PTO-1390 (Rev. 09-08)
Approved for use through 2/28/2010. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
31181U	Not Yet Assigned

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/JP2009/059801	28 May 2009 (28.05.2009)	30 May 2008 (30.05.2008)

TITLE OF INVENTION
MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING....

APPLICANT(S) FOR DO/EO/US
SAKAZUME, Satoru

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☑ This is a **FIRST** submission of items concerning a submission under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U.S.C. 371.
3. ☑ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☑ The US has been elected (Article 31).
5. ☑ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☑ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☑ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☑ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☑ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☑ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☑ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☑ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☑ A preliminary amendment.
14. ☑ An Application Data Sheet under 37 CFR 1.76.
15. ☐ A substitute specification.
16. ☑ A power of attorney and/or change of address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821- 1.825.
18. ☐ A second copy of the published International Application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering information, preparing, and submitting the completed form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Google Exhibit 1002

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
Not Yet Assigned	PCT/JP2009/059801	31181U

20. Other items or information:

Form PCT/IB304, one (1) page; Form /IB/308, one (1) page; Form PCT/ISA/210, three (3) pages; Form PCT/ISA/237, three (3) pages.

The following fees have been submitted	CALCULATIONS	PTO USE ONLY
21. ☑ Basic national fee (37 CFR 1.492(a))..... **$330**	$ 330	
22. ☑ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** All other situations..... **$220**	$ 220	
23. ☑ Search fee (37 CFR 1.492(b)) If the written opinion of the ISA/US or the International preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority..... **$100** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB..... **$430** All other situations..... **$540**	$ 430	
TOTAL OF 21, 22 and 23 =	$980	

☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)).
The fee is **$270** for each additional 50 sheets of paper or fraction thereof.

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round **up** to a whole number)	RATE	
149 - 100 =	1 /50 =		x $**270**	$ 270

Surcharge of **$130.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$ 0	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	$	
Total claims	25 - 20 =	5	x $ **52**	$ 260	
Independent claims	16 - 3 =	13	x **$220**	$ 2860	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$390**	$ 0	
			TOTAL OF ABOVE CALCULATIONS =	$ 4370	
☐ Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by ½.					
			SUBTOTAL =	$ 4370	
Processing fee of **$130.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +				$ 0	
			TOTAL NATIONAL FEE =	$ 4370	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$ 0	
			TOTAL FEES ENCLOSED =	$ 4370	
			Amount to be refunded:	$	
			Amount to be charged	$	

a. ☐ A check in the amount of $ _____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees.

c. ☑ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0112.

d. ☑ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended paying fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

SEND ALL CORRESPONDENCE TO:

Customer Number 20529

/Jerald L. Meyer/
SIGNATURE

Jerald L. Meyer
NAME

41194
REGISTRATION NUMBER

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/14 (11-08)
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	31181U
	Application Number	
Title of Invention	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM,	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1 Remove

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Satoru		SAKAZUME	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Kanagawa-ken	**Country Of Residence**[i]	JP
Citizenship under 37 CFR 1.41(b) [i]	JP		

Mailing Address of Applicant:

Address 1	12, Moriya-cho 3-chome, Kanagawa-ku,		
Address 2			
City	Yokohama-shi, Kanagawa	**State/Province**	
Postal Code		**Country**[i]	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	20529		
Email Address		Add Email	Remove Email

PTO/SB/14 (11-08)
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Application Information:

Title of the Invention	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM		
Attorney Docket Number	31181U	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	25	**Suggested Figure for Publication (if any)**	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	20529		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/JP2009/059801	2009-05-28

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

PTO/SB/14 (11-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	31181U
	Application Number	
Title of Invention	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM,	

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
P2008-142433	JP	2008-05-30	(•) Yes ( ) No

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
P2009-123960	JP	2009-05-22	(•) Yes ( ) No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1 Remove

If the Assignee is an Organization check here. [X]

Organization Name	VICTOR COMPANY OF JAPAN, LIMITED		
Mailing Address Information:			
Address 1	12, Moriya-cho 3-chome, Kanagawa-ku		
Address 2			
City	Yokohama-shi, Kanagawa	**State/Province**	
Country [i]	JP	Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the **Add** button. Add

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/ Jerald L. Meyer/			Date (YYYY-MM-DD)	2010-11-29
First Name	Jerald L.	Last Name	Meyer	Registration Number	41194

PTO/SB/14 (11-08)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Mail Stop PCT
Attorney Docket: 31181U

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Satoru SAKAZUME

Appl. No.:	Not Yet Assigned	Conf. No.:	TBD
Filed:	November 29, 2010	Examiner:	TBD
		Art Unit:	TBD

Intl. Application No.: PCT/JP2009/059801

Intl. Filing Date: 28 May 2009 (28.05.2009)

Title: **MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM.**

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Prior to examination on the merits and calculating the filing fees for the national phase application under 35 U.S.C. 371, filed herewith, please enter the following amendments:

Amendment to the Title begins on page 2 of this paper.

Amendments to the Specification begins on page 3 of this paper.

Amendments to the Claims begin on page 4 of this paper.

Amendments to the Abstract begins on page 23 of this paper.

Amendments to the Drawings begin on page 24 of this paper.

Remarks begin on page 25 of this paper.

A **Conclusion** appears at page 26 of this paper.

Amendment to the Title:

Please amend the following Title:

~~DYNAMIC IMAGE ENCODER, DYNAMIC IMAGE ENCODING METHOD, DYNAMIC IMAGE ENCODING PROGRAM, DYNAMIC IMAGE DECODER, DYNAMIC IMAGE DECODING METHOD, DYNAMIC IMAGE DECODING PROGRAM, DYNAMIC IMAGE RE-ENCODER, DYNAMIC IMAGE RE-ENCODING METHOD, DYNAMIC IMAGE REENCODING PROGRAM.~~

MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM.

Amendments to the Specification:

On page 1 of the Specification, please insert a cross-reference to a prior application after the title and before the heading of the first paragraph (Technical Field) by adding the following:

-- This is a National Phase Application filed under 35 U.S.C. 371 as a national stage of PCT/JP2009/059801, filed May 28, 2009, an application claiming the benefit from Japanese Application No. 2008-142433, filed May 30, 2008, and claiming benefit from Japanese Application No. 2009-123960, filed May 22, 2009, the content of each of which is hereby incorporated by reference in its entirety. --

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled).

2. (Currently Amended) ~~The~~ A moving picture encoding system ~~according to claim 1~~ comprising:

a first encoder configured to work on a subsequence of a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the subsequence of the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution; and

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures to implement a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits,

wherein the second encoder is configured to have the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

3. (Currently Amended) ~~The~~ A moving picture encoding system ~~according to claim 1 or 2,~~ comprising:

a first encoder configured to work on a subsequence of a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the subsequence of the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution;

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures to implement a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits;

a second super-resolution enlarger configured to acquire the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the second encoder is configured to have the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

4. (Currently Amended) The moving picture encoding system according to ~~any one of claims 1 to 3~~ claim 2, wherein the first super-resolution enlarger comprises:

a positioner configured to work in a processing for super-resolution enlargement, on a combination of a base picture constituting a base therein and one or more observation pictures to be based on, to make a positioning to pixel positions of a desirable high resolution, for an interval-unequal sampling to create nonhomogeneous high resolution pictures;

an interpolator configured to work on nonhomogeneous high resolution pictures created at the positioner, to implement a process for a prescribed nonhomogeneous interpolation to create interpolated pictures with a desirable high resolution;

an estimated picture creator configured to acquire interpolated pictures created at the interpolator, to implement thereon a process for a prescribed reconstruction to create estimated pictures with a desirable resolution; and

a repetition determiner configured to acquire a nonhomogeneous high resolution picture from the positioner and a nonhomogeneous estimated picture from the estimated picture creator, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the processing for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator with information for a control to continue the processing, and operate as the repetition is unnecessary, to provide the estimated picture creator with information for a control to output a set of estimated pictures with a high resolution after super-resolution enlargement.

5. (Currently Amended) The moving picture encoding system according to ~~any one of claims 1 to 4~~ claim 2, comprising a multiplexer configured to operate complying with a prescribed syntax structure to multiplex the first sequence of encoded bits from the first encoder, the second sequence of encoded bits from the second encoder, and information on encoding parameters of respective types used in the encoding at the first encoder and the encoding at the second encoder.

6. (Currently Amended) The moving picture encoding system according to ~~any one of claims 2 to 5~~ claim 2, comprising:

a first accumulation buffer configured to work in a course before the first encoder and the first super-resolution enlarger, to accumulate subsequences of the sequence of moving pictures with the standard resolution;

a second accumulation buffer configured to work in a course between the first encoder and the second encoder, to accumulate sets of decoded pictures from the first encoder;

an accumulation controller configured to work for detections of buffer accumulation amounts at the first accumulation buffer, the second accumulation buffer, the first encoder, and the second encoder, to control the buffer accumulation amounts; and

a code rate controller configured to work on bases of the detections of buffer accumulation amounts at the accumulation controller, to control code rates at the first encoder and the second encoder.

7. (Original) A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

8. (Original) A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of resolution converted enlarged decoded pictures from the third resolution converter as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

9. (Original) A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

10. (Original) A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution;

a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution;

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures, employing the set of decoded pictures from the first encoder and the set of super-resolution enlarged and converted decoded pictures with the standard resolution from the second resolution converter as sets of reference pictures, to implement thereon a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

11. (Currently Amended) A moving picture encoding method comprising:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution; and

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

12. (Currently Amended) A recording medium storing a moving picture encoding program configured to have a computer execute:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution; and

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

13. (Original) A moving picture decoding system comprising:

a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output at least a first and a second sequence of encoded bits;

a first decoder configured to acquire the first sequence of encoded bits obtained with a standard resolution at the demultiplexer to implement thereon a process for a prescribed first decoding to create a sequence of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures;

a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution; and

a second decoder configured to acquire the second sequence of encoded bits obtained with the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution.

14. (Original) The moving picture decoding system according to claim 13, comprising:

the demultiplexer being configured to work on the sequence of input encoded bits to implement the process for the prescribed demultiplexing to further output a third sequence of encoded bits;

a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder to implement thereon a process for a prescribed resolution conversion to create a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution; and

a third decoder configured to acquire the third sequence of encoded bits obtained with the high resolution at the demultiplexer, the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger, and the sequence of enlarged decoded pictures with the high resolution from the second resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed third decoding being a decoding with an extension of the high resolution, to create a sequence of super-resolution enlarged pictures as decoded.

15. (Original) A moving picture reencoding system comprising:

a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output at least a first and a second sequence of encoded bits;

a first decoder configured to acquire the first sequence of encoded bits obtained with a standard resolution at the demultiplexer to implement thereon a process for a prescribed first decoding to create a sequence of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures;

a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to

implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution;

a second decoder configured to acquire the second sequence of encoded bits obtained with the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution;

a reencoder configured to acquire from the first decoder information on coefficients of orthogonal transform in a course of decoding thereof, and from the second decoder information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding thereof, to make a synthesis of respective information on coefficients of orthogonal transform and implement thereon a process for a prescribed entropy encoding to create a sequence of encoded bits as reencoded; and

a multiplexer configured to acquire the sequence of encoded bits reencoded at the reencoder, to implement thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, to create a sequence of encoded bits as multiplexed.

16. (Original) The moving picture reencoding system according to claim 15, wherein the reencoder is configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder, the sequence of super-resolution decoded pictures with the standard resolution from the first resolution converter, and the sequence of super-resolution pictures with the standard resolution from the second decoder, to implement thereon a process for a prescribed encoding to create a sequence of encoded bits as reencoded.

17. (Original) A moving picture decoding method comprising:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting at least a first and a second sequence of encoded bits;

a step of acquiring the first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution; and

a step of acquiring the second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

18. (Original) The moving picture decoding method according to claim 17, comprising:

a step of implementing the process for the prescribed demultiplexing on the sequence of input encoded bits, outputting a third sequence of encoded bits;

a step of acquiring the sequence of decoded pictures created with the standard

resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed resolution conversion, creating a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution; and

a step of acquiring the third sequence of encoded bits obtained with the high resolution through the process for the prescribed demultiplexing, the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, and the sequence of enlarged decoded pictures created with the high resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed third decoding being a decoding with an extension of the high resolution, creating a sequence of super-resolution enlarged pictures as decoded.

19. (Original) A moving picture reencoding method comprising:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits;

a step of acquiring a first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution;

a step of acquiring a second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence

of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution;

a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the prescribed first decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded; and

a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

20. (Currently Amended) A recording medium storing a moving picture decoding program configured to have a computer execute:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting at least a first and a second sequence of encoded bits;

a step of acquiring the first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a

process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution; and

a step of acquiring the second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

21. (Currently Amended) A recording medium storing a moving picture reencoding program configured to have a computer execute:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits;

a step of acquiring a first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement,

implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution;

a step of acquiring a second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution;

a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the prescribed first decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded; and

a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

22. (New) The moving picture encoding system according to claim 3, wherein the first super-resolution enlarger comprises:

a positioner configured to work in a processing for super-resolution enlargement, on a combination of a base picture constituting a base therein and one or more observation pictures to be based on, to make a positioning to pixel positions of a desirable high resolution, for an interval-unequal sampling to create nonhomogeneous high resolution pictures;

an accumulation controller configured to work for detections of buffer accumulation amounts at the first accumulation buffer, the second accumulation buffer, the first encoder, and the second encoder, to control the buffer accumulation amounts; and

a code rate controller configured to work on bases of the detections of buffer accumulation amounts at the accumulation controller, to control code rates at the first encoder and the second encoder.

25. (New) A moving picture encoding method comprising:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution;

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits;

a step of acquiring the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a step of working on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of super-resolution enlarged and converted

decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

26. (New) A recording medium storing a moving picture encoding program configured to have a computer execute:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution;

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits;

a step of acquiring the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a step of working on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

Amendments to the Abstract:

Please place the following Abstract on a new last page of the Specification following the Claims and before the Drawings.

A first super-resolution enlarger 103 works on moving pictures input with a standard resolution, implementing a process for a super-resolution enlargement including information on frequency components in the spatial direction and the temporal direction that has been potentially contained in the input moving pictures but unable to express to a sufficient degree by the standard resolution, and provides super-resolution enlarged signals, which are returned to the standard resolution at a first resolution converter 104, and the super-resolution enlarged signals as returned to the standard resolution are encoded at a second encoder 107. There is a first encoder 102 for encoding moving pictures input with the standard resolution, and a multiplexer 109 working to multiplex a sequence of encoded bits from the first encoder 102, a sequence of encoded bits from the second encoder 107, and the like. The second encoder 107 is adaptive to employ local decoded signals in the first encoder 102 or processed signals thereof, as reference signals.

Amendments to the Drawings:

Please enter the 3 sheets of Replacement Formal Drawings attached hereto.

REMARKS

The specification to the Title has been made to effectively describe the invention.

The specification has been amended to incorporate by reference to the earlier filed applications.

Amendments to the claims have been presented to reduce excess claim fees and to conform them to U.S. practice. Upon entry of the above amendments, claims 1 is canceled, claims 2-6, 11, 12, 20 and 21 are amended, and claims 22-26 are newly added. Claims 2-26 are pending in this application. The claim amendments do not introduce new matter within the meaning of 35 U.S.C. §132.

Applicant reserves the right to reintroduce any cancelled subject matter to this application or to any child applications, or to reintroduce the full scope of any claim amended herein.

An Abstract has been newly added and is in proper U.S. form.

The replacement drawings submitted herewith is to amend Figure 3, 4 and Figure 24, to correct typographical errors in the text. No new matter has been added.

Accordingly, the Examiner is respectfully requested to enter the above amendments before examination. Favorable consideration is requested.

CONCLUSION

The Examiner is welcomed to telephone the undersigned attorney if he has any questions or comments.

Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

Respectfully submitted,

THE NATH LAW GROUP

Date: November 29, 2010

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FIG. 3

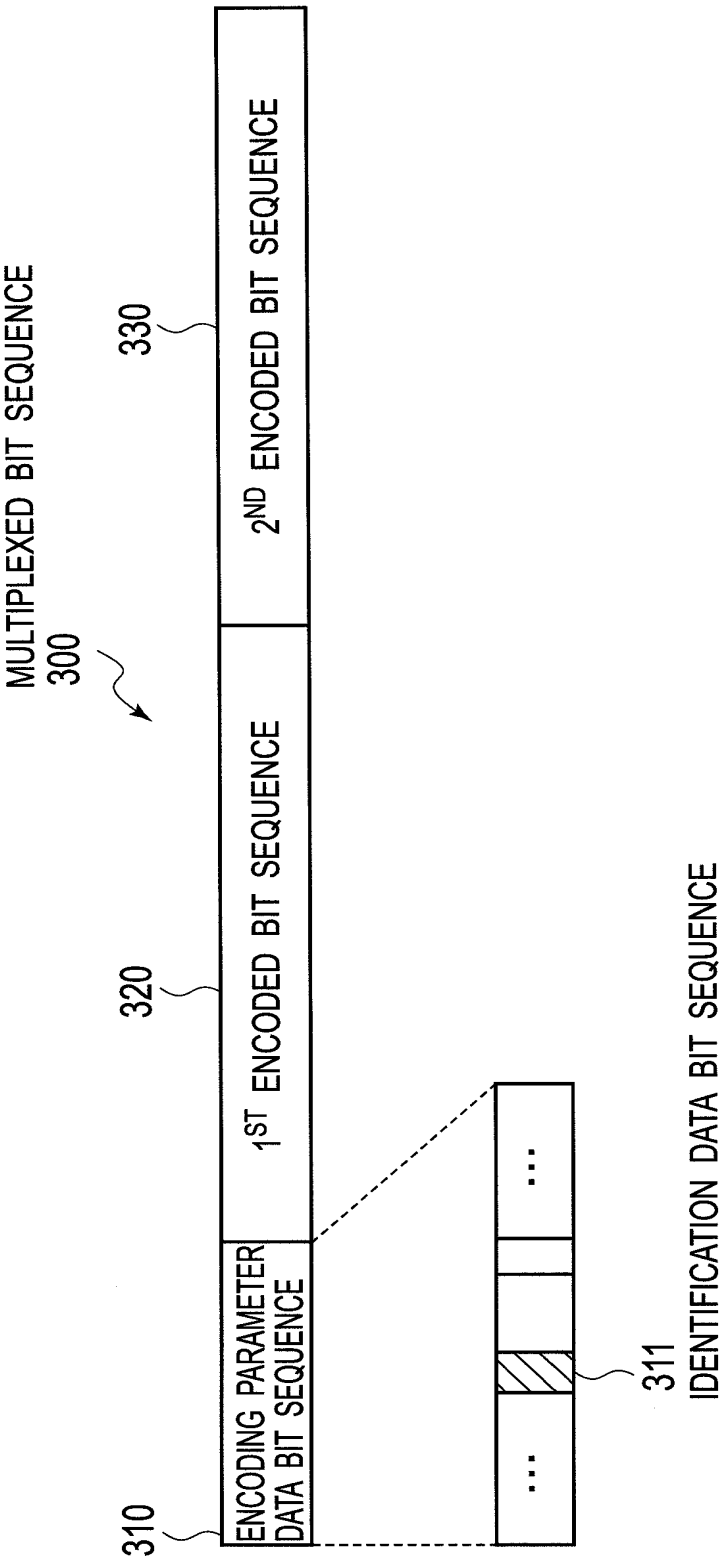

MULTIPLEXED BIT SEQUENCE
300
330
2ND ENCODED BIT SEQUENCE
320
1ST ENCODED BIT SEQUENCE
310
ENCODING PARAMETER DATA BIT SEQUENCE
311
IDENTIFICATION DATA BIT SEQUENCE

FIG. 4

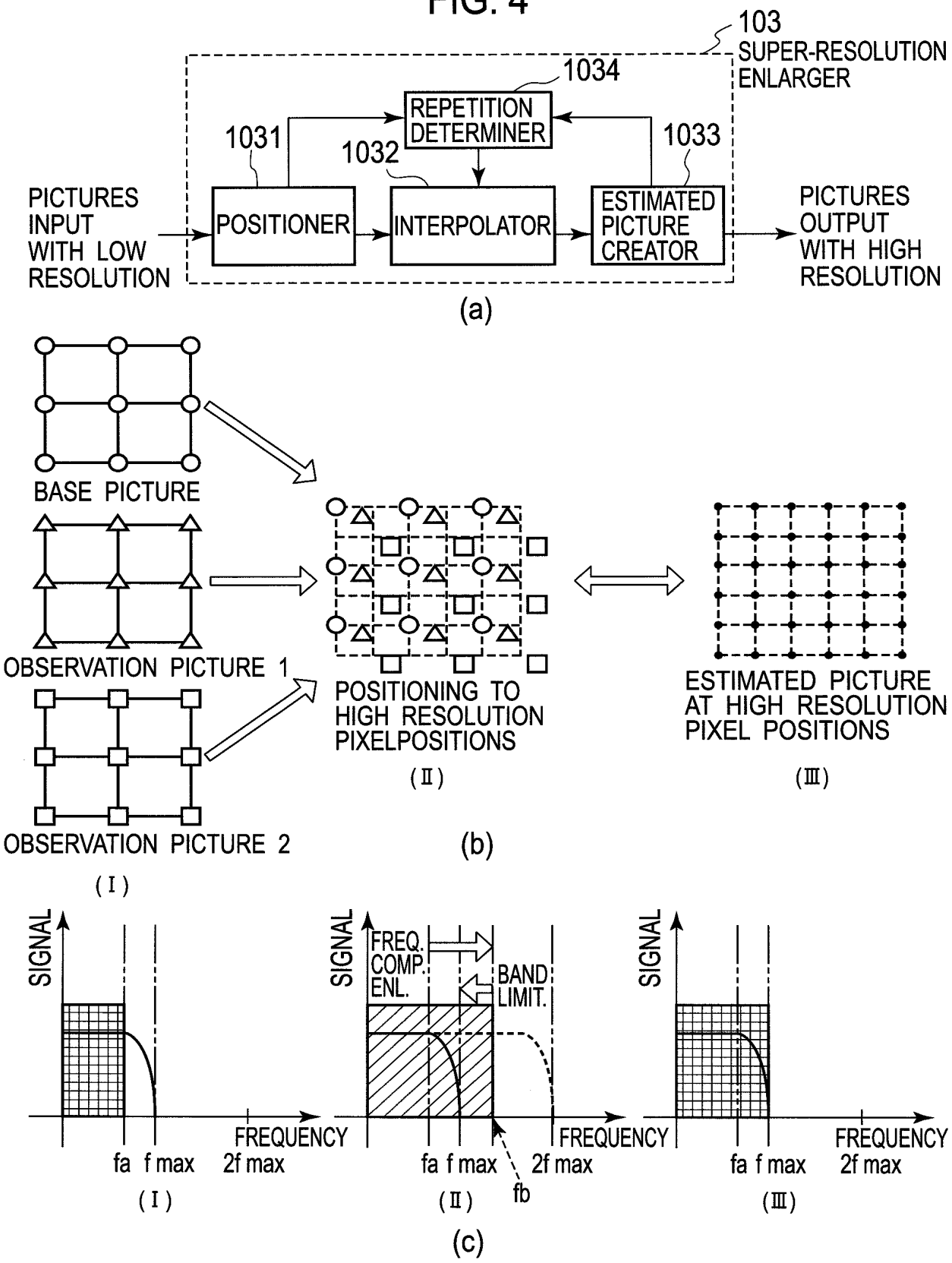
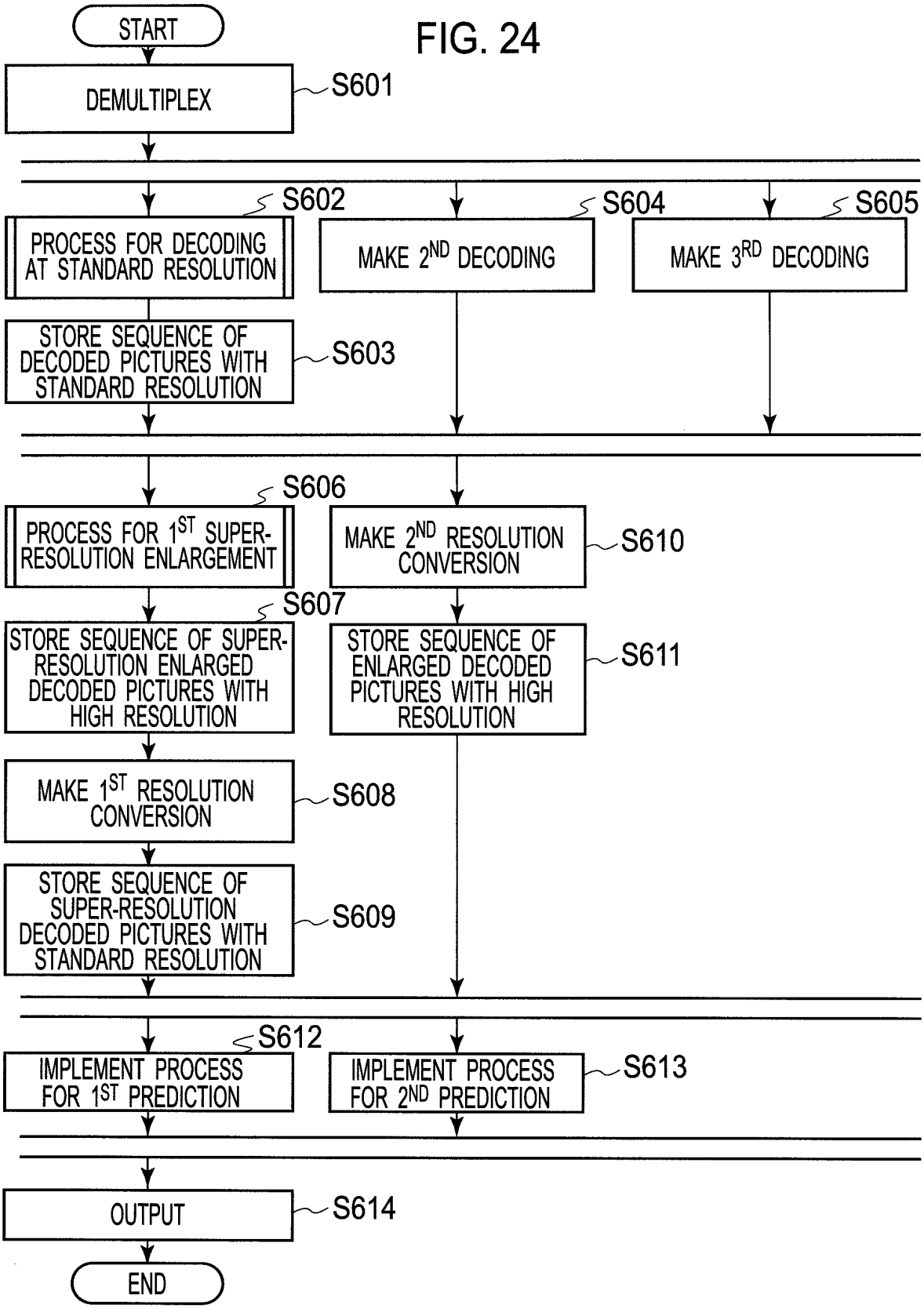

103
SUPER-RESOLUTION ENLARGER
1034
REPETITION DETERMINER
1031
1032
1033
PICTURES INPUT WITH LOW RESOLUTION
POSITIONER
INTERPOLATOR
ESTIMATED PICTURE CREATOR
PICTURES OUTPUT WITH HIGH RESOLUTION
(a)
BASE PICTURE
OBSERVATION PICTURE 1
OBSERVATION PICTURE 2
(I)
POSITIONING TO HIGH RESOLUTION PIXELPOSITIONS
(II)
ESTIMATED PICTURE AT HIGH RESOLUTION PIXEL POSITIONS
(III)
(b)
SIGNAL
FREQUENCY
fa f max
2f max
FREQ. COMP. ENL.
BAND LIMIT.
fb
(I)
(II)
(III)
(c)

FIG. 24


START
DEMULTIPLEX
S601
S602
PROCESS FOR DECODING AT STANDARD RESOLUTION
S604
MAKE 2ND DECODING
S605
MAKE 3RD DECODING
STORE SEQUENCE OF DECODED PICTURES WITH STANDARD RESOLUTION
S603
S606
PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
MAKE 2ND RESOLUTION CONVERSION
S610
S607
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
STORE SEQUENCE OF ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
S611
MAKE 1ST RESOLUTION CONVERSION
S608
STORE SEQUENCE OF SUPER-RESOLUTION DECODED PICTURES WITH STANDARD RESOLUTION
S609
S612
IMPLEMENT PROCESS FOR 1ST PREDICTION
IMPLEMENT PROCESS FOR 2ND PREDICTION
S613
OUTPUT
S614
END

an interpolator configured to work on nonhomogeneous high resolution pictures created at the positioner, to implement a process for a prescribed nonhomogeneous interpolation to create interpolated pictures with a desirable high resolution;

an estimated picture creator configured to acquire interpolated pictures created at the interpolator, to implement thereon a process for a prescribed reconstruction to create estimated pictures with a desirable resolution; and

a repetition determiner configured to acquire a nonhomogeneous high resolution picture from the positioner and a nonhomogeneous estimated picture from the estimated picture creator, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the processing for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator with information for a control to continue the processing, and operate as the repetition is unnecessary, to provide the estimated picture creator with information for a control to output a set of estimated pictures with a high resolution after super-resolution enlargement.

23. (New) The moving picture encoding system according to claim 3, further comprising a multiplexer configured to operate complying with a prescribed syntax structure to multiplex the first sequence of encoded bits from the first encoder, the second sequence of encoded bits from the second encoder, and information on encoding parameters of respective types used in the encoding at the first encoder and the encoding at the second encoder.

24. (New) The moving picture encoding system according to claim 3, further comprising:

a first accumulation buffer configured to work in a course before the first encoder and the first super-resolution enlarger, to accumulate subsequences of the sequence of moving pictures with the standard resolution;

a second accumulation buffer configured to work in a course between the first encoder and the second encoder, to accumulate sets of decoded pictures from the first encoder;

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
First Named Inventor/Applicant Name:	Satoru SAKAZUME
Filer:	Stanley Protigal/Samuel woldeyesus
Attorney Docket Number:	31181U

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
National Stage Fee	1631	1	330	330
Natl Stage Search Fee - Report provided	1642	1	430	430
National Stage Exam - all other cases	1633	1	220	220
Pages:				
Natl Stage Appl Sz fee per 50 pgs >100	1681	1	270	270
Claims:				
Claims in excess of 20	1615	5	52	260
Independent claims in excess of 3	1614	13	220	2860

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**4370**

Electronic Acknowledgement Receipt

EFS ID:	8918952
Application Number:	12995039
International Application Number:	PCT/JP2009/059801
Confirmation Number:	7504
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
First Named Inventor/Applicant Name:	Satoru SAKAZUME
Customer Number:	20529
Filer:	Stanley Protigal/Samuel Woldeyesus
Filer Authorized By:	Stanley Protigal
Attorney Docket Number:	31181U
Receipt Date:	29-NOV-2010
Filing Date:	
Time Stamp:	16:23:21
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$4370
RAM confirmation Number	3331
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Oath or Declaration filed	ExecutedDeclaration_31181U.pdf	678739 ce69aa8f28a1df6c75eb033107cdf2fa0717e66e	no	2
Warnings:					
Information:					
2	Documents submitted with 371 Applications	FormPCTIB304_31181U.pdf	179819 13ad416ab131a05e2813ff1ed3190a0e6ef78222	no	1
Warnings:					
Information:					
3	Documents submitted with 371 Applications	FormPCTIB308_31181U.pdf	188267 a73289c4413e1300f067d7d0ba5372463f371507	no	1
Warnings:					
Information:					
4	Documents submitted with 371 Applications	FormPCTISA237_31181U.pdf	308819 2451e55942e37adf26d392f38f3c94dfd582059b	no	3
Warnings:					
Information:					
5	Documents submitted with 371 Applications	FormPCTISA210_31181U.pdf	437147 b4012d11408bc81b495fe6d18671740628911bfb	no	3
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Filed (SB/08)	updated_IDS_1.pdf	612372 c0ab1ccbb16b504dfcdb54cd0ad2f69981d079f5	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
7	Foreign Reference	JP2008-042407_31181U.pdf	3099482 fc19b9f3846ffa83b91afe3d476a26ac4eda02d6	no	20
Warnings:					
Information:					
8	Foreign Reference	JP07162870_31181U.pdf	3262493 f80270bc8321305f7716c41a6391740805ecd916	no	24
Warnings:					
Information:					

9	Foreign Reference	200853848_31181U.pdf	1327841 acf9f95d42ec85ecf37ebc26782fa802937926f6	no	8
Warnings:					
Information:					
10		SpecClaimsAbDrawings_31181U.pdf	16309629 2918072dd016501b98eb72277bb70ae06ad2f5e9	yes	149

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Documents submitted with 371 Applications	1	1
	Specification	2	109
	Claims	110	124
	Drawings-only black and white line drawings	125	149

Warnings:					
Information:					
11	Transmittal of New Application	pto-1390_1.pdf	4929407 e7daded74c97635087f651194c53836403500b25	no	4
Warnings:					
Information:					
12	Application Data Sheet	sb0014_1fill.pdf	1104536 44b893d3128b3cd41aec0adcc6fe30f541a8f273	no	5
Warnings:					
Information:					
13		PreliminaryAmendment_31181U.pdf	2881023 2eb12f2300468c1a8a495f50c392b88aea77d6e0	yes	29

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Specification	2	3
	Claims	4	22
	Abstract	23	23

	Drawings-only black and white line drawings		24	24	
	Applicant Arguments/Remarks Made in an Amendment		25	26	
	Drawings-only black and white line drawings		27	29	
Warnings:					
Information:					
14	Fee Worksheet (PTO-875)	fee-info.pdf	39973 4a331b2902acc7f2bc4046f2ea653b0c83132457	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	35359547		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

DECLARATION FOR PATENT APPLICATION	Attorney Docket: 31181U Page 1 of 2

As a below-named inventor(s), I/we hereby declare that:

My/Our residence(s), post office address(es) and citizenship(s) is/are as stated below next to my/our name(s).

I/We believe I/we am/are the original inventor, first and sole *(if only one name is listed below)* or the original, first and joint inventors *(if plural names are listed below)* of the subject matter which is claimed, and for which a patent is sought on the invention entitled:
MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
the specification of which: (check one)

[ ] is attached hereto.

[X] was filed on May 28, 2009, as Serial No. PCT/JP2009/059801,

and was amended on _____ (if applicable).

We hereby state that we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information which is material to the patentability of this application as defined by 37 CFR § 1.56.

We hereby claim foreign priority benefits under 35 U.S.C. § 119 of any foreign application(s) for patent or inventor's certificate listed below, and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Applications:

(Application No.)	(Country)	(Day/Month/Year Filed)	Yes	No
P2008-142433	JAPAN	30/May/2008	[X]	[ ]
P2009-123960	JAPAN	22/May/2009	[ ]	[ ]
		/ /	[ ]	[ ]
		/ /	[ ]	[ ]
		/ /	[ ]	[ ]
		/ /	[ ]	[ ]

I/We hereby appoint the Practitioners associated with the following Customer Number:

Customer Number 20529

Direct Telephone Calls to:

Gary M. Nath
(703) 548-6284

Send Correspondence to:
Customer Number 20529
THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314
U.S.A.

We hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by 35 U.S.C. § 112, first paragraph, I/we acknowledge the duty to disclose material information as defined in 37 CFR § 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(U.S. Application Serial No.) (U.S. Filing Date) (Status--patented, pending, abandoned)

(U.S. Application Serial No.) (U.S. Filing Date) (Status--patented, pending, abandoned)

DECLARATION FOR PATENT APPLICATION	Attorney Docket: 31181U Page 2 of 2

I/we hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below:

Application Number(s) Filing Date

We hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. ' 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: **Satoru SAKAZUME**

Inventor's Signature Satoru Sakazume Date: November 02, 2010

Residence: Kanagawa-ken, Japan

Country of Citizenship: Japan

Post Office Address: 12, Moriya-cho 3-chome, Kanagawa-ku, Yokohama-shi, Kanagawa, Japan

Full name of second inventor:

Inventor's Signature Date:

Residence:

Country of Citizenship:

Post Office Address:

Full name of third inventor:

Inventor's Signature Date:

Residence:

Country of Citizenship:

Post Office Address:

Full name of fourth inventor:

Inventor's Signature Date:

Residence:

Country of Citizenship:

Post Office Address:

Full name of fifth inventor:

Inventor's Signature Date:

Residence:

Country of Citizenship:

Post Office Address:

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

MIYOSHI, Hidekazu
Toranomon Kotohira Tower, 2-8, Toranomon
1-chome, Minato-ku, Tokyo
1050001
JAPON

Date of mailing *(day/month/year)* 25 August 2009 (25.08.2009)	
Applicant's or agent's file reference JJVC-275-PCT	**IMPORTANT NOTIFICATION**
International application No. PCT/JP2009/059801	International filing date *(day/month/year)* 28 May 2009 (28.05.2009)
International publication date *(day/month/year)* **Not yet published**	Priority date *(day/month/year)* 30 May 2008 (30.05.2008)
Applicant VICTOR COMPANY OF JAPAN, LIMITED et al	

1. By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. *(If applicable)* The **letters "NR"** appearing in the right-hand column denote **a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau** under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

3. *(If applicable)***An asterisk (*)** appearing next to a date of receipt, in the right-hand column, denotes **a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b)** (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
30 May 2008 (30.05.2008)	2008-142433	JP	03 July 2009 (03.07.2009)
22 May 2009 (22.05.2009)	2009-123960	JP	03 July 2009 (03.07.2009)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Yoshiko Kuwahara
e-mail PT07.PCT@WIPO.INT
Telephone No. +41 22 338 74 07

WO 2009/145271
PCT/JP2009/059801

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

SECOND AND SUPPLEMENTARY NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION (TO DESIGNATED OFFICES WHICH APPLY THE 30 MONTH TIME LIMIT UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

To:

MIYOSHI, Hidekazu
Toranomon Kotohira Tower, 2-8, Toranomon 1-chome,
Minato-ku, Tokyo
1050001
JAPON

Date of mailing *(day/month/year)*	
30 September 2010 (30.09.2010)	
Applicant's or agent's file reference: JJVC-275-PCT	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2009/059801	28 May 2009 (28.05.2009)	30 May 2008 (30.05.2008)

Applicant: VICTOR COMPANY OF JAPAN, LIMITED et al

1. **ATTENTION**: For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does not apply**, please see Form PCT/IB/308(First Notice) issued previously.

2. Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93*bis*.1. The International Bureau has effected that communication on the date indicated below:
03 December 2009 (03.12.2009)

   AU, AZ, BY, CN, CO, DZ, EP, HU, KG, KP, KR, MD, MK, MY, MZ, NA, NG, PG, RU, SY, TM, US

   In accordance with Rule 47.1(c-*bis*)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

3. The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93*bis*.1 :

   AE, AG, AL, AM, AO, AP, AT, BA, BB, BG, BH, BR, BW, BZ, CA, CH, CR, CU, CZ, DE, DK, DM, DO, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, ID, IL, IN, IS, KE, KM, KN, KZ, LA, LC, LK, LR, LS, LT, LY, MA, ME, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PH, PL, PT, RO, RS, SC, SD, SE, SG, SK, SL, SM, ST, SV, TJ, TN, TR, TT, UA, UZ, VC, VN, ZA, ZM, ZW

   In accordance with Rule 47.1(c-*bis*)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

4. **TIME LIMITS for entry into the national phase**

   For the designated or elected Office(s) listed above, the applicable time limit for entering the national phase will, **subject to what is said in the following paragraph,** be **30 MONTHS** from the priority date.

   In practice, **time limits other than the 30-month time limit** will continue to apply, for various periods of time, in respect of certain of the designated or elected Office(s) listed above. For **regular updates on the applicable time limits** (30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at http://www.wipo.int/pct/en/index.html.

   It is the applicant's **sole responsibility** to monitor all these time limits.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Gijsbertus Beijer

e-mail: pt07.pct@wipo.int

特 許 協 力 条 約

発信人　日本国特許庁（国際調査機関）

代理人
三好　秀和
様

RECEIVED
2009 9. 2

あて名
〒105-0001
日本国東京都港区虎ノ門１丁目２番８号　虎ノ門琴平タワー

ＰＣＴ
国際調査機関の見解書
（法施行規則第40条の2）
〔ＰＣＴ規則43の2.1〕

発送日 （日.月.年）	０１．０９．２００９
出願人又は代理人 の書類記号　JJVC-275-PCT	今後の手続きについては、下記２を参照すること。

国際出願番号	国際出願日	優先日
ＰＣＴ／ＪＰ２００９／０５９８０１	（日.月.年）　２８．０５．２００９	（日.月.年）　３０．０５．２００８

国際特許分類（ＩＰＣ）Int.Cl. H04N7/32(2006.01)i

出願人（氏名又は名称）
日本ビクター株式会社

１．この見解書は次の内容を含む。

- ☑ 第Ⅰ欄　見解の基礎
- ☐ 第Ⅱ欄　優先権
- ☐ 第Ⅲ欄　新規性、進歩性又は産業上の利用可能性についての見解の不作成
- ☐ 第Ⅳ欄　発明の単一性の欠如
- ☑ 第Ⅴ欄　ＰＣＴ規則43の2.1(a)(i)に規定する新規性、進歩性又は産業上の利用可能性についての見解、それを裏付けるための文献及び説明
- ☐ 第Ⅵ欄　ある種の引用文献
- ☐ 第Ⅶ欄　国際出願の不備
- ☐ 第Ⅷ欄　国際出願に対する意見

２．今後の手続き
国際予備審査の請求がされた場合は、出願人がこの国際調査機関とは異なる国際予備審査機関を選択し、かつ、その国際予備審査機関がＰＣＴ規則66.1の2(b)の規定に基づいて国際調査機関の見解書を国際予備審査機関の見解書とみなさない旨を国際事務局に通知していた場合を除いて、この見解書は国際予備審査機関の最初の見解書とみなされる。

この見解書が上記のように国際予備審査機関の見解書とみなされる場合、様式ＰＣＴ／ＩＳＡ／２２０を送付した日から３月又は優先日から２２月のうちいずれか遅く満了する期限が経過するまでに、出願人は国際予備審査機関に、適当な場合は補正書とともに、答弁書を提出することができる。

さらなる選択肢は、様式ＰＣＴ／ＩＳＡ／２２０を参照すること。

３．さらなる詳細は、様式ＰＣＴ／ＩＳＡ／２２０の備考を参照すること。

見解書を作成した日
２０．０８．２００９

名称及びあて先	特許庁審査官（権限のある職員）		
日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	坂本　聡生	５Ｃ	２９５４
	電話番号　０３－３５８１－１１０１　内線　３５４１		

国際調査機関の見解書

国際出願番号　ＰＣＴ／ＪＰ２００９／０５９８０１

第Ⅰ欄　見解の基礎

１．言語に関し、この見解書は以下のものに基づき作成した。

☑ 出願時の言語による国際出願

☐ 出願時の言語から国際調査のための言語である＿＿＿＿＿＿＿＿語に翻訳された、この国際出願の翻訳文（ＰＣＴ規則12.3(a)及び23.1(b)）

２．☐ この見解書は、ＰＣＴ規則 91 の規定により国際調査機関が認めた又は国際調査機関に通知された明らかな誤りの訂正を考慮して作成した（ＰＣＴ規則 43 の 2.1(b)）。

３．この国際出願で開示されたヌクレオチド又はアミノ酸配列に関して、以下に基づき見解書を作成した。

ａ．タイプ　☐ 配列表

☐ 配列表に関連するテーブル

ｂ．フォーマット　☐ 紙形式

☐ 電子形式

ｃ．提出時期　☐ 出願時の国際出願に含まれていたもの

☐ この国際出願と共に電子形式により提出されたもの

☐ 出願後に、調査のために、この国際調査機関に提出されたもの

４．☐ さらに、配列表又は配列表に関連するテーブルを提出した場合に、出願後に提出した配列若しくは追加して提出した配列が出願時に提出した配列と同一である旨、又は、出願時の開示を超える事項を含まない旨の陳述書の提出があった。

５．補足意見：

国際調査機関の見解書

国際出願番号　ＰＣＴ／ＪＰ２００９／０５９８０１

第Ⅴ欄　新規性、進歩性又は産業上の利用可能性についてのＰＣＴ規則43の2.1(a)(i)に定める見解、それを裏付ける文献及び説明

1．　見解

新規性（Ｎ）	請求項	１－２１	有
	請求項		無
進歩性（ＩＳ）	請求項	２－３，７－１０，１３－２１	有
	請求項	１，４－６，１１－１２	無
産業上の利用可能性（ＩＡ）	請求項	１－２１	有
	請求項		無

2．　文献及び説明

文献１：ＪＰ　２００８－４２４０７　Ａ（日本放送協会）２００８．０２．２１，段落【００２０】－【００２６】，第１図

文献２：ＪＰ　２００８－５３８４８　Ａ（沖電気工業株式会社）２００８．０３．０６，段落【０００１】－【０００４】

請求の範囲１，４－６，１１－１２に係る発明は、国際調査報告で引用された文献１、文献２により進歩性を有しない。文献１に記載された、基準となる低解像度画像を符号化・復号化する手段と、基準となる低解像度画像を高解像度化する手段と、高解像度化された画像を符号化する手段と、を有する符号化装置において、高解像度化を行う際に、文献２に記載された周知である超解像処理、及び、周知である他の解像度変換処理によって高解像度化を行うことは、当業者にとって容易である。

請求の範囲２－３，７－１０，１３－２１に係る発明は、国際調査報告で引用されたいずれの文献にも記載されておらず、当業者にとって自明なものでない。

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2009/059801

A. CLASSIFICATION OF SUBJECT MATTER
H04N7/32(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N7/32

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2009
Kokai Jitsuyo Shinan Koho	1971-2009	Toroku Jitsuyo Shinan Koho	1994-2009

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2008-42407 A (Nippon Hoso Kyokai), 21 February, 2008 (21.02.08), Par. Nos. [0020] to [0026]; Fig. 1 (Family: none)	1,4-6,11-12 2-3,7-10, 13-21
Y	JP 2008-53848 A (Oki Electric Industry Co., Ltd.), 06 March, 2008 (06.03.08), Par. Nos. [0001] to [0004] (Family: none)	1,4-6,11-12

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search 20 August, 2009 (20.08.09)	Date of mailing of the international search report 01 September, 2009 (01.09.09)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

特 許 協 力 条 約

PCT

国際調査報告

（法８条、法施行規則第 40、41 条）
〔ＰＣＴ18 条、ＰＣＴ規則 43、44〕

RECEIVED
2009 9. 2
MIYOSHI
PATENT

出願人又は代理人 の書類記号　JJVC-275-PCT	今後の手続きについては、様式ＰＣＴ／ＩＳＡ／２２０ 及び下記５を参照すること。	
国際出願番号 ＰＣＴ／ＪＰ２００９／０５９８０１	国際出願日 (日.月.年)　２８．０５．２００９	優先日 (日.月.年)　３０．０５．２００８
出願人（氏名又は名称） 日本ビクター株式会社		

国際調査機関が作成したこの国際調査報告を法施行規則第41条（ＰＣＴ18条）の規定に従い出願人に送付する。
この写しは国際事務局にも送付される。

この国際調査報告は、全部で　2　ページである。

☐ この調査報告に引用された先行技術文献の写しも添付されている。

１．国際調査報告の基礎

ａ．言語に関し、この国際調査は以下のものに基づき行った。

☑ 出願時の言語による国際出願

☐ 出願時の言語から国際調査のための言語である＿＿＿＿＿＿＿＿ 語に翻訳された、
この国際出願の翻訳文（ＰＣＴ規則12.3(a)及び23.1(b)）

ｂ．☐ この国際調査報告は、ＰＣＴ規則91の規定により国際調査機関が認めた又は国際調査機関に通知された明らかな誤りの訂正を考慮して作成した（ＰＣＴ規則43.6の2(a)）。

ｃ．☐ この国際出願は、ヌクレオチド又はアミノ酸配列を含んでいる（第Ｉ欄参照）。

２．☐ 請求の範囲の一部の調査ができない（第Ⅱ欄参照）。

３．☐ 発明の単一性が欠如している（第Ⅲ欄参照）。

４．発明の名称は

☑ 出願人が提出したものを承認する。

☐ 次に示すように国際調査機関が作成した。

＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

５．要約は

☑ 出願人が提出したものを承認する。

☐ 第Ⅳ欄に示されているように、法施行規則第47条第１項（ＰＣＴ規則38.2）の規定により国際調査機関が作成した。出願人は、この国際調査報告の発送の日から１月以内にこの国際調査機関に意見を提出することができる。

６．図面に関して

ａ．要約書とともに公表される図は、
第　1　図とする。

☑ 出願人が示したとおりである。

☐ 出願人は図を示さなかったので、国際調査機関が選択した。

☐ 本図は発明の特徴を一層よく表しているので、国際調査機関が選択した。

ｂ．☐ 要約とともに公表される図はない。

国際調査報告

国際出願番号　ＰＣＴ／ＪＰ２００９／０５９８０１

Ａ．　発明の属する分野の分類（国際特許分類（ＩＰＣ））

Int.Cl.　H04N7/32(2006.01)i

Ｂ．　調査を行った分野

調査を行った最小限資料（国際特許分類（ＩＰＣ））

Int.Cl.　H04N7/32

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報	１９２２－１９９６年
日本国公開実用新案公報	１９７１－２００９年
日本国実用新案登録公報	１９９６－２００９年
日本国登録実用新案公報	１９９４－２００９年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）

Ｃ．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求項の番号
Ｙ	ＪＰ　２００８－４２４０７　Ａ（日本放送協会）２００８．０２．２１，段落【００２０】－【００２６】，第１図（ファミリーなし）	１，４－６，１１－１２
Ａ		２－３，７－１０，１３－２１
Ｙ	ＪＰ　２００８－５３８４８　Ａ（沖電気工業株式会社）２００８．０３．０６，段落【０００１】－【０００４】（ファミリーなし）	１，４－６，１１－１２

☐　Ｃ欄の続きにも文献が列挙されている。

☐　パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー
「Ａ」特に関連のある文献ではなく、一般的技術水準を示すもの
「Ｅ」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの
「Ｌ」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）
「Ｏ」口頭による開示、使用、展示等に言及する文献
「Ｐ」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献
「Ｔ」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの
「Ｘ」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの
「Ｙ」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの
「＆」同一パテントファミリー文献

国際調査を完了した日 ２０．０８．２００９	国際調査報告の発送日 ０１．０９．２００９
国際調査機関の名称及びあて先 日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	特許庁審査官（権限のある職員）　５Ｃ　２９５４ 坂本　聡生 電話番号　０３－３５８１－１１０１　内線　３５４１

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	31181U

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	1	2008-042407	JP	A	2008-02-21	NIPPON HOSO KYOKAI <NHK>		☒
	2	2008-053848	JP	A	2008-03-06	OKI ELECTRIC IND CO LTD		☒
	3	07-162870	JP	A	1995-06-23	AT & T CORP BELL COMMUN RES INC		☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	31181U

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NON-PATENT LITERATURE DOCUMENTS			Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐
If you wish to add additional non-patent literature document citation information please click the Add button			Add

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	31181U

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/ Jerald L. Meyer/	Date (YYYY-MM-DD)	2010-11-29
Name/Print	Jerald L. Meyer	Registration Number	41194

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(12) 特許協力条約に基づいて公開された国際出願

(19) 世界知的所有権機関
国際事務局

(43) 国際公開日
2009 年 12 月 3 日(03.12.2009)

PCT

(10) 国際公開番号
WO 2009/145271 A1

(51) 国際特許分類:
H04N 7/32 (2006.01)

(21) 国際出願番号: PCT/JP2009/059801

(22) 国際出願日: 2009 年 5 月 28 日(28.05.2009)

(25) 国際出願の言語: 日本語

(26) 国際公開の言語: 日本語

(30) 優先権データ:
特願 2008-142433 2008 年 5 月 30 日(30.05.2008) JP
特願 2009-123960 2009 年 5 月 22 日(22.05.2009) JP

(71) 出願人 (米国を除く全ての指定国について): 日本ビクター株式会社(VICTOR COMPANY OF JAPAN, LIMITED) [JP/JP]; 〒2218528 神奈川県横浜市神奈川区守屋町３丁目１２番地 Kanagawa (JP).

(72) 発明者; および
(75) 発明者/出願人 (米国についてのみ): 坂爪 智 (SAKAZUME, Satoru).

(74) 代理人: 三好 秀和, 外 (MIYOSHI, Hidekazu et al.); 〒1050001 東京都港区虎ノ門１丁目２番８号 虎ノ門琴平タワー Tokyo (JP).

(81) 指定国 (表示のない限り、全ての種類の国内保護が可能): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

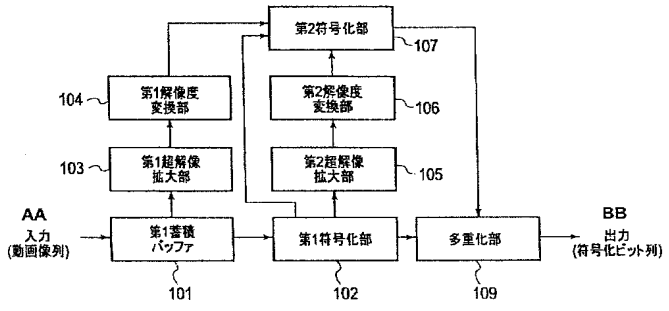
(84) 指定国 (表示のない限り、全ての種類の広域保護が可能): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), ユーラシア (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), ヨーロッパ (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

添付公開書類:
— 国際調査報告（条約第 21 条(3)）

(54) **Title**: DYNAMIC IMAGE ENCODER, DYNAMIC IMAGE ENCODING METHOD, DYNAMIC IMAGE ENCODING PROGRAM, DYNAMIC IMAGE DECODER, DYNAMIC IMAGE DECODING METHOD, DYNAMIC IMAGE DECODING PROGRAM, DYNAMIC IMAGE RE-ENCODER, DYNAMIC IMAGE RE-ENCODING METHOD, DYNAMIC IMAGE RE-ENCODING PROGRAM

(54) 発明の名称: 動画像符号化装置、動画像符号化方法、動画像符号化プログラム、動画像復号装置、動画像復号方法、動画像復号プログラム、動画像再符号化装置、動画像再符号化方法、動画像再符号化プログラム

[図1]



101 FIRST STORAGE BUFFER
102 FIRST ENCODER
103 FIRST SUPER-RESOLUTION IMAGE ENLARGEMENT UNIT
104 FIRST RESOLUTION CONVERTER
105 SECOND SUPER-RESOLUTION IMAGE ENLARGEMENT UNIT
106 SECOND RESOLUTION CONVERTER
107 SECOND ENCODER
109 MULTIPLEXER
AA INPUT (DYNAMIC IMAGE SEQUENCE)
BB OUTPUT (ENCODED BIT STREAM)

(57) **Abstract**: A first super-resolution image enlargement unit (103) includes frequency component information in the spatial direction and the temporal direction which could not be adequately displayed at the standard resolution although latently included in the input dynamic image by applying a super-resolution enlargement process to an input dynamic image having standard resolution. A first resolution converter (104) returns the signal which has undergone super-resolution image enlargement to the standard resolution. A second encoder (107) encodes the signal which has undergone super-resolution enlargement and which was returned to the standard resolution. A first encoder (102) encodes the input dynamic image having the standard resolution. A multiplexer (109) multiplexes the encoded bit stream from the first encoder (102) and the encoded bit stream from the second encoder (107). The second encoder (107) may use the locally decoded signal at the first encoder (102) or a processed version of that signal as the reference signal.

(57) 要約:

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WO 2009/145271 A1

DESCRIPTION

MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM

Technical Field

[0001]

The present invention relates to a moving picture encoding system, a moving picture encoding method, a moving picture encoding program, a moving picture decoding system, a moving picture decoding method, a moving picture decoding program, a moving picture reencoding system, a moving picture reencoding method, and a moving picture reencoding program adapted to work on moving picture sequences to implement processes such as those for super-resolution enlargement.

Background Art

[0002]

As conventional techniques to attain a spatial resolution scalability of pictures, there have been those implementing, in a hierarchical encoding system with two layers being a base layer and an enhancement layer, for instance, processing signals of pictures input with the same spatial resolution as the enhancement layer, for a decimation into a spatial resolution of the base layer, followed by an encoding at the base layer, making a prediction using a correlation between those signals decoded along with the base layer encoding and spatially interpolated as signals having the same spatial resolution as the enhancement layer and those signals of pictures input with the same spatial resolution as the enhancement layer, encoding signals of errors in the prediction, and having a combination of encoded bit streams obtained there and bit streams obtained by the base layer encoding, multiplexed and transmitted to a decoding system, the

multiplexed combination of encoded bit streams being decoded in reverse at the decoding system. (Refer to Patent Literature 1.)

Citation List

Patent Literature

[0003] PTL 1: Japanese Patent Application Laying-Open Publication No. 7-162870

Summary of the Invention

Technical Problem

[0004]

By the way, there are techniques for moving picture encoding services such as represented by MPEG-1, -2, and -4/AVC/ SVC specified to standardize under the ISO/IEC SC29WG11, including use of decoded pictures obtained by a local decoding as reference pictures for estimation of motions to create data on motion vectors, and use of data on motion vectors created by compensation of motions, to create such predictive pictures as having nearest image qualities to target pictures as encoding targets, followed by determining difference data between predictive pictures and target pictures, and implementing on the difference data a process for a prescribed encoding to attain a high efficient encoding making use of high correlations in the temporal direction. It is thus possible to have predictive pictures improved in image quality, and enhanced in correlation to target pictures, affording to expect more enhanced encoding efficiencies. However, failures to allot a sufficient code rate would cause deficiencies such as deficient precision of data on motion vectors or deficient attainment of the quality of images of locally decoded reference pictures, degrading image qualities of predictive pictures, resulting in reduced encoding efficiencies.

[0005]

Moreover, there are techniques for hierarchical encoding services on moving pictures represented by among others the above-noted Patent Literature 1and MPEG-4 SVC, which also include predictive pictures or predictive blocks created from reference pictures of a layer lower than the layer in which a current encoding is made, for use in combination with target pictures or target blocks of the current layer to make an inter-layer prediction in between, aiming at still enhanced encoding efficiencies making use of high correlations between different spatial

resolutions. However, like techniques making use of high correlations in the temporal direction, also those making use of high correlations between layers are subject to the problem that failures to allot a sufficient code rate would degrade image qualities of predictive pictures or predictive blocks, resulting in reduced encoding efficiencies.

[0006]

Further, they involve implementing a process for a prescribed resolution conversion on moving pictures input as encoding targets with a spatial resolution (referred herein to as a base or standard resolution), creating moving pictures with a resolution (referred herein to as a low resolution) lower than the standard resolution of the input moving pictures, to make a hierarchical encoding on moving pictures between two or more layers making use of high correlations between layers. However, in such the hierarchical encoding, even if the encoding process implemented was reversible, input moving pictures would undergo a band limitation to information on their spatial frequency components in the spatial direction that can be represented by the standard resolution, in addition to the implementation of a hierarchical encoding including a process to be implemented on the input moving pictures for such an encoding that involves decoded pictures obtained through a local decoding in course of hierarchical encoding, or by decoding bit streams encoded by way of hierarchical encoding, with image qualities nearest to those of input moving pictures under given encoding conditions, thus affording to make use of correlations between associated layers to estimate new information on spatial frequency components, while failing to encode and transmit more information on spatial frequency components than the information on spatial frequency components that can be represented by the standard resolution, as a problem.

[0007]

It therefore is an object of the present invention to provide a moving picture encoding system, a moving picture encoding method, and a moving picture encoding program adapted to encode and transmit more information on spatial frequency components than information on spatial frequency components that can be represented by a resolution of input moving pictures. It also is an object of the present invention to provide a moving picture decoding system, a moving picture decoding method, and a moving picture decoding program adapted to acquire and decode sequences of encoded bits created by a moving picture encoding system, a moving

picture encoding method, or a moving picture encoding program according to the present invention. It also is an object of the present invention to provide a moving picture reencoding system, a moving picture reencoding method, and a moving picture reencoding program adapted for a decoding followed by a re-encoding and a transmission.

Solution to Problem

[0008]

To solve the problems described, according to the present invention, there is a moving picture encoding system comprising, as illustrated in Fig. 9 for instance, a first encoder configured to work on a subsequence of a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a first super-resolution enlarger configured to work on the subsequence of the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution, and a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures to implement a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits.

[0009]

Here, as illustrated in Fig. 7 for instance, it may well have the second encoder configured to have the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

[0010]

Further, as illustrated in Fig. 1 and 8 for instance, it may well comprise a second super-resolution enlarger configured to acquire the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution

enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, and a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution, the second encoder being configured to have the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

[0011]

Further, as illustrated at (a) in Fig. 4 for instance, it may well have the first super-resolution enlarger comprising a positioner configured to work in a processing for super-resolution enlargement, on a combination of a base picture constituting a base therein and one or more observation pictures to be based on, to make a positioning to pixel positions of a desirable high resolution, for an interval-unequal sampling to create nonhomogeneous high resolution pictures, an interpolator configured to work on nonhomogeneous high resolution pictures created at the positioner, to implement a process for a prescribed nonhomogeneous interpolation to create interpolated pictures with a desirable high resolution, an estimated picture creator configured to acquire interpolated pictures created at the interpolator, to implement thereon a process for a prescribed reconstruction to create estimated pictures with a desirable resolution, and a repetition determiner configured to acquire a nonhomogeneous high resolution picture from the positioner and a nonhomogeneous estimated picture from the estimated picture creator, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the processing for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator with information for a control to continue the processing, and operate as the repetition is unnecessary, to provide the estimated picture creator with information for a control to output a set of estimated pictures with a high resolution after super-resolution enlargement.

[0012]

Further, as illustrated in Fig. 1 or such for instance, it may well comprise a multiplexer configured to operate complying with a prescribed syntax structure to multiplex the first sequence of encoded bits from the first encoder, the second sequence of encoded bits from the second encoder, and information on encoding parameters of respective types used in the encoding at the first encoder and the encoding at the second encoder.

[0013]

Further, as illustrated in Fig. 10 for instance, it may well comprise a first accumulation buffer configured to work in a course before the first encoder and the first super-resolution enlarger, to accumulate subsequences of the sequence of moving pictures with the standard resolution, a second accumulation buffer configured to work in a course between the first encoder and the second encoder, to accumulate sets of decoded pictures from the first encoder, an accumulation controller configured to work for detections of buffer accumulation amounts at the first accumulation buffer, the second accumulation buffer, the first encoder, and the second encoder, to control the buffer accumulation amounts , and a code rate controller configured to work on bases of the detections of buffer accumulation amounts at the accumulation controller, to control code rates at the first encoder and the second encoder.

[0014]

Further, according to the present invention, there is a moving picture encoding system comprising, as illustrated in Fig. 13 for instance, a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded

pictures with a resolution higher than the standard resolution, and a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

[0015]

Further, according to the present invention, there is a moving picture encoding system comprising, as illustrated in Fig. 16 for instance, a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution, and a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of resolution converted enlarged decoded pictures from the third resolution converter as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

[0016]

Further, according to the present invention, there is a moving picture encoding system comprising, as illustrated in Fig. 17 for instance, a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a first super-resolution enlarger configured to

work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, and a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

[0017]

Further, according to the present invention, there is a moving picture encoding system comprising, as illustrated in Fig. 19 for instance, a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution, a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution, a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first

resolution converter as a set of encoding target pictures, employing the set of decoded pictures from the first encoder and the set of super-resolution enlarged and converted decoded pictures with the standard resolution from the second resolution converter as sets of reference pictures, to implement thereon a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits, a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution, and a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

[0018]

Further, according to the present invention, there is a moving picture encoding method comprising a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution, and a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits.

[0019]

Further, according to the present invention, there is a moving picture encoding program configured to have a computer execute a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard

resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution, a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution, a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution, and a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits.

[0020]

Further, according to the present invention, there is a moving picture decoding system comprising, as illustrated in Fig. 26 for instance, a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output sequences of encoded bits with a standard resolution, a first decoder configured to acquire a sequence of encoded bits obtained with the standard resolution at the demultiplexer to implement thereon a process for a prescribed decoding to create a sequence of decoded pictures with the standard resolution, a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures, a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution, and a second decoder configured to acquire a sequence of encoded bits obtained with an extension of the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon processes including a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution.

[0021]

Here, the moving picture decoding system may well comprise, as illustrated in Fig. 23 for instance, a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the decoder to implement thereon a process for a prescribed resolution conversion to create a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution, and a third decoder configured to acquire a sequence of encoded bits obtained with an extension of the high resolution at the demultiplexer, the sequence of super-resolution enlarged decoded pictures created at the super-resolution enlarger, and the sequence of enlarged decoded pictures with the high resolution from the second resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed decoding, to create a sequence of super-resolution enlarged pictures as decoded.

[0022]

Further, according to the present invention, there is a moving picture reencoding system comprising, as illustrated in Fig. 27 for instance, a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output sequences of encoded bits with a standard resolution, a decoder configured to acquire a sequence of encoded bits obtained with the standard resolution at the demultiplexer to implement thereon a process for a prescribed decoding to create a sequence of decoded pictures with the standard resolution, a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures, a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution, a second decoder configured to acquire a sequence of encoded bits obtained with an extension of the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the above-noted decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a process for a

prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution, a reencoder configured to acquire from the above-noted decoder information on coefficients of orthogonal transform in a course of decoding thereof, and from the second decoder information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding thereof, to make a synthesis of respective information on coefficients of orthogonal transform and implement thereon a process for a prescribed entropy encoding to create a sequence of encoded bits as reencoded, and a multiplexer configured to acquire the sequence of encoded bits reencoded at the reencoder, to implement thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, to create a sequence of encoded bits as multiplexed.

[0023]

Here, the moving picture reencoding system may well have the reencoder configured to acquire the sequence of decoded pictures with the standard resolution from the above-noted decoder, the sequence of super-resolution decoded pictures with the standard resolution from the first resolution converter, and the sequence of super-resolution pictures with the standard resolution from the second decoder, to implement thereon a process for a prescribed encoding to create a sequence of encoded bits as reencoded.

[0024]

Further, according to the present invention, there is a moving picture decoding method comprising a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting sequences of encoded bits with a standard resolution, a step of acquiring a sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed decoding, creating a sequence of decoded pictures with the standard resolution, a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures, a step of acquiring the sequence of super-resolution enlarged decoded pictures created through

the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution, and a step of acquiring a sequence of encoded bits obtained with an extension of the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon processes including a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

[0025]

Here, the moving picture decoding method may well comprise a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, implementing thereon a process for a prescribed resolution conversion, creating a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution, and a step of acquiring a sequence of encoded bits obtained with an extension of the high resolution through the process for the prescribed demultiplexing, the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, and the sequence of enlarged decoded pictures created with the high resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed decoding, creating a sequence of super-resolution enlarged pictures as decoded.

[0026]

Further, according to the present invention, there is a moving picture reencoding method comprising a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, a step of acquiring a sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed decoding, creating a sequence of decoded pictures with the standard resolution, a step of acquiring the sequence of decoded pictures created with the standard

resolution through the process for the above-noted prescribed decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures, a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution, a step of acquiring a sequence of encoded bits obtained with an extension of the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution, a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the above-noted prescribed decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded, and a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

[0027]

Further, according to the present invention, there is a moving picture decoding program configured to have a computer execute a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting sequences of encoded bits with a standard resolution, a step of acquiring a sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, implementing thereon

a process for a prescribed decoding, creating a sequence of decoded pictures with the standard resolution, a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures, a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution, and a step of acquiring a sequence of encoded bits obtained with an extension of the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon processes including a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

[0028]

Further, according to the present invention, there is a moving picture reencoding program configured to have a computer execute a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, a step of acquiring a sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed decoding, creating a sequence of decoded pictures with the standard resolution, a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures, a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution, a step of acquiring a sequence of encoded bits obtained with an extension of the standard resolution through the process for the prescribed demultiplexing, the sequence of

decoded pictures created with the standard resolution through the process for the above-noted prescribed decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution, a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the above-noted prescribed decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded, and a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

Advantageous Effects of the Invention

[0029]

According to the present invention, there are systems such as a moving picture encoding system, having a first encoder working for services to encode moving pictures input with a standard resolution, in combination with a first super-resolution enlarger working on moving pictures input with the standard resolution, implementing a process for a super-resolution enlargement including information on frequency components in the spatial direction and the temporal direction that has been potentially contained in the input moving pictures but unable to express to a sufficient degree by the standard resolution, followed by implementing processes such as for a prescribed resolution conversion at a first resolution converter, thus permitting a second encoder to make an encoding of moving pictures based on an increased amount of information relative to an information amount of moving pictures input with the standard resolution, as a resultant effect. At the second encoder, as reference signals for the encoding there may be use of, among others, decoded signals as decoded at the first

encoder or as additionally processed through processes such as for a second super-resolution enlargement and a second resolution conversion.

[0030]

Moreover, according to the present invention, there are systems such as a moving picture encoding system, having a first encoder working for services to encode moving pictures input with a standard resolution, in combination with a first super-resolution enlarger working on moving pictures input with the standard resolution, implementing a process for a super-resolution enlargement including information on frequency components in the spatial direction and the temporal direction that has been potentially contained in the input moving pictures but unable to express to a sufficient degree by the standard resolution, followed by an encoding of thus obtained signals at a third encoder, permitting the third encoder to make an encoding of moving pictures based on an increased amount of information relative to an information amount of moving pictures input with the standard resolution, as a resultant effect. At the third encoder, as reference signals for the encoding there may be use of decoded signals as decoded at the first encoder and processed through processes such as for a second super-resolution enlargement or a third resolution conversion to enhance the resolution up to the same resolution as first super-resolution enlarged signals. Still more, according to the present invention, there are systems such as a moving picture decoding system, adapted to input thus encoded moving pictures to decode, and yet more, according to the present invention, there are systems such as a moving picture reencoding system,. adapted to input thus encoded moving pictures to decode and reencode.

Brief Description of Drawings

[0031]

[Fig. 1] Fig. 1 is a block diagram showing an example of basic configuration of a moving picture encoding system according to a first embodiment of the present invention.

[Fig. 2] Fig. 2 is a flowchart of actions of the moving picture encoding system according to the first embodiment.

[Fig. 3] Fig. 3 is a diagram of data format illustrating an example of structure of a multiplexed bit sequence created at a multiplexer 109 in the first embodiment.

[Fig. 4] Fig. 4 is a combination of a block diagram showing an example of detailed configuration of a first super-resolution enlarger 103 in the first embodiment, and conceptual diagrams illustrating an example of process for a prescribed super-resolution enlargement to be implemented at the first super-resolution enlarger 103.

[Fig. 5] Fig. 5 is a flowchart of actions of the first super-resolution enlarger 103 in the first embodiment.

[Fig. 6] Fig. 6 is a combination of a block diagram showing an example of detailed structure of a first resolution converter 104 in the first embodiment, and conceptual diagrams illustrating an example of process for a prescribed resolution conversion to be implemented at the first resolution converter 104.

[Fig. 7] Fig. 7 is a block diagram showing an example of configuration of a moving picture encoding system according to a second embodiment.

[Fig. 8] Fig. 8 is a block diagram showing another example of configuration of the moving picture encoding system according to the second embodiment.

[Fig. 9] Fig. 9 is a block diagram showing still another example of configuration of the moving picture encoding system according to the second embodiment.

[Fig. 10] Fig. 10 is a block diagram showing an example of configuration of a moving picture encoding system according to a third embodiment.

[Fig. 11] Fig. 11 is a block diagram showing an example of configuration of a first encoder 403 in the third embodiment.

[Fig. 12] Fig. 12 is a block diagram showing an example of configuration of a first decoder 404 in the third embodiment.

[Fig. 13] Fig. 13 is a block diagram showing an example of configuration of a moving picture encoding system according to a fourth embodiment.

[Fig. 14] Fig. 14 is a flowchart of exemplary actions of the moving picture encoding system according to the fourth embodiment.

[Fig. 15] Fig. 15 is a diagram of data format illustrating an example of structure of a multiplexed bit sequence created at a multiplexer 109 in the fourth embodiment.

[Fig. 16] Fig. 16 is a block diagram showing an example of configuration of a moving picture encoding system according to a fifth embodiment.

[Fig. 17] Fig. 17 is a block diagram showing another example of configuration of the moving picture encoding system according to the fifth embodiment.

[Fig. 18] Fig. 18 is a block diagram showing an example of configuration of a moving picture encoding system according to a sixth embodiment.

[Fig. 19] Fig. 19 is a block diagram showing an example of configuration of a moving picture encoding system according to a seventh embodiment.

[Fig. 20] Fig. 20 is a flowchart of exemplary actions of the moving picture encoding system according to the seventh embodiment.

[Fig. 21] Fig. 21 is a diagram of data format illustrating an example of structure of a multiplexed bit sequence created at a multiplexer 109 in the seventh embodiment.

[Fig. 22] Fig. 22 is a block diagram showing an example of configuration of a moving picture encoding system according to an eighth embodiment.

[Fig. 23] Fig. 23 is a block diagram showing an example of configuration of a moving picture decoding system according to a ninth embodiment.

[Fig. 24] Fig. 24 is a flowchart of exemplary actions of the moving picture decoding system according to the ninth embodiment.

[Fig. 25] Fig. 25 is a flowchart showing an example of operational procedure of a process for a decoding at a standard resolution at a step S602 in Fig. 24.

[Fig. 26] Fig. 26 is a block diagram showing an example of configuration of a moving picture decoding system according to a tenth embodiment.

[Fig. 27] Fig. 27 is a block diagram showing an example of configuration of a moving picture reencoding system according to an eleventh embodiment.

[Fig. 28] Fig. 28 is a flowchart of exemplary actions of the moving picture reencoding system according to the eleventh embodiment.

Description of Embodiments

[0032]

(First Embodiment)

Fig. 1 is a block diagram showing an example of configuration of a moving picture encoding system according to a first embodiment of the present invention.

[0033]

Referring to Fig. 1, the moving picture encoding system according to the first embodiment includes a first accumulation buffer 101, a first encoder 102, a first super-resolution enlarger 103, a first resolution converter 104, a second super-resolution enlarger 105, a second resolution converter 106, a second encoder 107, and a multiplexer 109.

[0034]

The first accumulation buffer 101 is configured for functions to work on moving pictures input as an input, to accumulate two or more pictures as necessary to implement later-described processes for a prescribed pre-super-resolution encoding and a first super-resolution enlargement, and supply the first encoder 102, the first super-resolution enlarger 103, and the like with pictures they require.

[0035]

The first encoder 102 is configured for functions to acquire from the first accumulation buffer 101 a set of pictures with a standard resolution required for a process for a prescribed encoding, and work on pictures acquired with the standard resolution to implement the process for the prescribed encoding (referred herein to as a process for a pre-super-resolution encoding), to create a first sequence of encoded bits, to supply the first sequence of encoded bits thus created to the multiplexer 109. The first encoder 102 is configured for functions to implement a process for a prescribed decoding, to supply decoded pictures to the second super-resolution enlarger 105 and the second encoder 107. The first encoder 102 may well be configured for functions to temporarily store decoded pictures. There may be a configuration to implement the process for the prescribed decoding as a decoding process on the first sequence of encoded bits as created to create decoded pictures. There may be configuration for use of a process for a local decoding constituting part of the process for the prescribed encoding to employ results of the local decoding to create pictures decoded therefrom.

[0036]

The first super-resolution enlarger 103 is configured for functions to acquire from the first accumulation buffer 101 two or more pictures with the standard resolution, as necessary for a process for a prescribed super-resolution enlargement, and work on pictures acquired with the standard resolution to implement the process for the prescribed super-resolution enlargement, to

create super-resolution enlarged pictures with a resolution higher than the standard resolution, and supply thus created super-resolution enlarged pictures to the first resolution converter 104. There may be configuration with a function to have a ratio of enlargement set up upon implementation of the process for the prescribed super-resolution enlargement as preset information on a prescribed enlargement ratio, or as acquired information on enlargement ratio such as set up by an external user, and work on the basis of acquired information on enlargement ratio to establish an enlargement ratio to implement the process for the prescribed super-resolution enlargement. More preferably, to provide information on the prescribed enlargement ratio to a decoding system end, there should be use of a configuration to implement an ushown process for a prescribed entropy encoding, to create a bit sequence of information on enlargement ratio, to supply to the multiplexer 109, to transmit to that end. In this regard, there should be use of similar configuration for the second super-resolution enlarger 105 also. The first super-resolution enlarger 103 and the second super-resolution enlarger 105 have their configurations and actions, of which detailed examples will be described with reference to Fig. 4.

[0037]

The first resolution converter 104 is configured for functions to acquire super-resolution enlarged pictures from the first super-resolution enlarger 103, and work on acquired super-resolution enlarged pictures to implement a process for a prescribed resolution conversion to create, from the super-resolution enlarged pictures having a resolution higher than the standard resolution, a set of pictures (as a set of super-resolution enlarged and converted pictures) such as having the standard resolution for instance, to supply to the second encoder 107.

[0038]

The second super-resolution enlarger 105 is configured for functions to acquire from the first encoder 102 two or more decoded pictures with the standard resolution, as necessary for a process for a prescribed super-resolution enlargement, and work on pictures acquired with the standard resolution to implement the process for the prescribed super-resolution enlargement, to create super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, and supply thus created super-resolution enlarged decoded pictures to the second

resolution converter 106. Like the first super-resolution enlarger 103, there may be configuration with a function to have a ratio of enlargement set up upon implementation of the process for the prescribed super-resolution enlargement as preset information on a prescribed enlargement ratio, or as acquired information on enlargement ratio such as set up by an external user, and work on the basis of acquired information on enlargement ratio to establish an enlargement ratio to implement the process for the prescribed super-resolution enlargement. It is noted that the resolution after enlargement at the second super-resolution enlarger 105 may be equal to or different from the resolution after enlargement at the first super-resolution enlarger 103.

[0039]

The second resolution converter 106 is configured for functions to acquire super-resolution enlarged decoded pictures from the second super-resolution enlarger 105, and work on acquired super-resolution enlarged decoded pictures to implement a process for a prescribed resolution conversion to create, from the super-resolution enlarged decoded pictures having a resolution higher than the standard resolution, a set of super-resolution decoded pictures (as a set of super-resolution enlarged and converted decoded pictures) such as having the standard resolution for instance, to supply to the second encoder 107. There may be configuration with a function to have a ratio of resolution conversion set up upon implementation of the process for the prescribed resolution conversion as preset information on a prescribed resolution conversion ratio, or as acquired information on resolution conversion ratio such as set up by an external user, and work on the basis of acquired information on resolution conversion ratio to establish a resolution conversion ratio to implement the process for the prescribed resolution conversion. More preferably, to provide information on the resolution conversion ratio, there should be use of a configuration to implement an ushown process for a prescribed entropy encoding, to create a bit sequence of information on resolution conversion ratio, to supply to the multiplexer 109.

[0040]

The second encoder 107 is configured for functions to have super-resolution enlarged and converted signals of input pictures with the standard resolution from the first resolution converter 104 as encoding target pictures, decoded pictures from the first encoder 102 as first

reference pictures, and super-resolution enlarged and converted signals of decoded pictures with the standard resolution from the second resolution converter 106 as second reference pictures, and implement thereon a combination of processes for a prescribed prediction and a second encoding, to create a second sequence of encoded bits, and supply the multiplexer 109 with the second sequence of encoded bits thus created.

[0041]

For a reference picture to be used in a process for the prescribed prediction at the second encoder 107, there may be a configuration to employ either a first reference picture obtained from a decoded picture or a second reference picture obtained from a super-resolution enlarged and converted decoded picture, to create a predictive picture, and subtract the predictive picture from a target picture, to create a data on a difference in between.

[0042]

There may be a configuration involved to create a difference data from a target picture, using neither first reference picture nor second reference picture.

[0043]

For control to make a selection of reference picture for each picture or for each set of a prescribed number of pictures, the second encoder 107 may be configured to create a set of data on the selection of reference picture to identify a first reference picture or a second reference picture whichever is used, and implement thereon a process for a prescribed entropy encoding using an unshown entropy encoder to create a sequence of encoded bits of data on the reference picture selection, to supply to the multiplexer 109. There are sequences of encoded bits of data on reference picture selection, multiplexed as a bit sequence 310 of data on encoding parameters constituting part of a multiplexed bit sequence 300, as will be described later on. There may be use of combination of target pictures each respectively divided with no spaces left into regions of a prescribed area and first and second reference pictures likewise divided with no spaces left into regions of a prescribed area, to operate for each commensurate region to identify a first reference picture or a second reference picture whichever is selective to create a predictive picture, and subtract the predictive picture from a target picture, to create a data on a difference in between. There may be operations made for each region of a prescribed area to have data for identification of which reference picture has been used, as data on reference picture selection,

and implement thereon a process for a prescribed entropy encoding using an unshown entropy encoder, to create, and supply to the multiplexer 109, a resultant sequence of encoded bits of data on reference picture selection. There may well be regions of a prescribed area shaped as regions of a prescribed rectangular form, or as regions of an arbitrary form conforming to a prescribed domain division.

[0044]

The second encoder 107 may be configured for combination of a set of operations to subtract a first reference picture as a predictive picture from an encoding target picture, to obtain a data on a difference in between as a first difference data, and implement thereon a process for a prescribed second encoding to create a first sequence of bits encoded by the second encoding, a set of operations to subtract a second reference picture as a predictive picture from the encoding target picture, to obtain a data on a difference in between as a second difference data, and implement thereon the process for the prescribed second encoding to create a second sequence of bits encoded by the second encoding, and a set of operations to create a data on difference simply from the encoding target picture, using neither first reference picture nor second reference picture, to use as a third difference data, and implement thereon the process for the prescribed second encoding to create a third sequence of bits encoded by the second encoding, to provide the multiplexer 109 with thus created first to third sequences of bits encoded by second encoding. There are data on methods for selection of respective types of reference pictures and data on encoding methods as described, which may be collected as data on reference picture selection modes and as data on encoding modes for the second encoding, respectively, and processed by implementing thereon a process for a prescribed entropy encoding using an unshown entropy encoder, to supply to the multiplexer 109.

[0045]

The second encoder 107 may be configured to execute an encoding in the CGS (Coarse Grain Scalability) layer under MPEG-4 SVC for instance, and work for sequences of moving pictures equal in spatial resolution to the spatial resolution of sequences of moving pictures having a standard resolution at the first encoder 102, to operate complying with a prescribed syntax structure meeting the restraining conditions to facilitate a conversion from SVC to AVC in terms of the AVC rewriting by the JVT (Joint Video Team) being a joint group

of MPEG and ITU-T, to make the second encoding for creation of second encoded bit sequences. This configuration permits the second encoder 107 to create second encoded bit sequences, as sequences of such encoded bits that afford to make the conversion from the encoding format of SVC that is a hierarchical encoding to the encoding format of AVC that is a single layer encoding, without the need of making such a reencoding that involves a combination of complete decoding and encoding.

[0046]

The multiplexer 109 is configured for functions to acquire from the first encoder 102 a first sequence of encoded bits and from the second encoder 107 a second sequence of encoded bits, and operate complying with a prescribed syntax structure to implement a process of multiplexing the first sequence of encoded bits, the second sequence of encoded bits, and sequences of encoded bits of associated data covering sets of data on encoding parameters of respective types used in encoding processes, involving data on motion vectors and data on quantizing parameters, encompassing data on the above-noted reference picture selection and the like, as well as sets of data on encoding modes or such, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for their identification, to create a sequence of bits multiplexed as illustrated in Fig. 3 that will be described later on. The multiplexer 109 may well be configured for functions to additionally acquire data on modes of reference picture selection and data on reference picture selection as prepared at the second encoder 107 in the form of sequences of encoded bits encoded through an unshown entropy encoder, and implement thereon a process for a multiplexing to create a sequence of bits multiplexed as described above.

[0047]

According to the present embodiment, there is a system including the foregoing configurations and adapted to work on input moving pictures, to implement a process for a prescribed super-resolution enlargement and a process for a prescribed resolution conversion, creating super-resolution enlarge and converted signals of moving pictures input with a standard resolution, to make use of them allowing for a moving picture encoding based on an increased amount of information relative to an information amount of input moving pictures. It is noted that between the first super-resolution enlarger 103 and the second super-resolution enlarger 105,

the enlargement ratios applied may not be always equal to each other. Likewise, between the first resolution converter 104 and the second resolution converter 106, the resolution conversion ratios applied may not be always equal to each other. However, for configuration in Fig. 1, there should be resolution conversion ratios established for the first resolution converter 104 and the second resolution converter 106 to have a spatial resolution after their processes for resolution conversion, equalized to the standard resolution.

[0048]

Description is now made of actions of the moving picture encoding system according to the first embodiment shown in Fig. 1, with reference to a flowchart of Fig. 2.

[0049]

First, the first accumulation buffer 101 stores therein input moving pictures, as necessary in number of pictures for the first super-resolution enlarger 103 to implement a process for a first super-resolution enlargement (step S201).

[0050]

The first super-resolution enlarger 103 acquires from the first accumulation buffer 101 two or more pictures, as necessary for a process for a prescribed super-resolution enlargement, and implements thereon the process for the prescribed super-resolution enlargement (step S202), whereby it creates super-resolution enlarged pictures with a resolution higher than a standard resolution that input moving pictures have as a spatial resolution thereof, to supply to the first resolution converter 104. For the first super-resolution enlarger 103, specific configurations as well as contents of the process for super-resolution enlargement will be described later on.

[0051]

After that, the first resolution converter 104 acquires super-resolution enlarged pictures from the first super-resolution enlarger 103, and implements thereon a process for a prescribed resolution conversion (step S203), whereby it creates super-resolution enlarged and converted signals of pictures input with the standard resolution, and supplies the second encoder 107 with thus created super-resolution enlarged and converted signals of pictures input with the standard resolution.

[0052]

After that, the second encoder 107 acquires super-resolution enlarged and converted signals of input pictures with the standard resolution from the first resolution converter 104, storing them in a prescribed buffer for temporary accumulation (step S204).

[0053]

On the other hand, the first encoder 102 acquires from the first accumulation buffer 101 a sequence of moving pictures with the standard resolution as necessary for implementation of a process for a prescribed pre-super-resolution encoding, and implements thereon a process for an encoding and a decoding at the standard resolution (step S205), whereby it creates a first sequence of encoded bits with the standard resolution as a result of the encoding process, and a set of decoded pictures with the standard resolution as a result of the decoding. After that, the first encoder 102 works to supply the first sequence of encoded bits thus created to the multiplexer 109, and further to supply the set of decoded pictures thus created to the second super-resolution enlarger 105 and the second encoder 107.

[0054]

After that, the second encoder 107 acquires the set of decoded pictures from the first encoder 102, storing in a prescribed buffer for temporary accumulation (step S206).

[0055]

After that, the second super-resolution enlarger 105 works like the first super-resolution enlarger 103, to acquire the set of decoded pictures from the first encoder 102, and implement thereon a process for a prescribed super-resolution enlargement (step S207), whereby it creates a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, to supply to the second resolution converter 106.

[0056]

After that, the second resolution converter 106 acquires the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger 105, and implements thereon a process for a prescribed resolution conversion (step S208), whereby it creates super-resolution enlarged and converted signals of decoded pictures with the standard resolution, to supply to the second encoder 107.

[0057]

After that, the second encoder 107 acquires super-resolution enlarged and converted signals of decoded pictures with the standard resolution from the second resolution converter 106, storing them in a prescribed buffer for temporary accumulation (step S209).

[0058]

The combination of processes associated with steps S202 to S204 and the combination of processes associated with steps S205 to S209 may be implemented in parallel, or in series with either ahead in execution.

[0059]

With the combinations of processes at steps S202 to S209 completed, the second encoder 107 has a set of encoding target pictures in the form of super-resolution enlarged and converted signals of input pictures as they are input pictures having undergone the first combination of super-resolution enlargement and resolution conversion through the first super-resolution enlarger 103 and the first resolution converter 104, a set of first reference pictures in the form of decoded pictures as they are input pictures having been simply encoded and decoded at the first encoder 102, and a set of second reference pictures in the form of super-resolution enlarged and converted signals of decoded pictures as they are those decoded pictures having undergone the second combination of super-resolution enlargement and resolution conversion through the second super-resolution enlarger 105 and the second resolution converter 106, and implements thereon a process for a prescribed second prediction (step S210), whereby the second encoder 107 creates a set of difference data at the standard resolution. After that, the second encoder 107 works on the set of difference data thus created to implement a second encoding process as a process for a prescribed second encoding (step S211), whereby it creates a second sequence of encoded bits, to supply to the multiplexer 109.

[0060]

After that, the multiplexer 109 acquires a first sequence of encoded bits from the first encoder 102 and a second sequence of encoded bits from the second encoder 107. Then, complying with a prescribed syntax structure, it implements a process of multiplexing the first sequence of encoded bits, the second sequence of encoded bits, and sequences of encoded bits of associated data covering sets of data on encoding parameters used in encoding processes, involving data on motion vectors, data on quantizing parameters, and data on reference picture

selection, as they area each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like (step S212), to create a sequence of multiplexed bits. The present embodiment involves a series of actions to be complete through the foregoing steps.

[0061]

According to the present invention, there is a moving picture encoding system operable through execution of such the steps to create sequences of encoded bits as necessary.

[0062]

Fig. 3 illustrates an example of multiplexed bit sequence 300 to be output from the multiplexer 109.

[0063]

As illustrated in Fig. 3, the multiplexed bit sequence 300 is comprised of multiplexed information including a bit sequence 310 of data on encoding parameters, a first sequence 320 of encoded bits from the first encoder 102, and a second sequence 330 of encoded bits from the second encoder 107.

[0064]

The bit sequence 310 of data on encoding parameters has sequences of encoded bits stored therein to define data on encoding parameters of respective types that among others the first encoder 103 and the second encoder 107 have employed in their encoding processes, involving data on motion vectors, data on quantizing parameters, data on associated encoding modes, and data on the above-noted selection of reference pictures and reference picture selection modes, and a bit sequence 311 of identification data inserted to identify the first sequence of encoded bits 320 and the second sequence of encoded bits 330 as multiplexed in the multiplexed bit sequence 300. Such the configuration of multiplexed bit sequence 300 is a simple example, and there may be another example of configuration to have those data required over an entirety of encoding and stored in a bit sequence 310 of data on encoding parameters, those data employed at the first encoder 102 as inherent information to the first encoder 102 and stored in a first sequence of encoded bits 320, and those data employed at the second encoder 107 as inherent information to the second encoder 107 and stored in a second sequence of encoded bits 330.

[0065]

There have been operations described as being parallel processes according to the present embodiment, while those processed in parallel may well be consecutively processed in a configuration operable according to the present embodiment.

[0066]

According to the present embodiment, there may well be operations to keep the first super-resolution enlarger 103 and the first resolution converter 104 from working, to supply pictures input with the standard resolution and stored in the first accumulation buffer 101, as super-resolution enlarged and converted signals of input pictures with the standard resolution, to the second encoder 107, to implement thereon a process for a prescribed second encoding at the second encoder 107 in a configuration operable according to the present embodiment.

[0067]

Like this, the provision of a first super-resolution enlarger 103 and a second super-resolution enlarger 105 combined with the provision of a first resolution converter 104 and a second resolution converter 106 affords for services on super-resolution enlarged pictures that are defined with the same standard resolution as input pictures but have information on spatial and temporal frequency components increased by a process for a first super-resolution enlargement, to implement a process for a first resolution conversion that limits the frequency band within a range of desirable frequency components, to create super-resolution enlarged and converted signals of input pictures with the standard resolution.

[0068]

Thus created super-resolution enlarged and converted signals of input pictures with the standard resolution afford for services on the super-resolution enlarged pictures created with greater amounts of information on frequency components than input moving pictures have, to take in therefrom information on frequency components within a band of frequencies up to an uppermost one that can be expressed by spatial frequencies on the standard resolution, into the super-resolution enlarged and converted signals of input pictures with the standard resolution, thus permitting information amounts of frequency components that input moving pictures have to be extended, to implement a process for a moving picture encoding to create a first sequence of encoded bits with the standard resolution and a second sequence of encoded bits with the

standard resolution, allowing for a moving picture encoding to be implemented on bases of information amounts greater than information amounts that input moving pictures have.

[0069]

Further, it is afforded to provide services on moving pictures input with the standard resolution, to implement a combination of processes for prescribed encoding and decoding to create decoded pictures with the standard resolution. Still more, it is afforded to provide services on the decoded pictures with the standard resolution, to implement a process for a prescribed second super-resolution enlargement, creating super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, having increased information on spatial and temporal frequency components, and implement a process for a prescribed second resolution conversion on thus created super-resolution enlarged decoded pictures, creating super-resolution enlarged and converted signals of decoded pictures with the standard resolution. Yet more, it is afforded to have thus created super-resolution enlarged and converted signals of decoded pictures with the standard resolution, as reference pictures, and employ them together with super-resolution enlarged and converted signals of input pictures with the standard resolution, to implement a process for a prescribed prediction in between, followed by implementing a process for a prescribed second encoding, to create a second sequence of encoded bits. It is thus permitted to utilize super-resolution enlarged and converted signals of decoded pictures with the standard resolution, as reference pictures, in combination with super-resolution enlarged and converted signals of input pictures with the standard resolution, to make a hierarchical encoding in between making use of correlations of spatial resolution between identical resolutions, allowing for a moving picture encoding based on greater amounts of information than input moving pictures have.

[0070]

It also is possible for the second encoder 107 to work upon creation of a predictive picture, on one hand to have a first reference picture in the form of a decoded picture as it is an input picture having been simply encoded and decoded at the first encoder 102, and on the other hand to have a second reference picture in the form of a set of super-resolution enlarged and converted signals of a picture as decoded as it represents that decoded picture which has been processed for second super-resolution enlargement and resolution conversion through the

second super-resolution enlarger 105 and the second resolution converter 106, to use the first reference picture or the second reference picture, whichever is selective to create the predictive picture, to implement thereon a process for an encoding, permitting a hierarchical encoding to be made by utilization of a correlation of spatial resolution between the decoded picture and a set of super-resolution enlarged and converted signals of the input picture with the standard resolution or by utilization of a correlation of spatial resolution between the set of super-resolution enlarged and converted decoded signals and the set of super-resolution enlarged and converted signals of the input picture with the standard resolution, whichever is requested, thus allowing for different multiplexed bit sequences to be created to supply to, accumulate at, and /or transmit to a decoding system end.

[0071]

Also, it is possible to work along creation of predictive pictures, to control selection of reference picture for each picture or for each set of a prescribed number of pictures, permitting an adaptive creation of predictive picture in accordance with the image quality of decoded picture, resulting in an enhanced encoding efficiency.

[0072]

Moreover, it is possible to provide a configuration for services to create a data of reference picture selection for identifying a first reference picture or a second reference picture whichever is used, to supply to the multiplexer 109, to multiplex into a multiplexed bit sequence 300, allowing for a facilitated identification of a reference picture used in the encoding.

[0073]

Moreover, it is possible to provide a target picture divided with no spaces left into regions each having a prescribed area, and combination of a first reference picture and a second reference picture likewise divided into regions each having a prescribed area, and identify the first reference picture or the second reference picture whichever is selective for a respective region to create a predictive picture, thereby permitting an adaptive creation of predictive picture in accordance with the image quality of decoded picture, resulting in an enhanced encoding efficiency.

[0074]

Further, it is possible to work on moving pictures input with the standard resolution, to implement a process for prescribed encoding and decoding to create a first sequence of encoded bits, and implement a process for second encoding to create a second sequence of encoded bits, and to operate complying with a prescribed syntax structure, to implement a process of multiplexing the sequences of encoded bits, together with sequences of encoded bits of data on encoding parameters used in the encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding modes, while inserting data else such as identification data for identification of a set of subsequent sequences of encoded bits, as necessary to create a sequence of multiplexed bits. The sequence of multiplexed bits thus created is configured as a single sequence of encoded bits including both of a result of encoding on inherent input moving pictures and a result of encoding on a set of errors in a prediction using information on frequency components as enlarged in super-resolution pictures having undergone a process for super-resolution enlargement combined with a process for resolution conversion, and is adaptive for services such as transmitting to an unshown external accumulator before recording in a prescribed recording medium, or delivering through a network using an unshown external communication system, thereby permitting a moving picture encoding system according to the present embodiment to operate on moving pictures with heavy amounts of information, allowing for efficient encoding, accumulation, and transmission.

[0075]

Further, it is possible to acquire a first sequence of encoded bits from the first encoder 102 and a second sequence of encoded bits from the second encoder 107, and implement thereon a process for a prescribed multiplexing in accordance with data on encoding modes, permitting a variety of encoded bit sequences to be created, affording to make a selective decoding at a decoding system end.

[0076]

Further, it is possible to operate according to the present embodiment, to keep the first super-resolution enlarger 103 and the first resolution converter 104 from working, to supply pictures input with the standard resolution and stored in the first accumulation buffer 101, as super-resolution enlarged and converted signals of input pictures with the standard resolution, to

the second encoder 107, to implement thereon a process for a prescribed second encoding at the second encoder 107 in a configuration operable according to the present embodiment, thereby affording to have input pictures with the standard resolution as encoding target pictures at the second encoder 107, permitting the second encoder 107 to make more efficient use of reference pictures than in typical processes for inter-layer prediction to create predictive pictures, reducing information amounts of difference data to be created, thus allowing for an enhanced encoding efficiency of the second sequence of encoded bits, with an enabled encoding process rendered the nearer to original moving pictures with the standard resolution.

[0077]

Description is now made of a process for a prescribed super-resolution enlargement applied to the present embodiment according to the present invention.

[0078]

For resolution enhancement of pictures using a super-resolution enlarging process, there have been generalized techniques including those employing low-resolution pictures relatively strongly correlating with each other, such as those simply deviated in position, to predict a single high-resolution picture, there having been many studies reported in recent years. For instance, there is "Super-Resolution Image Reconstruction, by Sung C. P. and Min K. P. : A Technical Overview, IEEE Signal Proc. Magazine, Vol. 26, No. 3, pp. 21-36, 2003", among others.

[0079]

Further, there is "Reconstruction of a high-resolution image by simultaneous registration, restoration, and interpolation of low-resolution images, by B. C. Tom and A. K. Katsaggelos, Proc. IEEE Int. Conf. Image Processing, Vol. 2, pp. 539-542, 1995" disclosing an ML (Maximum-likelihood) method as a proposal. The ML method has an evaluation function in terms of a square error between a set of pixel values of a low-resolution picture estimated from a high-resolution picture and a set of actual observed pixel values, and an estimated picture as such a high-resolution picture that minimizes the evaluation function. This method is a method of implementing a super-resolution process based on the principle of maximum likelihood estimation.

[0080]

Further, there is "Extraction of high-resolution frames from video sequences, by R. R. Schulz and R. L. Stevenson, IEEE Trans. Image Processing, Vol. 5, pp. 996-1011, 1996" disclosing an MAP (Maximum A Posterior) method as a proposal. The MAP method makes an estimation of such a high-resolution picture that minimizes an evaluation function having probability information of high-resolution picture added to a square error. This method is a method for super-resolution process that makes the estimation of high-resolution picture as an optimization problem making use of some prior information on a high-resolution picture, to maximize the posterior probability.

[0081]

Further, there is "High resolution image recovery from image-plane arrays, using convex projections, by H. Stark and P. Oskoui, J. Opt. Soc. Am. A, Vol. 6, pp. 1715-1726, 1989" disclosing a POCS (Projection Onto Convex Sets) method as a proposal. The POCS method is a method for super-resolution process that writes simultaneous equations on sets of pixel values of high-resolution picture and low-resolution picture, and solves them sequentially, to thereby obtain a high-resolution picture.

[0082]

According to the present embodiment, the process for the prescribed super-resolution enlargement may for instance be an application of any such super-resolution process as described above.

[0083]

There will be description made of an example of basic configuration of a process for super-resolution enlargement employed in the present embodiment according to the present invention.

[0084]

Part (a) of Fig. 4 is a block diagram showing a detailed configuration of the first super-resolution enlarger 103 in the first embodiment according to the present invention, Part (b) of Fig. 4, a combination of conceptual diagrams illustrating a process for super-resolution enlargement, and Fig. 5, a flowchart of exemplary actions in the process for super-resolution enlargement.

[0085]

In Part (a) of Fig. 4, according to the first embodiment, the first super-resolution enlarger 103 includes a positioner 1031, an interpolator 1032, an estimated picture creator 1033, and a repetition determiner 1034. It is noted that the second the super-resolution enlarger 105 has a similar configuration.

[0086]

The positioner 1031 is configured to work in a processing for super-resolution enlargement, to acquire combination of a base picture constituting a base in therein and one or more observation pictures, such as those illustrated in Section (I) in Part (b) of Fig. 4. It is now assumed to acquire such a combination of base picture, observation picture 1, and observation picture 2, as illustrated in Section (I) in Part (b) of Fig. 4. As illustrated in Section (II) in Part (b) of Fig. 4, the positioner 1031 is configured for functions to make a registration or positioning to pixel positions of a resolution higher than resolutions of observation pictures 1and 2 and base picture thus acquired, for an interval-unequal sampling to create nonhomogeneous high resolution pictures. Further, it is configured for a function to supply created nonhomogeneous high resolution pictures to the interpolator 1032 and the repetition determiner 1034. For the creation of nonhomogeneous high resolution pictures, preferably, as illustrated in Section (II) in Part (b) of Fig. 4, observation pictures should be each positioned relative to pixels of the base picture, to arrange in place to have a highest correlation with the base picture. Further, in application of a resolution to a certain positioning, preferably, the resolution used to make the positioning should be a higher resolution than would be obtained after an associated process for super-resolution enlargement. For Part (c) of Fig. 4, there will be description made later on in comparison with Part (c) of Fig. 6.

[0087]

The interpolator 1032 is configured for functions to acquire nonhomogeneous high resolution pictures created at the positioner 1031, and use acquired nonhomogeneous high resolution pictures, for implementing a process for a prescribed nonhomogeneous interpolation to create therefrom interpolated pictures with a desirable high resolution, to supply to the estimated picture creator 1033. Further, the interpolator 1032 acquires from the repetition determiner 1034 necessary information for control to continue the process. The control information for continuation of process may well include a nonhomogeneous estimated picture

created at the estimated picture creator 1033. The interpolator 1032 may be configured to work when implementing a repetition process in accordance with the control information, to operate following a prescribed updating method, for use of a nonhomogeneous estimated picture to update a nonhomogeneous high resolution picture acquired from the positioner 1031, while correcting respective interpolated pixels.

[0088]

The estimated picture creator 1033 is configured for functions to acquire interpolated pictures created at the interpolator 1032, and implement thereon a process for a prescribed reconstruction in consideration of a point spread (PSF) function obtained from a prescribed camera model, implementing a process for a prescribed noise removal, as necessary, to create such estimated pictures with a desirable resolution as illustrated in Section (III) in Part (b) of Fig. 4. Further, it is configured for functions to implement a re-sampling process on estimated pictures, to create nonhomogeneous estimated pictures corresponding to pixels of nonhomogeneous high resolution pictures, to supply to the repetition determiner 1034. Further, it is configured for functions to acquire control information from the repetition determiner 1034, and operate in accordance with the control information, to create and externally output estimated pictures as high resolution pictures with a desirable resolution.

[0089]

The repetition determiner 1034 is configured for functions to acquire a nonhomogeneous high resolution picture from the positioner 1031 and a nonhomogeneous estimated picture from the estimated picture creator 1033, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the process for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator 1032 with information for a control to continue the process, and operate as the repetition is unnecessary, to provide the estimated picture creator 1033 with information for a control to output estimated pictures with a high resolution as a result of the process for super-resolution enlargement.

[0090]

For a process for super-resolution enlargement required to implement at a still higher rate, there may be application of such a rate increasing method for super-resolution process as

disclosed in Japanese Patent No. 3837575 for instance, to a picture processing system according to the present invention, to thereby attain a still better configuration.

[0091]

Description is now made of actions of the super-resolution enlarger 103 shown in Part (a) of Fig. 4, with reference to a flowchart in Fig. 5.

[0092]

First, the positioner 1031 acquires a base picture as a base in an associated process for super-resolution enlargement, and one or more observation pictures (S500). After that, for each picture acquired, it makes a positioning at a resolution higher than a desirable resolution (S510). On this occasion, after arrangement of pixels of the base picture to corresponding positions, it arranges pixels of observation pictures, making highest correlations with the base picture, thereby creating an interval-unequally sampled nonhomogeneous high resolution picture.

[0093]

After that, the interpolator 1032 acquires the created nonhomogeneous high resolution picture, and implements thereon a process for a prescribed nonhomogeneous interpolation to effect interpolation of pixels (S520). This creates an interpolated picture with a desirable high resolution.

[0094]

Next, the estimated picture creator 1033 acquires the interpolated picture, and implements thereon a process for a prescribed reconstruction, implementing a process for a prescribed noise removal, as necessary, to create an estimated picture with a desirable resolution (S530). Further, it implements a re-sampling process on the estimated picture, to create a nonhomogeneous estimated picture corresponding to a set of pixels of the nonhomogeneous resolution picture.

[0095]

Next, the repetition determiner 1034 acquires the nonhomogeneous resolution picture from the positioner 1031, while acquiring the nonhomogeneous estimated picture from the estimated picture creator 1033. Employing the acquired pictures, it follows a prescribed

determination method, thereby determining whether or not a repetition of the process for super-resolution enlargement is necessary (S540).

[0096]

If the repetition of the process for super-resolution enlargement is determined as being necessary (YES at S540), it provides the interpolator 1032 with information for a control to continue the process. If the repetition of the process for super-resolution enlargement is determined as being unnecessary (NO at S540), it provides the estimated picture creator 1033 with information for a control to output an estimated picture with a high resolution as a result of the process for super-resolution enlargement, whereby the estimated picture creator 1033 operates in accordance with the control information, to output the estimated picture created with the desirable resolution, as a high resolution picture obtained by the process for super-resolution enlargement (S550). Then, according to the first embodiment, the process for super-resolution enlargement goes to an end.

[0097]

Description is now made of an example of process for a prescribed resolution conversion applied to the first resolution converter 104 as well as to the second resolution converter 106.

[0098]

Part (a) of Fig. 6 is a block diagram showing an example of configuration of the first resolution converter 104.

[0099]

In Part (a) of Fig. 6, the first resolution converter 104 includes a pixel inserter 1041, a filtering processor 1042, and a pixel thinner 1043. It is noted that among others the second resolution converter 106 is likewise configured, as well as a third resolution converter 110 in a later-described embodiment.

[0100]

The pixel inserter 1041 is adapted for enlargement of resolution of an input picture to extend the band of spatial frequencies available to handle, and is configured to insert new pixels between pixels, to create an upsampled picture, to supply to the filtering processor 1042.

[0101]

The filtering processor 1042 is configured to acquire the upsampled picture from the pixel inserter 1041, and implement thereon a process for a filtering using a prescribed low-pass filter, to create a band-limited picture, to supply to the pixel thinner 1043. The process for the filtering using a prescribed low-pass filter may well be a filtering process implemented on an upsampled picture, by using a low-pass filter adapted for band limitation and interpolation, within a band of spatial frequencies that can represent the spatial resolution of a picture finally output at the resolution converter, and the filter used may be, for instance, a filter based on the sinc function or Lanczos function, or an IIR filter or FIR filter designed with a precipitous cut-off frequency characteristic for a frequency response to be flat over an entirety of band. There may be a process reduced in duty by use of such a filter as based on the Nearest-neighbor method, the Bilinear method, or the Spline method.

[0102]

The pixel thinner 1043 is configured to acquire the band-limited picture from the filtering processor 1042, and implement thereon a process for a prescribed pixel thinning or decimation for a match with the resolution of a picture finally output at the resolution converter, to create a picture to be output.

[0103]

Part (b) of Fig. 6 is a combination of conceptual diagrams illustrating how signal components vary in a picture subjected to a contraction process by decimation after a process for enlargement of picture by resolution conversion at a resolution converter such as the first resolution converter 104.

[0104]

As illustrated in Section (I) in Part (b) of Fig. 6, assuming an input picture inherently containing a range of spatial frequency components not exceeding an 'fa', in the process for resolution conversion at the resolution converter, even if this was operated to implement a process for enlargement of the picture with a resolution enhanced to enlarge the range of spatial frequency components available to handle, and created a picture with an increased number of pixels, the range of spatial frequency components contained therein as itself could not have increased instead. Therefore, as illustrated in Section (II) in Part (b) of Fig. 6, there would have been resulted a state simply containing the range of spatial frequency components left as it

was, so even if this was subjected to a low-pass filtering process to limit the band to an 'fmax', still combined with a process for an inter-pixel thinning down to the pixel number of an original spatial resolution, there would have been created a picture containing the range of spatial frequency components left as it was.

[0105]

On the other hand, Part (c) of Fig. 4 is a combination of conceptual diagrams illustrating how signal components vary in a picture subjected to a decimation process after a process for super-resolution enlargement at a super-resolution enlarger such as the first super-resolution enlarger 103.

[0106]

As illustrated in Section (I) in Part (c) of Fig. 4, assuming an input picture inherently containing a range of spatial frequency components not exceeding an 'fa', in the process for super-resolution enlargement at the super-resolution enlarger that makes such a processing as illustrated in Part (b) of Fig. 4, the range of spatial frequency components contained therein as itself does increase. Therefore, as illustrated in Section (II) in Part (c) of Fig. 4, assuming a resultant state having a range of contained spatial frequency components extended up to an 'fb', if this is subjected to a low-pass filtering process to limit the band to an 'fmax', there appears a picture created with such components inclusive that exceed the range of spatial frequency components inherently contained up to the 'fa', but are still contained in the picture which can express a range of spatial frequencies up to the 'fmax'.

[0107]

Such the process is implemented for a super-resolution enlargement at the super-resolution enlarger 103, and provides a picture that is equal in resolution to a resolution conversion at the first resolution converter 104, but is essentially different therefrom in that the former can create and make use of such a picture as compensated for those picture components to be inherently contained. This is similar also in relationships such as associated with the second super-resolution enlarger 105 or the third super-resolution enlarger 110.

[0108]

There may be configuration with a function to have a ratio of resolution conversion set up upon implementation of the process for the prescribed resolution conversion as preset

information on a prescribed resolution conversion ratio, or as acquired information on resolution conversion ratio such as set up by an external user, and work on the basis of acquired information on resolution conversion ratio to establish a resolution conversion ratio to implement the process for the prescribed resolution conversion.

[0109]

For instance, assuming among others the first resolution converter 104 or the second resolution converter 106 configured as illustrated in Part (a) of Fig. 6, this operates upon a process being implemented for a decimation of picture from a super-resolution enlarged picture with a resolution higher than a standard resolution to a super-resolution enlarged and converted picture with the standard resolution, to set up combination of a proportion of new pixels to be inserted between pixels at the pixel inserter 1041 and a proportion of pixels to be thinned out at the pixel thinner 1043, depending on a given resolution conversion ratio.

[0110]

The resolution conversion ratio can be expressed such that the resolution conversion ratio = a pixel insertion ratio / a pixel thinning ratio, where the pixel insertion ratio is such that pixel insertion ratio = input pixels / output pixels, and the pixel thinning ratio is such that pixel thinning ratio = input pixels / output pixels.

[0111]

For instance, assuming a super-resolution enlarged picture created from the standard resolution with a resolution conversion ratio of 2, there are operations to return the picture to the standard resolution with a resolution conversion ratio of 1/2, including a setting made at the pixel inserter 1041, such that input pixels : output pixels = 1 : 1, i.e., to have an input picture supplied, as it is, in the form of an upsampled picture to the filtering processor 1042. At the pixel thinner 1043 , there is a setting made such that input pixels : output pixels = 2 : 1, i.e., to implement a process of thinning one pixel out of each set of two pixels to create a picture to be output.

[0112]

Further, to implement a process for enlargement of picture using the first resolution converter 104 configured as illustrated in Part (a) of Fig. 6, assuming creating a picture enlarged twice the standard resolution with a resolution conversion ratio of 2 = 2/1, for instance, there are

operations including a setting made at the pixel inserter 1041 such that input pixels : output pixels = 1 : 2, i.e., to insert one pixel per one pixel to create an upsampled picture to supply to the filtering processor 1042. At the pixel thinner 1043, there is a setting made such that input pixels : output pixels = 1 : 1, i.e., to have a picture output as it is to output without implementing the thinning process.

[0113]

It is noted that the configuration of first resolution converter 104 illustrated in Part (a) of Fig. 6 is a simple example, and there may be an example configured as necessary for a process for enlargement or contraction to a more flexible resolution, such as by use of the Spline method, to prepare from an input picture a set of pixels arranged in arbitrary positions with a fractal positional precision, to create a picture with a desirable resolution.

[0114]

Therefore, according to the first embodiment, there is a moving picture encoding system adapted to set a spatial resolution that an input moving picture has as a standard resolution, and process information on frequency components in the spatial direction and the temporal direction that has been potentially contained in the input moving picture but unable to express to a sufficient degree by the standard resolution, to reconstruct on basis of a prescribed super-resolution process at a first super-resolution enlarger 103, describing with a resolution higher than the standard resolution, to create a super-resolution enlarged picture with an extended amount of information of the information on frequency components the input moving picture has, to implement thereon a moving picture encoding process, permitting an encoding of input moving pictures based on a greater amount of information than the moving pictures have, as an advantageous effect.

[0115]

Moreover, according to the first embodiment, there is a moving picture encoding system adapted to operate on a super-resolution enlarged picture created at a first super-resolution enlarger 103, to implement a process for a prescribed resolution conversion at a first resolution converter 104 to create a super-resolution enlarged and converted picture described with a standard resolution, thus creating information on frequency components in the spatial direction and the temporal direction that has been potentially contained in an input

moving picture but unable to express to a sufficient degree by the standard resolution, while processing information on frequency components that have not been inherently contained, to restrict within a range of information on frequency components that can be expressed with the standard resolution, to include in the super-resolution picture, thereby reflecting on the super-resolution picture such information on frequency components that have been unable to express in the input moving picture, to implement a moving picture encoding process on the super-resolution picture, permitting an encoding of input moving pictures based on a greater amount of information than the moving pictures have, as an advantageous effect.

[0116]

Further, according to the first embodiment, there is a moving picture encoding system adapted to operate on a decoded picture with a standard resolution as encoded and decoded to create at a firs encoder 102, to implement a combination of processes for prescribed super-resolution enlargement and resolution conversion at a second super-resolution enlarger 105 and a second resolution converter 106, respectively, creating a super-resolution enlarged decoded picture and a super-resolution enlarged and converted signal of the decoded picture with the standard resolution, and operate at a second encoder 107, as this is given an input picture after another combination of processes for super-resolution enlargement and resolution conversion at a first super-resolution enlarger 103 and a first resolution converter 104, respectively, to have a super-resolution enlarged and converted signal of the input picture, as an encoding target picture, the decoded picture being the input picture encoded and decoded as it is at the firs encoder 102, as a first reference picture, and the super-resolution enlarged and converted signal of the decoded picture that is the decoded picture after the combination of processes for super-resolution enlargement and resolution conversion at the second super-resolution enlarger 105 and the second resolution converter 106, as a second reference picture, to implement thereon a combination of processes for prescribed second prediction and encoding, thus affording to obtain a predictive picture or predictive blocks with an image quality better than predictive pictures or predictive blocks obtainable by motion picture encoding techniques in the past, with resultant enhancement in encoding efficiency, as an advantageous effect.

[0117]

(Second Embodiment)

In the first embodiment described above, there has been a second encoder 107 working as illustrated in Fig. 1 to have a pair of reference pictures input thereto, that is, combination of a first reference picture being an input picture as encoded and decoded as it is at a first encoder 102 to provide as a decoded picture, and a second reference picture being the decoded picture as subjected to a combination of second super-resolution enlargement and resolution conversion through a second super-resolution enlarger 105 and a second resolution converter 106 to provide as a super-resolution enlarged and converted signal of the decoded picture, to employ the reference pictures enabling a high efficient prediction to create a predictive picture, whereas there may well be an example adapted for instance, as illustrated in Fig. 7, for operation to supply a second encoder 107 simply with a first reference picture being an input picture as encoded and decoded as it is at a first encoder 102 to provide as a decoded picture, or as illustrated in Fig. 8, for operation to supply a second encoder 107 simply with a second reference picture being a decoded picture from a first encoder 102 as subjected to a combination of second super-resolution enlargement and resolution conversion through a second super-resolution enlarger 105 and a second resolution converter 106 to provide as a super-resolution enlarged and converted signal of the decoded picture, combined with operations for the second encoder 107 to employ simply the first or the second reference picture to make a combination of prediction and encoding using an encoding target picture being a super-resolution enlarged and converted signal of an input picture as subjected to a combination of first super-resolution enlargement and resolution conversion.

[0118]

Or else, there may well be an example adapted, as illustrated in Fig. 9, for operations for a second encoder 107 to make a combination of prediction and encoding using an encoding target picture being a super-resolution enlarged and converted signal of an input picture as subjected to a combination of first super-resolution enlargement and resolution conversion, excluding operations to supply the second encoder 107 with either of two reference pictures, that is, without an operation to supply a first reference picture being an input picture as encoded and decoded as it is at a first encoder 102 to provide as a decoded picture, and an operation to supply a second reference picture being the decoded picture as subjected to a combination of

second super-resolution enlargement and resolution conversion through a second super-resolution enlarger 105 and a second resolution converter 106 to provide as a super-resolution enlarged and converted signal of the decoded picture.

[0119]

(Third Embodiment)

Description is now made of a moving picture encoding system according to a third embodiment of the present invention.

[0120]

Fig. 10 is a block diagram showing an example of configuration of the moving picture encoding system according to the third embodiment.

[0121]

Referring to Fig. 10, the moving picture encoding system according to the third embodiment is configured as a specific example of the moving picture encoding system according to the first embodiment shown in Fig. 1, including an accumulation controller 412, a second accumulation buffer 416, a second reference picture buffer 418, and a code rate controller 423 added anew.

[0122]

In Fig. 10, there is a first encoder 102 including a first predictor 402, a first encoder element 403, a first decoder element 404, an intra-predictor 405, a first predictive picture buffer 406, a first reference picture buffer 407, a motion estimator 408, a motion compensator 409, an adder 410, and a deblocker 411. This configuration affords to implement an equivalent function to MPEG-4 AVC specified to standardize under the ISO/IEC SC29 WG11 as a typical motion picture encoding. However, this specific configuration of the first encoder 102 is an example, so there may well be any example else subject to functions of the first encoder 102 to be implemented. For instance, there may be an example compliant with MPEG-2 employed in digital broadcasting or the like, or an example compliant with MPEG-4 SVC being a scalable extension of MPEG-4 AVC. There may be use of a pre-super-resolution encoder element based on a wavelet transform, as typified by JPRG2000.

[0123]

Further, in Fig. 10, there is a second encoder 107 including a third accumulation buffer 415, a second predictor 420, and a second encoder element 421.

[0124]

Description is now made of those component elements of the moving picture encoding system according to the third embodiment shown in Fig. 10, which have different functions or new functions relative to component elements of the first embodiment shown in Fig. 1.

[0125]

The first predictor 402 is configured for functions to acquire from a first accumulation buffer 101 a set of pictures with a standard resolution as necessary for a process for a prescribed encoding, and from the first predictive picture buffer 406 a set of predictive pictures or predictive blocks stored therein, and implement a process for a prescribed prediction on acquired pictures and predictive pictures, to create data on differences, to supply to the first encoder element 403. The process for prediction at the first predictor 402 may well be a process of having a respective one of pictures acquired with the standard resolution, as an encoding target picture, and subtracting acquired predictive pictures or predictive blocks from the target picture, creating data on differences in between, to supply to the first encoder element 403.

[0126]

The first encoder element 403 is configured for functions to acquire from the first predictor 402 data on differences after the process for prediction, and implement thereon the process for the prescribed encoding, to create a first sequence of encoded bits with the standard resolution, to supply to the first decoder element 404 and to a multiplexer 109. The first encoder element 403 may be configured to supply a first sequence of encoded bits to the first decoder element 404, as illustrated in Part (a) of Fig. 11, or may be configured to create data after quantization in a course of the process for the prescribed encoding, to supply to the first decoder element 404, as illustrated in Part (b) of Fig. 11. The first encoder element 403 is configured for a function to vary the code rate of a first sequence of encoded bits being created in the process for encoding, in accordance with control information from the code rate controller 423.

[0127]

The first decoder element 404 is configured for functions to work in accordance with the type of output at the first encoder element 403 illustrated in Part (a) or (b) of Fig. 11, to acquire a first sequence of encoded bits from the first encoder element 403 as illustrated in Part (a) Fig. 12 or acquire post-quantization data from the first encoder element 403 as illustrated in Part (b) Fig. 12, and implement a process for a prescribed decoding on the first sequence of encoded bits or the post-quantization data, to create decoded data on differences, to supply to the adder 410.

[0128]

The intra-predictor 405 is configured for functions to acquire data on decoded pictures as necessary for a process for a prescribed intra-prediction, and implement thereon the process for the prescribed intra-prediction, to create intra-predictive data, to supply to the first predictive picture buffer 406. For creation of intra-predictive data, the intra-predictor 405 may well implement the process for the prescribed intra-prediction on blocks as decoded about a block constituting a target of prediction to create a set of intra-predictive blocks.

[0129]

The first predictive picture buffer 406 is configured for functions to acquire intra-predictive data from the intra-predictor 405 and motion compensation predictive data from the motion compensator 409, to accumulate as predictive pictures or predictive blocks, and supply predictive pictures or predictive blocks to the first predictor 402 and the adder 410. The first predictive picture buffer 406 may be configured to acquire information on control for accumulation from the accumulation controller 412, and work on the accumulation control information to control acquisition, accumulation, and supply of predictive pictures or predictive blocks.

[0130]

The first reference picture buffer 407 is configured for functions to acquire deblocked decoded pictures or decoded blocks from the deblocker 411 and decoded pictures or decoded blocks from the adder 410, to accumulate as reference pictures or reference blocks, and supply accumulated reference pictures or reference blocks, as necessary, to demanding ends inclusive of the intra-predictor 405, the motion estimator 408, the motion compensator 409, and the

second accumulation buffer 416. The first reference picture buffer 407 may be configured to acquire information on control for accumulation from the accumulation controller 412, and work on the accumulation control information to control acquisition, accumulation, and supply of reference pictures or reference blocks.

[0131]

The motion estimator 408 is configured for functions to acquire encoding target pictures from the first accumulation buffer 101 and reference pictures from the first reference picture buffer 407, and makes thereon a prescribed estimation of motions to create data on motion vectors. The motion estimator 408 is configured for a function to supply created motion vector data at least to the motion compensator 409. Preferably, there should be a configuration for motion vector data created at the motion estimator 408 to be processed for a prescribed entropy encoding at an unshown entropy encoder, to supply to the multiplexer 109.

[0132]

The motion compensator 409 is configured for functions to acquire reference pictures from the first reference picture buffer 407 and motion vector data from the motion estimator 408, and make a prescribed motion compensation on acquired reference pictures and motion vector data, to create predictive pictures, to supply to the first predictive picture buffer 406.

[0133]

The adder 410 is configured for functions to acquire decoded difference data from the first decoder element 404 and predictive pictures or predictive blocks from the first predictive picture buffer 406, and make an addition thereof, to create decoded pictures, to supply to the first reference picture buffer 407 and the deblocker 411.

[0134]

The deblocker 411 is configured for functions to acquire decoded pictures from the adder 410, and implement thereon a process for a prescribed deblocking, to create deblocked decoded pictures, to supply to the first reference picture buffer 407.

[0135]

Part (a) and Part (b) of Fig. 11 show examples of configuration of the first encoder element 403 according to the third embodiment.

[0136]

In an example, the first encoder element 403 includes an orthogonal transformer 4031, a quantizer 4032, and an entropy encoder 4033.

[0137]

The orthogonal transformer 4031 is configured for functions to acquire data on differences, and implement thereon a process for a prescribed orthogonal transform, to create data on orthogonal transform coefficients, to supply to the quantizer.

[0138]

The quantizer 4032 is configured for functions to acquire data on orthogonal transform coefficients from the orthogonal transformer 4031, and implement thereon a process for a prescribed quantization, to create quantized data, to supply to the entropy encoder 4033. For application to a model of first decoder element 404 configured to work without making an entropy decoding on an encoded bit sequence, to acquire quantized data as a result of local decoding and implement thereon a process for a prescribed decoding, there may be use of a quantizer 4032 configured to supply quantized data to the first decoder element 404, as illustrated in Part (b) of Fig. 11.

[0139]

The entropy encoder 4033 is configured for functions to acquire quantized data from the quantizer 4032, and implement thereon a process for a prescribed entropy encoding, to create a first sequence of encoded bits, to supply to the multiplexer 109. For application to a model of first decoder element 404 configured to make an entropy decoding on a first encoded bit sequence, to acquire quantized data and implement thereon a process for a prescribed decoding, there may be use of an entropy encoder 4033 configured to create a first sequence of encoded bits, to supply to the first decoder element 404, as illustrated in Part (a) of Fig. 11.

[0140]

Part (a) and Part (b) of Fig. 12 show examples of configuration of the first decoder element 404 according to the third embodiment.

[0141]

For adaptation to a local decoding process, the first decoder element 404 includes at least an inverse quantizer 4042, and an inverse orthogonal transformer 4043, as illustrated in Part (a) and Part (b) of Fig. 12. For configuration to acquire a first sequence of encoded bits to

implement thereon a complete decoding process, it may additionally include an entropy decoder 4041, as illustrated in Part (a) of Fig. 12.

[0142]

The entropy decoder 4041 is configured for functions to acquire a first sequence of encoded bits from the first encoder element 403, and implement thereon a process for a prescribed entropy decoding, to create quantized data, to supply to the inverse quantizer 4042.

[0143]

The inverse quantizer 4042 is configured for functions to acquire quantized data from the entropy decoder 4041 or the quantizer 4032, and implement thereon a process for a prescribed inverse quantization, to create inverse quantized data on orthogonal transform coefficients, to supply to the inverse orthogonal transformer 4043.

[0144]

The inverse orthogonal transformer 4043 is configured for functions to acquire inverse quantized data on orthogonal transform coefficients from the inverse quantizer 4042, and implement thereon a process for a prescribed inverse orthogonal transform, to create decoded data on differences, to supply to the adder 410.

[0145]

Referring again to Fig. 10, according to the third embodiment, the second encoder 107 includes the third accumulation buffer 415, the second predictor 420, and the second encoder element 421.

[0146]

The third accumulation buffer 415 is configured for functions to acquire from a first resolution converter 104 super-resolution enlarged and converted signals of input pictures with a standard resolution, to accumulate therein, and supply to the second predictor 420. The third accumulation buffer 415 is configured for functions to acquire from the accumulation controller 412 information on control for accumulation, and work on the accumulation control information to control acquisition, accumulation, and supply of super-resolution enlarged and converted signals of input pictures with the standard resolution.

[0147]

The second predictor 420 is configured for functions to acquire from the third accumulation buffer 415 super-resolution enlarged and converted signals of input pictures with the standard resolution, from the second accumulation buffer 416 decoded pictures with the standard resolution, and from a second resolution converter 106 super-resolution enlarged and converted signals of decoded pictures with the standard resolution, and have the super-resolution enlarged and converted signals of input pictures, as encoding target pictures, the decoded pictures derived from the first encoder 102, as first reference pictures, and super-resolution enlarged and converted decoded pictures of the super-resolution enlarged and converted signals of decoded pictures with the standard resolution, as second reference pictures, to implement thereon a process for a prescribed prediction to create predictive pictures, and subtract the predictive pictures from the target pictures, to create data on differences, to supply to the second encoder element 421.

[0148]

The second encoder element 421 is configured for functions to acquire data on differences from the second predictor 420, and implement thereon a process for a prescribed encoding to create the above-noted second sequence of encoded bits, to supply to the multiplexer 109, while working on control information from the code rate controller 423, to vary the code rate of the second sequence of encoded bits being created by the encoding process.

[0149]

The accumulation controller 412 is configured for functions to supply information on control for accumulation to each accumulation buffer, to control among others the state of accumulation, acquisition of pictures, and timings of supply of the accumulation buffer.

[0150]

The second accumulation buffer 416 is configured for functions to acquire decoded pictures with the standard resolution from the first reference picture buffer 407, and supply acquired decoded pictures to the second predictor 420 as well as to a second super-resolution enlarger 105.

[0151]

The second accumulation buffer 416 is configured for functions to acquire information on control for accumulation from the accumulation controller 412, and work on the accumulation control information to control acquisition, accumulation, and supply of decoded pictures.

[0152]

The second reference picture buffer 407 is configured for functions to acquire super-resolution enlarged decoded pictures from the second super-resolution enlarger 105, to accumulate therein, and supply acquired super-resolution enlarged decoded pictures to the second resolution converter 106. In doing so, the second reference picture buffer 407 acquires information on control for accumulation from the accumulation controller 412, and works on the accumulation control information to control acquisition, accumulation, and supply of super-resolution enlarged and converted signals of input pictures with the standard resolution.

[0153]

The code rate controller 423 is configured for functions to monitor code rates of encoded bit sequences created at respective encoder elements, to control actions of the encoder elements to have the code rates fall within prescribed ranges, and work in accordance with among others states of the code rates and states of accumulation buffers obtained from the accumulation controller 412, to control the accumulation controller 412 to change actions of the accumulation buffers. The code rate controller 423 is configured to work when controlling actions of the encoder elements to control the code rates, to change data on parameters of quantization at the encoder elements to thereby control the code rates. There may be an example preferably configured to work on among others information on states of signal amplitudes of difference data at each encoder elements and information on reference picture selection adapted to identify which reference picture is used at each predictor, as necessary to determine whether a process for super-resolution enlargement on a decoded picture is effective or ineffective, to operate when it is ineffective, to command the accumulation controller 412 to control the second accumulation buffer 416 to stop supplying decoded pictures to the second super-resolution enlarger 105, and make a changeover to use data on parameters of quantization created as information on predictive differences based on first reference pictures, as they are

different from those data on parameters of quantization which have been used while the process for super-resolution enlargement has been effective, to control the code rates.

[0154]

Therefore, the moving picture encoding system according to the third embodiment is adapted to exhibit similar advantageous effects to the moving picture encoding system according to the first embodiment shown in Fig. 1, and besides configured with components such as an accumulation controller 412 and a code rate controller 423, implementing among others accumulation control at respective buffers and code rate control at a first encoder 102 and a second encoder 107, thus permitting an encoding to be executed taking into consideration among others accumulation amounts at the buffers and code rates at the first encoder 102 and the second encoder 107.

[0155]

In the third embodiment described, there have been components such as an accumulation controller 412 and a code rate controller 423 incorporated in the moving picture encoding system according to the first embodiment shown in Fig. 1, to effect accumulation control at respective buffers and code rate control at a first encoder 102 and a second encoder 107, whereas there may well be an example having components such as an accumulation controller 412 and a code rate controller 423 incorporated in the moving picture encoding system according to the second embodiment shown in Fig. 7 as well as in Fig. 8 and Fig. 9, to likewise effect among others accumulation control and code rate control.

[0156]

(Fourth Embodiment)

Description is now made of a moving picture encoding system according to a fourth embodiment of the present invention.

[0157]

Fig. 13 is a block diagram showing an example of configuration of the moving picture encoding system according to the fourth embodiment.

[0158]

Referring to Fig. 13, the moving picture encoding system according to the fourth embodiment includes a first accumulation buffer 101, a first encoder 102, a first super-resolution

enlarger 103, a second super-resolution enlarger 105, a third resolution converter 110, a third encoder 108, and a multiplexer 109.

[0159]

The first accumulation buffer 101 is configured for equivalent functions to the embodiment shown in Fig. 1, and redundant description is omitted.

[0160]

The first encoder 102 is configured for equivalent functions to the embodiment shown in Fig. 1. In the fourth embodiment, there is a set of decoded pictures created to supply to the second super-resolution enlarger 105 and the third resolution converter 110.

[0161]

The first super-resolution enlarger 103 is configured for equivalent functions to the embodiment shown in Fig. 1. According to the fourth embodiment, the first super-resolution enlarger 103 is configured for functions to create super-resolution enlarged pictures with a resolution higher than a standard resolution, to supply to the third encoder 108.

[0162]

The second super-resolution enlarger 105 is configured for equivalent functions to the embodiment shown in Fig. 1. According to the fourth embodiment, the second super-resolution enlarger 105 is configured for functions to create super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, to supply to the third encoder 108.

[0163]

The third resolution converter 110 is configured for functions to acquire decoded pictures with the standard resolution from the first encoder 102, and implement a process for a prescribed resolution conversion on acquired decoded pictures with the standard resolution to create resolution conversion enlarged decoded pictures being high resolution enlarged decoded pictures with a resolution equal to the spatial resolution of super-resolution enlarged pictures created at the first super-resolution enlarger 103 and that of super-resolution enlarged decoded pictures created at the second super-resolution enlarger 105, to supply to the third encoder 108. There may be configuration with a function to have a ratio of resolution conversion set up upon implementation of the process for the prescribed resolution conversion as preset information on

a prescribed resolution conversion ratio, or as acquired information on resolution conversion ratio such as set up by an external user, and work on the basis of acquired information on resolution conversion ratio to establish a resolution conversion ratio to implement the process for the prescribed resolution conversion.

[0164]

The third encoder 108 is configured for functions to acquire from the first super-resolution enlarger 103 super-resolution enlarged pictures, from the third resolution converter 110 resolution conversion enlarged decoded pictures with a high resolution, and from the second super-resolution enlarger 105 super-resolution enlarged decoded pictures with the high resolution, to have acquired super-resolution enlarged pictures as encoding target pictures, resolution conversion enlarged decoded pictures from the third resolution converter 110 as first reference pictures, and super-resolution enlarged decoded pictures from the second super-resolution enlarger 105 as second reference pictures, and implement thereon a combination of processes for prescribed prediction and encoding to create a third sequence of encoded bits, and supply the multiplexer 109 with the third sequence of encoded bits thus created.

[0165]

For a reference picture to be used in a process for the prescribed prediction at the third encoder 108, there may be a configuration to employ either a first reference picture obtained from a resolution conversion enlarged decoded picture or a second reference picture obtained from a super-resolution enlarged decoded picture, to create a predictive picture, and subtract the predictive picture from a target picture, to create a data on a difference in between.

[0166]

There may be a configuration involved to create a difference data from a target picture, using neither first reference picture nor second reference picture.

[0167]

For control to make a selection of reference picture for each picture or for each set of a prescribed number of pictures, the third encoder 108 may be configured to create a set of data on the selection of reference picture to identify a first reference picture or a second reference picture whichever is used, and implement thereon a process for a prescribed entropy encoding

using an unshown entropy encoder to create a sequence of encoded bits of data on the reference picture selection, to supply to the multiplexer 109.

[0168]

There may be use of combination of target pictures each respectively divided with no spaces left into regions of a prescribed area and first and second reference pictures likewise divided with no spaces left into regions of a prescribed area, to operate for each commensurate region to identify a first reference picture or a second reference picture whichever is selective to create a predictive picture, and subtract the predictive picture from a target picture, to create a data on a difference in between. There may be operations made for each region of a prescribed area to have data for identification of which reference picture has been used, as data on reference picture selection, and implement thereon a process for a prescribed entropy encoding using an unshown entropy encoder, to create, and supply to the multiplexer 109, a resultant sequence of encoded bits of data on reference picture selection. There may well be regions of a prescribed area shaped as regions of a prescribed rectangular form, or as regions of an arbitrary form conforming to a prescribed domain division.

[0169]

The third encoder 108 may be configured for combination of a set of operations to subtract a first reference picture as a predictive picture from an encoding target picture, to obtain a data on a difference in between as a first difference data, and implement thereon a process for a prescribed third encoding to create a first sequence of bits encoded by the third encoding, a set of operations to subtract a second reference picture as a predictive picture from the encoding target picture, to obtain a data on a difference in between as a second difference data, and implement thereon the process for the prescribed third encoding to create a second sequence of bits encoded by the third encoding, and a set of operations to create a data on difference simply from the encoding target picture, using neither first reference picture nor second reference picture, to use as a third difference data, and implement thereon the process for the prescribed third encoding to create a third sequence of bits encoded by the third encoding, to provide the multiplexer 109 with thus created first to third sequences of bits encoded by third encoding. There are data on methods for selection of respective types of reference pictures and data on encoding methods as described, which may be collected as data on reference picture selection

modes and as data on encoding modes for the third encoding, respectively, and processed by implementing thereon a process for a prescribed entropy encoding using an unshown entropy encoder, to supply to the multiplexer 109.

[0170]

The multiplexer 109 is configured for functions to acquire from the first encoder 102 a first sequence of encoded bits and from the third encoder 108 a third sequence of encoded bits, and operate complying with a prescribed syntax structure to implement a process of multiplexing the first sequence of encoded bits, the third sequence of encoded bits, and sequences of encoded bits of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like, to create a sequence of multiplexed bits to be output. The multiplexer 109 may well be configured for functions to additionally acquire data on modes of reference picture selection and data on reference picture selection as created at the third encoder 108 in the form of sequences of encoded bits encoded through an unshown entropy encoder, and implement thereon a process for a multiplexing to create a sequence of bits multiplexed as described above.

[0171]

The multiplexer 109 may be configured to acquire from the first encoder 102 a first sequence of encoded bits, and from the third encoder 108 the first to the third sequence of bits encoded by the third encoding. The multiplexer 109 may then be configured to reproduce the acquired first sequence of encoded bits with the standard resolution, to create a first to a third sequence of bits encoded by a first encoding with the standard resolution. The multiplexer 109 may then be configured to operate complying with a prescribed syntax structure to implement a process of multiplexing a respective one of combination of the first sequence of bits encoded by the third encoding and the first sequence of bits encoded by the first encoding with the standard resolution, combination of the second sequence of bits encoded by the third encoding and a second sequence of bits encoded by the first encoding with the standard resolution, and combination of the third sequence of bits encoded by the third encoding and the third sequence of bits encoded by the first encoding with the standard resolution, and sequences of encoded bits

of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like, to create a first to a third sequence of encoded bits as multiplexed to output. The multiplexer 109 may then be configured to operate in response to a demand such as from a data on encoding mode, to selectively create any of the first to the third sequence of encoded bits as multiplexed. The data on encoding mode then used may be formatted to include at least information to control the multiplexing.

[0172]

According to the fourth embodiment, there is a moving picture encoding system configured for the foregoing functions, and adapted to work on input moving pictures, to implement a process for a prescribed super-resolution enlargement and a process for a prescribed resolution conversion, creating super-resolution enlarged and converted pictures, to make use of them allowing for a moving picture encoding based on an increased amount of information relative to an information amount of input moving pictures. In the configuration shown in Fig. 13, the first super-resolution enlarger 103 and the second super-resolution enlarger 105 have enlargement ratios applied thereto, which may well be enlargement ratios equal to each other, while they may be unequal to each other. Further, the resolution conversion ratio applied to the third resolution converter 110 may well be such a resolution conversion ratio that would provide the same resolution as the spatial resolution of super-resolution enlarged pictures created at the first super-resolution enlarger 103 and super-resolution enlarged decoded pictures created at the second super-resolution enlarger 105, while it may not be so.

[0173]

Description is now made of actions of the moving picture encoding system according to the fourth embodiment shown in Fig. 13, with reference to a flowchart of Fig. 14.

[0174]

Fig. 14 is a flowchart showing actions of the moving picture encoding system according to the fourth embodiment.

[0175]

First, in the moving picture encoding system according to the fourth embodiment, the first accumulation buffer 101 stores therein input moving pictures, as necessary in number of pictures for the first super-resolution enlarger 103 to implement a process for a first super-resolution enlargement (S1401).

[0176]

The first super-resolution enlarger 103 acquires from the first accumulation buffer 101 two or more pictures, as necessary for a process for a prescribed first super-resolution enlargement, and implements thereon the process for the prescribed super-resolution enlargement (S1402), whereby it creates super-resolution enlarged pictures with a resolution higher than a standard resolution that input moving pictures have as a spatial resolution thereof, to supply to the third encoder 108.

[0177]

The third encoder 108 acquires super-resolution enlarged pictures from the first super-resolution enlarger 103, storing them in a prescribed buffer for temporary accumulation (S1403).

[0178]

On the other hand, the first encoder 102 acquires from the first accumulation buffer 101 a sequence of moving pictures with the standard resolution as necessary for implementation of a process for a prescribed pre-super-resolution encoding, and implements thereon a process for an encoding and a decoding at the standard resolution (S1404), whereby it creates a first sequence of encoded bits with the standard resolution as a result of the encoding process, and a set of decoded pictures with the standard resolution as a result of the decoding.

[0179]

After that, the first encoder 102 works to supply the first sequence of encoded bits thus created to the multiplexer 109, and store the set of decoded pictures thus created in a prescribed buffer for temporary accumulation (S1405).

[0180]

The second super-resolution enlarger 105 acquires the set of decoded pictures from the first encoder 102, and implements thereon a process for a prescribed super-resolution

enlargement (S1406), whereby it creates a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, to supply to the third encoder 108.

[0181]

After that, the third encoder 108 acquires super-resolution enlarged decoded pictures from the second super-resolution enlarger 105, storing them in a prescribed buffer for temporary accumulation (S1407).

[0182]

Further, the third resolution converter 110 acquires the set of decoded pictures from the first encoder 102, and implements thereon a process for a prescribed resolution conversion (S1408), whereby it creates resolution conversion enlarged decoded pictures being high resolution enlarged decoded pictures with a resolution higher than the standard resolution, to supply to the third encoder 108.

[0183]

After that, the third encoder 108 acquires resolution conversion enlarged decoded pictures with a high resolution from the third resolution converter 110, storing them in a prescribed buffer for temporary accumulation (S1409).

[0184]

The combination of processes associated with steps S1402 to S1403, the combination of processes associated with steps S1404 to S1407, and the combination of processes associated with steps S1408 to S1409 may be implemented in parallel, or in series.

[0185]

With the foregoing processes completed, the third encoder 108 has super-resolution enlarged pictures acquired from the first super-resolution enlarger 103 as encoding target pictures, resolution conversion enlarged decoded pictures acquired from the third resolution converter 110 as first reference pictures, and super-resolution enlarged decoded pictures acquired from the second super-resolution enlarger 105 as second reference pictures, and implements thereon a process for a prescribed third prediction (S1410), whereby it creates data on differences at the high resolution. After that, it works on the created data on differences, to implement a third encoding process that is a prescribed third encoding (S1411), whereby it creates a third sequence of encoded bits, to supply to the multiplexer 109.

[0186]

After that, the multiplexer 109 acquires a first sequence of encoded bits from the first encoder 102 and a third sequence of encoded bits from the third encoder 108, and works complying with a prescribed syntax structure, to implement a process of multiplexing them together with sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they area each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like (S1412), to create such a sequence of multiplexed bits as illustrated in Fig. 15. The present embodiment involves a series of actions to be complete through the foregoing steps.

[0187]

Fig. 15 is a diagram of data format illustrating an example of structure of a multiplexed bit sequence 300 created at the multiplexer 109 according to the fourth embodiment.

[0188]

The multiplexed bit sequence 300 has multiplexed therein a bit sequence 310 of data on encoding parameters, a first sequence 320 of encoded bits from the first encoder 102, and a third sequence 340 of encoded bits from the third encoder 108.

[0189]

There have been operations described as being parallel processes according to the fourth embodiment, while those processed in parallel may well be consecutively processed in a configuration operable according to the present embodiment.

[0190]

According to the fourth embodiment, like the first embodiment described, the moving picture encoding system is configured with the first super-resolution enlarger 103 and the second super-resolution enlarger 105 working to implement processes for a first and a second super-resolution enlargement, affording to have a spatial resolution of input pictures as a standard resolution, permitting the process for the first super-resolution enlargement to create super-resolution enlarged pictures with a resolution higher than the standard resolution.

[0191]

As a result, the process for the first super-resolution enlargement is allowed to process information on spatial and temporal frequency components that have been potentially contained in input moving pictures but unable to express to a sufficient degree by the standard resolution, to reconstruct from the input moving pictures on the basis of a prescribed super-resolution process, to describe with a resolution higher than the standard resolution. It is thus possible to extend information on frequency components that input moving pictures have, to implement thereon a process for moving picture encoding, to make a moving picture encoding based on a greater amount of information than input moving pictures have.

[0192]

Further, it is possible to work on moving pictures input with the standard resolution, to implement a process for prescribed encoding and decoding to create decoded pictures with the standard resolution, and implement a process for a prescribed second super-resolution enlargement on the decoded pictures to create super-resolution enlarged decoded pictures with a resolution higher than the standard resolution with enlarged information on spatial and temporal frequency components, and to have thus created super-resolution enlarged decoded pictures as reference pictures with a high resolution, and use to implement a process for a prescribed prediction relative to super-resolution enlarged pictures, before implementing a process for a prescribed third encoding to create a third sequence of encoded bits. Like this, there can be use of super-resolution enlarged decoded pictures as reference pictures, to effect a hierarchical encoding making use of correlations of spatial resolution relative to super-resolution enlarged pictures, to make a moving picture encoding based on a greater amount of information than input moving pictures have.

[0193]

That is, according to the fourth embodiment, like the first embodiment described, such information on frequency components of pictures that could have been expressed simply within a range that can be described with an inherent spatial resolution of standard resolution as input, is reconstructed making use of correlations that the pictures themselves potentially contain, so it is possible to implement a process for a prescribed super-resolution enlargement to create anew such information on frequency components that can be described simply within a range of spatial resolutions higher than the standard resolution, and reflect in super-resolution

enlarged pictures, permitting differences between the super-resolution enlarged pictures being new final encoding targets thus created and information on frequency components of spatial resolution respectively contained in sequences of original moving pictures with the standard resolution, to be encoded and transmitted according to the present invention, as an essential point. Instead, even with a moving picture decoding system adapted to simply implement a process for a second super-resolution enlargement to create super-resolution enlarged decoded pictures to output to an external display system, there would have been a prescribed decoding process implemented on a first sequence of encoded bits as decoding targets with a standard resolution to create decoded pictures with the standard resolution, which should have contained not a little deterioration in the encoding, so even if the process for the second super-resolution enlargement were implemented as prescribed on the decoded pictures, the process implemented should have been for a super-resolution enlargement on decoded pictures with the standard resolution containing encoding deteriorations, and could not always have been a proper process implemented for super-resolution enlargement, while it might have had a certain effect. According to the present invention, there is a configuration adapted to implement a process for a prescribed extension encoding on super-resolution enlarged decoded pictures being not always sufficient as described, to encode and transmit their differences relative to information on frequency components contained in super-resolution enlarged pictures as inherently would be, thus allowing for more and accurate information on frequency components contained in super-resolution enlarged pictures to be supplied to a decoding system end.

[0194]

Further, according to the fourth embodiment, it is possible to work upon creation of a predictive picture, to use a first reference picture from the third resolution converter 110 or a second reference picture from the second super-resolution enlarger 105, whichever is selective to implement a third encoding process that is a prescribed third encoding, permitting a hierarchical encoding to be made by utilization of a correlation of spatial resolution between a super-resolution enlarged picture and a resolution conversion enlarged decoded picture being the first reference picture or by utilization of a correlation of spatial resolution between the super-resolution enlarged picture and a super-resolution enlarged decoded picture being the

second reference picture, whichever is requested, thus allowing for different multiplexed bit sequences to be created to supply to, accumulate at, and /or transmit to a decoding system end.

[0195]

Further, according to the fourth embodiment, it is possible to work along creation of predictive pictures, to control selection of reference picture for each picture or for each set of a prescribed number of pictures, permitting an adaptive creation of predictive picture in accordance with the image quality of decoded picture, resulting in an enhanced encoding efficiency.

[0196]

Further, according to the fourth embodiment, it is possible to provide a configuration for services to create a data of reference picture selection for identifying a first reference picture or a second reference picture whichever is used, to supply to the multiplexer 109, allowing for a facilitated identification of a reference picture used in an encoding according to the present invention.

[0197]

Further, according to the fourth embodiment, it is possible to provide a target picture divided with no spaces left into regions each having a prescribed area, and combination of a first reference picture and a second reference picture likewise divided into regions each having a prescribed area, and identify the first reference picture or the second reference picture whichever is selective for a respective region to create a predictive picture, thereby permitting an adaptive creation of predictive picture in accordance with the image quality of decoded picture, resulting in an enhanced encoding efficiency.

[0198]

Further, it is possible to work on moving pictures input with the standard resolution, to implement a process for prescribed encoding and decoding to create a first sequence of encoded bits, and implement a process for third encoding to create a third sequence of encoded bits with the standard resolution, and to operate complying with a prescribed syntax structure, to implement a process of multiplexing the sequences of encoded bits, together with sequences of encoded bits of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters,

as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like, to create a sequence of multiplexed bits. The sequence of multiplexed bits thus created is configured as a single sequence of encoded bits including both of a result of encoding on inherent input moving pictures and a result of encoding on a set of errors in a prediction using information on frequency components as enlarged in super-resolution enlarged pictures having undergone a process for super-resolution enlargement, and is adaptive for services such as transmitting to an unshown external accumulator before recording in a prescribed recording medium, or delivering through a network using an unshown external communication system, thereby permitting a moving picture encoding system according to the present embodiment to operate on moving pictures with heavy amounts of information, allowing for efficient encoding, accumulation, and transmission.

[0199]

Further, it is possible to work to acquire a first and a second sequence of bits encoded by the third encoding, identify a set of sequences of encoded bits to be multiplexed in accordance with data on encoding modes, and implement a process for a prescribed multiplexing on identified sequences of encoded bits to create a sequence of multiplexed bits, permitting a variety of encoded bit sequences to be created, affording to make a selective decoding at a decoding system end.

[0200]

(Fifth Embodiment)

In the fourth embodiment described above, there has been a third encoder 108 working as illustrated in Fig. 13 to have a pair of reference pictures input thereto, that is, combination of a first reference picture being a decoded picture from a first encoder 102 as processed for a third resolution conversion at a third resolution converter 110 to provide as a resolution conversion enlarged decoded picture, and a second reference picture being the decoded picture from the first encoder 102 as processed for a second super-resolution enlargement at a second super-resolution enlarger 105 to provide as a super-resolution enlarged decoded picture, to employ the reference pictures enabling a high efficient prediction to create a predictive picture, whereas there may well be an example adapted for instance as illustrated in

Fig. 16, for operation to simply input a resolution conversion enlarged decoded picture from a third resolution converter 110, as a reference picture, or for instance as illustrated in Fig. 17, for operation to simply input a super-resolution enlarged decoded picture from a second super-resolution enlarger 105, as a reference picture, and have a super-resolution enlarged picture from a first super-resolution enlarger 103, as an encoding target picture, for use to make a combination of prediction and encoding.

[0201]

(Sixth Embodiment)

Description is now made of a moving picture encoding system according to a sixth embodiment of the present invention.

[0202]

Fig. 18 is a block diagram showing an example of configuration of the moving picture encoding system according to the sixth embodiment.

[0203]

Referring to Fig. 18, the moving picture encoding system according to the sixth embodiment is configured as a specific example of the moving picture encoding system according to the fourtht embodiment shown in Fig. 13, including an accumulation controller 412, a second accumulation buffer 416, a second reference picture buffer 418, and a code rate controller 423 added anew.

[0204]

Description is now made of those component elements in Fig. 18, which have different functions or new functions relative to component elements of the fourth embodiment shown in Fig. 13.

[0205]

There is a fourth accumulation buffer 501 configured for functions to acquire super-resolution enlarged pictures from a first super-resolution enlarger 103, to accumulate therein, and supply accumulated super-resolution enlarged pictures to a third predictor 502. The fourth accumulation buffer 501 may work to acquire information on control for accumulation from the accumulation controller 412, and operate on the accumulation control

information to control acquisition, accumulation, and supply of super-resolution enlarged pictures.

[0206]

The third predictor 502 may well be configured for functions to acquire from the fourth accumulation buffer 501 super-resolution enlarged pictures, from the second accumulation buffer 418 super-resolution enlarged decoded pictures, and from a third resolution converter 110 resolution conversion enlarged decoded pictures, and have a respective one of the super-resolution enlarged pictures thus acquired, as an encoding target picture, a respective one of the resolution conversion enlarged decoded pictures, as a first reference picture from resolution conversion enlarged decoded picture, and a respective one of the super-resolution enlarged decoded pictures, as a second reference picture from super-resolution enlarged decoded picture, to implement thereon a process for a prescribed prediction to create a predictive picture, and subtract the predictive picture from the encoding target picture, to create data on a difference in between, to supply to a third encoder element 503.

[0207]

The third encoder element 503 is configured for functions to acquire difference data from the third predictor 502, and implement thereon a process for a prescribed encoding to create a third sequence of encoded bits, to supply to a multiplexer 109. The third encoder element 503 may well be configured for functions to work on control information from the code rate controller 423, to vary the code rate of the third sequence of encoded bits being created by the encoding process.

[0208]

The third resolution converter 110 is configured for functions to acquire decoded pictures from the second accumulation buffer 416, and implement thereon a process for a prescribed resolution conversion, to create resolution conversion enlarged decoded pictures being enlarged decoded pictures with a high resolution, to supply to the third predictor 502. The third resolution converter 110 may be configured to implement the process for the prescribed resolution conversion to create resolution conversion enlarged decoded pictures with a high resolution equal to the spatial resolution of super-resolution enlarged pictures created at

the first super-resolution enlarger 103 and that of super-resolution enlarged decoded pictures created at the second super-resolution enlarger 105.

[0209]

There will be supplemental description of the accumulation controller 412, the second accumulation buffer 416, the second accumulation buffer 418, and the code rate controller 423.

[0210]

The accumulation controller 412 can do with functions equivalent to those of the accumulation controller 412 in the third embodiment show in Fig. 10, and redundant description is omitted.

[0211]

The second accumulation buffer 416 can do with functions equivalent to those of the second accumulation buffer 416 in the third embodiment show in Fig. 10, and redundant description is omitted.

[0212]

The second accumulation buffer 418 is configured for additional functions to supply super-resolution enlarged decoded pictures acquired from the second super-resolution enlarger 105, to the third predictor 502.

[0213]

Also the code rate controller 423 is configured for functions equivalent to those of the code rate controller 423 in the third embodiment show in Fig. 10.

[0214]

Such being the case, the sixth embodiment shown in Fig. 18 is adapted for operations similar to those of the third embodiment show in Fig. 10, and redundant description is omitted.

[0215]

The moving picture encoding system according to the sixth embodiment is adapted to exhibit similar advantageous effects to the moving picture encoding system according to the fourth embodiment shown in Fig. 1, and like the third embodiment show in Fig. 10, configured with components, such as an accumulation controller 412 and a code rate controller 423, implementing among others accumulation control at respective buffers and code rate control at a first encoder 102 and a third encoder 108, thus permitting an encoding to be executed taking

into consideration among others accumulation amounts at the buffers and code rates at the first encoder 102 and the third encoder 108.

[0216]

In the sixth embodiment described, there have been components such as an accumulation controller 412 and a code rate controller 423 incorporated in the moving picture encoding system according to the fourth embodiment shown in Fig. 13, to effect accumulation control at respective buffers and code rate control at a first encoder 102 and a third encoder 108, whereas there may well be an example having components such as an accumulation controller 412 and a code rate controller 423 incorporated in an example of moving picture encoding system according to the fifth embodiment shown in Fig. 16 or Fig. 17, to likewise effect among others accumulation control and code rate control.

[0217]

(Seventh Embodiment)

Description is now made of a moving picture encoding system according to a seventh embodiment of the present invention.

[0218]

Fig. 19 is a block diagram showing an example of configuration of the moving picture encoding system according to the seventh embodiment.

[0219]

As shown in Fig. 19, the moving picture encoding system according to the seventh embodiment is configured as an integration of the moving picture encoding system according to the first embodiment shown in Fig. 1 and the moving picture encoding system according to the fourth embodiment shown in Fig. 13, so as for basic functions of component elements, different ones will be described, omitting redundancy.

[0220]

There is a multiplexer 109 configured for functions to acquire from a first encoder 102 a first sequence of encoded bits, from a second encoder 107 a second sequence of encoded bits, and from a third encoder 108 a third sequence of encoded bits, and operate complying with a prescribed syntax structure to implement a process of multiplexing the first sequence of encoded bits, the second sequence of encoded bits, and the third sequence of encoded bits,

together with sequences of encoded bits of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like, to create a sequence of multiplexed bits. The multiplexer 109 may then be configured to reproduce a first sequence of encoded bits acquired from the first encoder 102 with a standard resolution, to have a first sequence of bits encoded by a first encoding, and a second sequence of bits encoded by the first encoding, and operate complying with a prescribed syntax structure to implement a process of multiplexing the first sequence of bits encoded by the first encoding as reproduced with the standard resolution, and the second sequence of encoded bits as acquired, together with sequences of encoded bits of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits, to create a sequence of encoded bits as multiplexed to output. The multiplexer 109 may be configured to operate complying with a prescribed syntax structure to implement a process of multiplexing the second sequence of bits encoded by the first encoding as reproduced, and the third sequence of encoded bits as acquired, together with sequences of encoded bits of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like, to create a second sequence of encoded bits as multiplexed to output.

[0221]

Further , the multiplexer 109 may be configured to acquire from the second encoder 107 a first to a third sequence of bits encoded by a second encoding, and from the third encoder 108 a first to a third sequence of bits encoded by a third encoding. The multiplexer 109 may then be preferably configured for functions to reproduce a first sequence of encoded bits acquired with a standard resolution, to have a first to a sixth sequence of bits encoded by a first

encoding, and operate complying with a prescribed syntax structure to implement a process of multiplexing a respective one of a combination of the first sequence of bits encoded by the second encoding and the first sequence of bits encoded by the first encoding with the standard resolution, a combination of a second sequence of bits encoded by the second encoding and a second sequence of bits encoded by the first encoding with the standard resolution, a combination of the third sequence of bits encoded by the second encoding and a third sequence of bits encoded by the first encoding with the standard resolution, a combination of the first sequence of bits encoded by the third encoding and a fourth sequence of bits encoded by the first encoding with the standard resolution, a combination of a second sequence of bits encoded by the third encoding and a fifth sequence of bits encoded by the first encoding with the standard resolution, and a combination of the third sequence of bits encoded by the third encoding and the sixth sequence of bits encoded by the first encoding with the standard resolution, and sequences of encoded bits of sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they are each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like, to create a first to a sixth sequence of encoded bits as multiplexed to output as requested. The multiplexer 109 may then be configured to operate in response to a demand, to selectively create any of the first to the sixth sequence of encoded bits as multiplexed.

[0222]

With functions inclusive of the foregoing, the seventh embodiment is configured to work on input moving pictures, to implement a process for a prescribed super-resolution enlargement and a process for a prescribed resolution conversion, to create among others super-resolution enlarged signals and super-resolution enlarged and converted signals of input pictures, to make use of them allowing for a moving picture encoding based on an increased amount of information relative to an information amount of input moving pictures. In the configuration shown in Fig. 19, there is combination of a first super-resolution enlarger 103 and a second super-resolution enlarger 105 that have enlargement ratios applied thereto, which may well be equal to each other, while they may be unequal to each other. Moreover, there is

combination of a first resolution converter 104 and a second resolution converter 106 that have resolution conversion ratios applied thereto, which may well be such an identical resolution conversion ratio that would provide a standard resolution as a spatial resolution after the process for resolution conversion, while they may be different enlargement ratios. Further, there is a third resolution converter 110 that has a resolution conversion ratio applied thereto, which may well be such a resolution conversion ratio that would provide the same resolution as the spatial resolution of super-resolution enlarged pictures created at the first super-resolution enlarger 103 and super-resolution enlarged decoded pictures created at the second super-resolution enlarger 105, while it may be a different enlargement ratio.

[0223]

Description is now made of actions of the moving picture encoding system according to the seventh embodiment shown in Fig. 19, with reference to a flowchart of Fig. 20.

[0224]

First, there are input moving pictures stored in a first accumulation buffer 101, as necessary in number of pictures for the first super-resolution enlarger 103 to implement a process for a first super-resolution enlargement (S1901).

[0225]

The first super-resolution enlarger 103 acquires from the first accumulation buffer 101 two or more pictures, as necessary for a process for a prescribed first super-resolution enlargement, and implements thereon the process for the prescribed super-resolution enlargement (S1902), whereby it creates super-resolution enlarged pictures with a resolution higher than a standard resolution that input moving pictures have as a spatial resolution thereof, to supply to the first resolution converter 104 and the third encoder 108.

[0226]

After that, the third encoder 108 acquires super-resolution enlarged pictures from the first super-resolution enlarger 103, storing them in a prescribed buffer for temporary accumulation (S1903).

[0227]

After that, the first resolution converter 104 acquires super-resolution enlarged pictures from the first super-resolution enlarger 103, and implements thereon a process for a

prescribed resolution conversion (S1904), whereby it creates super-resolution enlarged and converted signals of input pictures with the standard resolution, to supply thus created super-resolution enlarged and converted signals of input pictures with the standard resolution to the second encoder 107.

[0228]

After that, the second encoder 107 acquires from the first resolution converter 104 super-resolution enlarged and converted signals of input pictures with the standard resolution, storing them in a prescribed buffer for temporary accumulation (S1905).

[0229]

On the other hand, the first encoder 102 acquires from the first accumulation buffer 101 a sequence of moving pictures with the standard resolution as necessary for implementation of a process for a prescribed pre-super-resolution encoding, and implements thereon a process for an encoding and a decoding at the standard resolution (S1906), whereby it creates a first sequence of encoded bits with the standard resolution as a result of the encoding process, and a set of decoded pictures with the standard resolution as a result of the decoding. After that, the first encoder 102 works to supply the first sequence of encoded bits thus created to the multiplexer 109, and supply the set of decoded pictures created with the standard resolution to the second super-resolution enlarger 105, the second encoder 107, and the third resolution converter 110.

[0230]

Then, the second encoder 107 acquires the set of decoded pictures from the first encoder 102, storing in a prescribed buffer for temporary accumulation (S1907).

[0231]

Further, the second super-resolution enlarger 105 acquires the set of decoded pictures from the first encoder 102, and implements thereon a process for a prescribed super-resolution enlargement (S1908), whereby it creates a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution, to supply to the second resolution converter 106 and the third encoder 108.

[0232]

Then, the third encoder 108 acquires the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger 105, storing in a prescribed buffer for temporary accumulation (S1909).

[0233]

Further, the second resolution converter 106 acquires the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger 105, and implements thereon a process for a prescribed resolution conversion (S1910), whereby it creates super-resolution enlarged and converted decoded signals with the standard resolution, to supply to the second encoder 107.

[0234]

Then, the second encoder 107 acquires super-resolution enlarged and converted decoded signals with the standard resolution from the second resolution converter 106, storing them in a prescribed buffer for temporary accumulation (S1911).

[0235]

Further, the third resolution converter 110 acquires the set decoded pictures from the first encoder 102, and implements thereon a process for a prescribed resolution conversion (S1912), whereby it creates a set of resolution conversion enlarged decoded pictures being enlarged decoded pictures with a high resolution, to supply to the third encoder 108.

[0236]

After that, the third encoder 108 acquires the set of resolution conversion enlarged decoded pictures with the high resolution from the third resolution converter 110, storing in a prescribed buffer for temporary accumulation (S1913).

[0237]

The combination of processes associated with steps S1902 to S1905, the combination of processes associated with steps S1906 to S1911, and the combination of processes associated with steps S1912 to S1913 may be implemented in parallel, or in series.

[0238]

With the foregoing processes completed, the second encoder 107 has super-resolution enlarged and converted pictures of input pictures acquired from the first resolution converter 104 as encoding target pictures, decoded pictures acquired from the first encoder 102 as first

reference pictures, and super-resolution enlarged and converted decoded pictures acquired from the second resolution converter 106 as second reference pictures, and works to implement thereon a process for a prescribed second prediction to create data on differences at the standard resolution (S1914), implement a second encoding process as a process for a prescribed second encoding on the difference data thus created (S1915), whereby it creates a second sequence of encoded bits, to supply to the multiplexer 109.

[0239]

Further, the third encoder 108 has super-resolution enlarged pictures of input pictures acquired from the first super-resolution enlarger 103 as encoding target pictures, resolution conversion enlarged decoded pictures acquired from the third resolution converter 110 as first reference pictures, and super-resolution enlarged decoded pictures acquired from the second super-resolution enlarger 105 as second reference pictures, and works to implement thereon a process for a prescribed third prediction to create data on differences at the high resolution (S1916), and implement a third encoding process being a prescribed third encoding on the data on differences thus created to (S1917), whereby it creates a third sequence of encoded bits, to supply to the multiplexer 109. After that, it waits for completion of other parallel processes.

[0240]

After that, the multiplexer 109 acquires a first sequence of encoded bits from the first encoder 102, a second sequence of encoded bits from the second encoder 107, and a third sequence of encoded bits from the third encoder 108, and works complying with a prescribed syntax structure, to implement a process of multiplexing the first sequence of encoded bits, the second sequence of encoded bits, and the third sequence of encoded bits, together with sets of data used in encoding processes, involving data on motion vectors, data on quantizing parameters, data on reference picture selection, and data on encoding parameters, as they area each respectively processed through an unshown entropy encoder, while inserting identification data for identification of a set of subsequent sequences of encoded bits and the like (S1918), to create a sequence of multiplexed bits. The present embodiment involves a series of actions to be complete through the foregoing steps.

[0241]

Fig. 21 is a diagram of data format illustrating an example of structure of a multiplexed bit sequence 300 created at the multiplexer 109 according to the seventh embodiment.

[0242]

The multiplexed bit sequence 300 has multiplexed therein a bit sequence 310 of data on encoding parameters, a first sequence 320 of encoded bits from the first encoder 102, a second sequence 330 of encoded bits from the second encoder 107, and a third sequence 340 of encoded bits from the third encoder 108.

[0243]

There have been operations described as being parallel processes according to the present embodiment, while those processed in parallel may well be consecutively processed in a configuration operable according to the present embodiment.

[0244]

Therefore, the seventh embodiment, configured as shown in Fig. 19, affords to make simultaneous use of advantageous effects available from the first embodiment shown in Fig. 1 and those from the fourth embodiment shown in Fig. 12.

[0245]

Further, according to the seventh embodiment, there is a system including a first encoder 102 configured to work on moving pictures input with a standard resolution, to implement thereon a combination of processes for prescribed encoding and decoding to create a first sequence of encoded bits with the standard resolution, a second encoder 107 configured to implement a process for a second encoding to create a second sequence of encoded bits with the standard resolution, and a third encoder 108 configured to implement a process for a third encoding to create a third sequence of encoded bits with a high resolution, the system being adapted to implement a process for a prescribed multiplexing on the first to the third sequence of encoded bits to create a sequence of multiplexed bits, as a single stream of encoded bits carrying results of encoding on inherent input moving pictures, and results of encoding on a set of errors in a prediction using information on frequency components as enlarged in among others super-resolution enlarged pictures and super-resolution enlarged and converted pictures created by a process for super-resolution enlargement combined with a process for resolution

conversion, permitting their efficient accumulation or transmission, allowing for a selective decoding at a decoding system end.

[0246]

Further, according to the seventh embodiment, there is a system configured with a second encoder 107 adapted to implement a process for a prescribed prediction making use of a first reference picture obtained from a decoded picture with a standard resolution or a second reference picture obtained from a set of super-resolution enlarged and converted signals of the decoded picture with the standard resolution, whichever is used as a reference picture, to create a predictive picture, and subtract the predictive picture from an encoding target picture obtained from a set of super-resolution enlarged and converted signals of an input picture with the standard resolution, to create a data on a difference in between, implementing a process for a prescribed encoding on the difference data to create a second sequence of encoded bits, in combination with a third encoder 108 adapted to implement a process for a prescribed prediction making use of a first reference picture obtained from a resolution conversion enlarged decoded picture with a high resolution or a second reference picture obtained from a super-resolution enlarged decoded picture, whichever is used as a reference picture, to create a predictive picture, and subtract this predictive picture from an encoding target picture obtained from a super-resolution enlarged picture, to create a data on a difference in between, implementing a process for a prescribed encoding on this difference data to create a third sequence of encoded bits, thereby affording to operate in accordance with a request, to perform a hierarchical encoding making use of a correlation of spatial resolution between the decoded picture and the set of super-resolution enlarged and converted signals of the input picture with the standard resolution, as well as in use of a correlation of spatial resolution between the set of super-resolution enlarged and converted decoded signals and the set of super-resolution enlarged and converted signals of the input picture with the standard resolution, and perform a hierarchical encoding making use of a correlation of spatial resolution between the super-resolution enlarged picture and the resolution conversion enlarged decoded picture, as well as in use of a correlation of spatial resolution between the super-resolution enlarged picture and the super-resolution enlarged decoded picture, thus allowing for different multiplexed bit sequences to be created to supply to, accumulate at, and /or transmit to a decoding system end.

[0247]

Moreover, it is possible to provide a configuration for services to create information on reference picture selection including a data on reference picture selection for identifying a first reference picture or a second reference picture whichever is used, to supply to the multiplexer 109, allowing for a facilitated identification of a reference picture used in an encoding according to the seventh embodiment.

[0248]

Further, according to the seventh embodiment, there is a system adapted to operate in accordance with a request, to implement a process for a multiplexing on a domain including a first sequence of encoded bits as derived from a first encoder 102 with a standard resolution, a first to a third sequence of bits encoded by a second encoding as derived from a second encoder 107, and a first to a third sequence of bits encoded by a third encoding as derived from a third encoder 107, to create any of first to sixth sequences of encoded bits as multiplexed, permitting creation of a variety of encoded bit sequences. Further, there is a system adaptive for services such as transmitting to an unshown external accumulator before recording in a prescribed recording medium, or delivering through a network using an unshown external communication system, thereby permitting a moving picture encoding system according to the present embodiment to operate on moving pictures with heavy amounts of information, allowing for efficient encoding, accumulation, and transmission, as well as for selective decoding at a decoding system end.

[0249]

In Fig. 19, the moving picture encoding system according to the seventh embodiment is configured as an integration of the moving picture encoding system according to the first embodiment shown in Fig. 1 and the moving picture encoding system according to the fourth embodiment shown in Fig. 13, while there may well be integrations such as an integration of the moving picture encoding system according to the first embodiment shown in Fig. 1 and an example of moving picture encoding system according to the fifth embodiment shown in Fig. 16 or Fig. 17, an integration of an example of moving picture encoding system according to the second embodiment shown in Fig. 7, Fig. 8, or Fig. 9 and an example of moving picture encoding system according to the fifth embodiment shown in Fig. 16 or Fig. 17, and an

integration of an example of moving picture encoding system according to the second embodiment shown in Fig. 7, Fig. 8, or Fig. 9 and the moving picture encoding system according to the fourth embodiment shown in Fig. 13.

[0250]

(Eighth Embodiment)

Description is now made of a moving picture encoding system according to an eighth embodiment of the present invention.

[0251]

Fig. 22 is a block diagram showing an example of configuration of the moving picture encoding system according to the eighth embodiment.

[0252]

Referring to Fig. 22, the moving picture encoding system according to the eighth embodiment is comprised of a set of component elements equivalent to an integration of the fourth embodiment shown in Fig. 13 and the sixth embodiment shown in Fig. 18. Accordingly, the eighth embodiment is adapted for a set of operations equivalent to a combination of operations of the fourth embodiment and operations of the sixth embodiment shown, so redundant description is omitted.

[0253]

The moving picture encoding system according to the eighth embodiment is adapted to exhibit similar advantageous effects to the moving picture encoding system according to the seventh embodiment shown in Fig. 19, and like the third embodiment show in Fig. 10, the sixth embodiment show in Fig. 18, or the like, configured with components, such as an accumulation controller 412 and a code rate controller 423, implementing among others accumulation control at respective buffers and code rate control at a first encoder 102 and a third encoder 108, thus permitting an encoding to be executed taking into consideration among others accumulation amounts at the buffers and code rates at the first encoder 102 and the third encoder 108.

[0254]

In the first to the eighth embodiment described, there have been moving picture encoding systems depicted by block diagrams and described as hardware configurations, whereas according to the present invention being not limited thereto, there may well be moving

picture encoding programs stored in CPU's and among others memories and HDD's, to attain functions of the first to the eighth embodiment by software processes, respectively. According to the present invention, there are moving picture encoding systems, moving picture encoding methods, and moving picture encoding programs having their ranges of application to such apparatuses or systems, methods, and programs as adapted for encoding moving pictures, without specific limitations. For the present invention, applications cited may involve, for instance, broadcasting equipment typified by TV, mobile telephones, teleconferences, monitors, DVD-R / RW or BD-R / RW, HDD, SD®, recording and reproducing systems using a recordable and rewritable recording medium such as a holographic memory, imaging, recording and reproducing systems such as a camcorder, recording and editing systems such as a an authoring system, and delivering systems for moving pictures.

[0255]

(Ninth Embodiment)

There will be described moving picture decoding systems embodied according to the present invention, as a ninth embodiment et seq.

[0256]

Fig. 23 is a block diagram showing an example of configuration of a moving picture decoding system according to the ninth embodiment.

[0257]

Referring to Fig. 23, the moving picture decoding system according to the ninth embodiment includes a demultiplexer 1801, a first decoder 1802, a first super-resolution enlarger 1803, a first resolution converter 1804, a second decoder 1805, a second resolution converter 1806, and a third decoder 1807.

[0258]

The demultiplexer 1801 is configured for functions to acquire as an input a sequence of multiplexed encoded bits input thereto, and work complying with a prescribed syntax structure, to make a demultiplexing, while identifying identification data for identification of sets of data involving data on encoding modes and data on parameters of respective types as they are used in encoding processes, to acquire from the sequence of multiplexed encoded bits a first sequence of encoded bits to be decoded at the first decoder 1802, a second sequence of

encoded bits to be decoded at the second decoder 1805, and a third sequence of encoded bits to be decoded at the third decoder 1807. The demultiplexer 1801 may well be configured for functions to additionally acquire, if available any from the sequence of multiplexed encoded bits, sequences of bits of data on enlargement ratios, sequences of bits of data on resolution conversion ratios, sequences of encoded bits of data on selection of reference pictures and data on selection modes of reference pictures to be used in a process for a second decoding, and sequences of encoded bits of data on selection of reference pictures and data on selection modes of reference pictures to be used in a process for a third decoding, to supply as necessary. The demultiplexer 1801 is configured for functions at least to supply the first decoder 1802 with the first sequence of encoded bits, the second decoder 1805 with the second sequence of encoded bits, and the third decoder 1807 with the third sequence of encoded bits, as they are acquired. The demultiplexer 1801 may well be configured for functions to acquire, as possible if any from the sequence of multiplexed encoded bits, sequences of encoded bits of data on motion vectors, to supply to the first decoder 1802.

[0259]

The first decoder 1802 is configured for functions to acquire a first sequence of encoded bits with a standard resolution from the demultiplexer 1801, and implement thereon a process for a prescribed first decoding, to create a sequence of decoded pictures with the standard resolution. The first decoder 1802 may well be configured for functions to acquire, as possible if any through an unshown entropy decoder, a set of data on motion vectors obtained by implementation of a process for a prescribed entropy decoding, for use to implement the process for the prescribed decoding. The first decoder 1802 is configured for functions to supply the sequence of decoded pictures created with the standard resolution to the first super-resolution enlarger 1803, the second decoder 1805, and the second resolution converter 1806. The first decoder 1802 may well be configured for functions to temporarily store the sequence of decoded pictures. The first decoder 1802 may well be configured for functions to work in accordance with a request, to supply the sequence of decoded pictures created with the standard resolution to an unshown external display system, affording to provide an output for display of sequences of decoded pictures with the standard resolution.

[0260]

The first super-resolution enlarger 1803 is configured for functions to acquire from the first decoder 1802 a sequence of decoded pictures with the standard resolution, for acquisition of two or more decoded pictures with the standard resolution as necessary for a process for a prescribed super-resolution enlargement, work on the sequence of decoded pictures acquired with the standard resolution to implement the process for the prescribed super-resolution enlargement, to create and output a sequence of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution. For the process for the prescribed super-resolution enlargement to be given an enlargement ratio, there may well be a configuration for functions to acquire data on the enlargement ratio as it is preset as a prescribed enlargement ratio, or obtained as a data acquired at the demultiplexer 1801 and processed for a prescribed entropy decoding at an unshown entropy decoder, and work on the data on enlargement ratio thus acquired to establish an enlargement ratio, for use to implement the process for the prescribed super-resolution enlargement. The first super-resolution enlarger 1803 is configured for functions to supply the sequence of super-resolution enlarged decoded pictures thus created, to the first resolution converter 1804. The first super-resolution enlarger 1803 may well be configured for functions to work in accordance with a request, to supply the sequence of super-resolution enlarged decoded pictures created to an unshown external display system, affording to provide an output for display of sequences of super-resolution enlarged decoded pictures with the resolution higher than the standard resolution.

[0261]

The first resolution converter 1804 is configured for functions to acquire from the first super-resolution enlarger 1803 a sequence of super-resolution enlarged decoded pictures, and work on the sequence of super-resolution enlarged decoded pictures as acquired, to implement a process for a prescribed resolution conversion to create, from the sequence of super-resolution enlarged decoded pictures with the resolution higher than the standard resolution, a sequence of super-resolution decoded pictures with the standard resolution, to supply to the second decoder 1805. For the process for the prescribed resolution conversion to be given a resolution conversion ratio, there may well be a configuration for functions to acquire data on the resolution conversion ratio as is it is preset as a prescribed resolution conversion ratio or, if

possible, obtained as a data from the demultiplexer 1801 as it is processed for a prescribed entropy decoding at an unshown entropy decoder, and work on the data on resolution conversion ratio thus acquired to establish a resolution conversion ratio, for use to implement the process for the prescribed resolution conversion. The first resolution converter 1804 may well be configured for functions to work in accordance with a request, to supply the sequence of super-resolution decoded pictures created to an unshown external display system, affording to provide an output for display of sequences of super-resolution decoded pictures with the standard resolution.

[0262]

The second decoder 1805 is configured for functions to acquire a second sequence of encoded bits with the standard resolution from the demultiplexer 1801, a sequence of decoded pictures with the standard resolution from the first decoder 1802, and a sequence of super-resolution decoded pictures with the standard resolution from the first resolution converter 1804, and work on the second sequence of encoded bits as acquired, to implement a process for a prescribed second decoding being an extension decoding at the standard resolution, to create a set of decoded difference data at the standard resolution. The second decoder 1805 may well be configured for functions to temporarily store the sequences of pictures as acquired.

[0263]

The second decoder 1805 is configured for functions to have a respective decoded picture in the decoded picture sequence, as a first reference picture, and a respective super-resolution decoded picture in the super-resolution decoded picture sequence, as a second reference picture, for use to implement a process for a prescribed prediction to create predictive pictures with the standard resolution. The second decoder 1805 may be configured better with functions to acquire, if possible, data on reference picture selection and data on reference picture selection modes obtained from the demultiplexer 1801 as they are processed for a prescribed entropy decoding at an unshown entropy decoder, and work on the data on reference picture selection and the data on reference picture selection modes, to implement the process for the prescribed prediction to create predictive pictures with the standard resolution. For the process for the prescribed prediction, there may well be a configuration to follow the data on reference picture selection and the data on reference picture selection modes as acquired, to define what

reference pictures were used under what encoding modes to prepare predictive pictures in creation of the second sequence of encoded bits constituting decoding targets, and work so as to make predictive pictures equivalent to those in the encoding. For instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode using either a set of first reference pictures or a set of second reference pictures, then the second decoder 1805 is to select a set of reference pictures thus identified, for use to implement the process for the prescribed prediction to create predictive pictures. Or for instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode using neither a set of first reference pictures nor a set of second reference pictures, then the second decoder 1805 is to implement the process for the prescribed prediction to create predictive pictures, using neither of the sets of reference pictures. Or for instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode comprised of controlling selection of reference picture for each picture or for each set of a prescribed number of pictures, then the second decoder 1805 is to make use of the data on reference picture selection, to identify a first reference picture or a second reference picture, whichever is selective in order, to use reference pictures thus identified to implement the process for the prescribed prediction to create predictive pictures. Or for instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode comprised of having a respective target picture divided with no spaces left into regions of a prescribed area and also a first reference picture and a second reference picture each likewise divided with no spaces left into regions of a prescribed area, and making a control for each combination of corresponding regions to select the first or the second reference picture for use, then the second decoder 1805 is to make use of the data on reference picture selection, to identify for each combination of corresponding regions a first reference picture or a second reference picture, whichever is selective in order, to use reference pictures thus identified to implement the process for the prescribed prediction to create predictive pictures.

[0264]

The second decoder 1805 is configured for functions to add decoded difference data

created at the standard resolution to predictive pictures with the standard resolution, to create a sequence of super-resolution pictures as decoded with the standard resolution. The second decoder 1805 may well be configured to work in accordance with a request, to supply the created sequence of super-resolution pictures as decoded with the standard resolution to an unshown external display system, affording to provide an output for display of sequences of super-resolution pictures with the standard resolution.

[0265]

The second resolution converter 1806 is configured for functions to acquire from the first decoder 1802 a sequence of decoded pictures with the standard resolution, and work on the sequence of decoded pictures acquired with the standard resolution, to implement a process for a prescribed resolution conversion, to create a sequence of enlarged decoded pictures with a high resolution having the same resolution as the spatial resolution of the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger 1803, to supply to the third decoder 1807. For the process for the prescribed resolution conversion to be given resolution a conversion ratio, there may well be a configuration for functions to acquire data on the resolution conversion ratio as it is preset as a prescribed resolution conversion ratio or, if possible, obtained as a data from the demultiplexer 1801 as it is processed for a prescribed entropy decoding at an unshown entropy decoder, and work on the data on the resolution conversion ratio thus acquired to establish a resolution conversion ratio, for use to implement the process for the prescribed resolution conversion. The second resolution converter 1806 may well be configured for functions to work in accordance with a request, to supply the sequence of super-resolution decoded pictures created to an unshown external display system, affording to provide an output for display of sequences of super-resolution decoded pictures with the standard resolution.

[0266]

The third decoder 1807 is configured for functions to acquire a third sequence of encoded bits with the high resolution from the demultiplexer 1801, a sequence of enlarged decoded pictures with the high resolution from the second resolution converter 1806, and a sequence of super-resolution enlarged decoded pictures with the high resolution from the first

super-resolution enlarger 1803, and work on the third sequence of encoded bits as acquired, to implement a process for a prescribed third decoding being an extension decoding at the high resolution, to create a set of decoded difference data at the high resolution. The third decoder 1807 may well be configured for functions to temporarily store the sequences of pictures as acquired.

[0267]

The third decoder 1807 is configured for functions to have a respective enlarged decoded picture in the enlarged decoded picture sequence, as a first reference picture, and a respective super-resolution enlarged decoded picture in the super-resolution enlarged decoded picture sequence, as a second reference picture, for use to implement a process for a prescribed prediction to create predictive pictures with the high resolution. The third decoder 1807 may be configured better with functions to acquire, if possible, data on reference picture selection and data on reference picture selection modes obtained from the demultiplexer 1801 as they are processed for a prescribed entropy decoding at an unshown entropy decoder, and work on the data on reference picture selection and the data on reference picture selection modes, to implement the process for the prescribed prediction to create predictive pictures with the high resolution. For the process for the prescribed prediction, there may well be a configuration to follow the data on reference picture selection and the data on reference picture selection modes as acquired, to define what reference pictures were used under what encoding modes to prepare predictive pictures in creation of the third sequence of encoded bits constituting decoding targets, and work so as to make predictive pictures equivalent to those in the encoding. For instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode using either a set of first reference pictures or a set of second reference pictures, then the third decoder 1807 is to select a set of reference pictures thus identified, for use to implement the process for the prescribed prediction to create predictive pictures. Or for instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode using neither a set of first reference pictures nor a set of second reference pictures, then the third decoder 1807 is to implement the process for the prescribed prediction to create predictive pictures, using neither of the sets of reference pictures. Or for instance, if it is defined from the data on reference picture

selection modes that employed to implement a prediction process was an encoding mode comprised of controlling selection of reference picture for each picture or for each set of a prescribed number of pictures, then the third decoder 1807 is to make use of the data on reference picture selection, to identify a first reference picture or a second reference picture, whichever is selective in order, to use reference pictures thus identified to implement the process for the prescribed prediction to create predictive pictures. Or for instance, if it is defined from the data on reference picture selection modes that employed to implement a prediction process was an encoding mode comprised of having a respective target picture divided with no spaces left into regions of a prescribed area and also a first reference picture and a second reference picture each likewise divided with no spaces left into regions of a prescribed area, and making a control for each combination of corresponding regions to select the first or the second reference picture for use, then the third decoder 1807 is to make use of the data on reference picture selection, to identify for each combination of corresponding regions a first reference picture or a second reference picture, whichever is selective in order, to use reference pictures thus identified to implement the process for the prescribed prediction to create predictive pictures.

[0268]

The third decoder 1807 is configured for functions to add decoded difference data created at the high resolution to predictive pictures with the high resolution, to create a sequence of super-resolution enlarged pictures as decoded with the high resolution. The third decoder 1807 may well be configured to work in accordance with a request, to supply the created sequence of super-resolution enlarged pictures as decoded with the high resolution to an unshown external display system for instance, affording to provide an output for display of sequences of super-resolution enlarged pictures with the high resolution.

[0269]

The moving picture decoding system configured as described is adapted to input multiplexed sequences of encoded bits created at a moving picture encoding system according to any of the first to the eighth embodiment or the like, and decode in reverse to the encoding, affording to acquire decoded picture sequences with more diverse spatial resolutions or frequency components and higher qualities than ever, such as decoded picture sequences with

standard resolution, enlarged decoded picture sequences, super-resolution enlarged decoded picture sequences, super-resolution decoded picture sequences, super-resolution picture sequences as decoded, and super-resolution enlarged picture sequences as decoded. It also is possible to provide a configuration adapted to operate in accordance with a request for a selective output of such diverse decoded picture sequences to an unshown display system. For instance, for users of those display devices non-adaptive to high resolution display, such as mobile terminal display devices, it is possible to request selective one of a decoded picture sequence with standard resolution, a super-resolution decoded picture sequence with standard resolution, and a super-resolution picture sequence as decoded with standard resolution, as an output to view and listen. Or for instance, for users of those display devices adaptive to high resolution display, such as high-definition televisions, it is possible to request selective one of an enlarged decoded picture sequence with high resolution, a super-resolution enlarged decoded picture sequence with high resolution, and a super-resolution enlarged picture sequence as decoded, as an output to view and listen.

[0270]

Description is now made of actions of the moving picture decoding system according to the ninth embodiment shown in Fig. 23, with reference to a flowchart of Fig. 24.

[0271]

First, the demultiplexer 1801 acquires a sequence of multiplexed bits input thereto, and works thereon complying with a prescribed syntax structure, to make a demultiplexing (step S601) while identifying identification data for identification of among others data on encoding modes and data on parameters of respective types used in encoding processes, to acquire a first sequence of encoded bits with the standard resolution, a second sequence of encoded bits with the standard resolution, and a third sequence of encoded bits with the high resolution, and supply the first sequence of encoded bits to the first decoder 1802, the second sequence of encoded bits to the second decoder 1805, and the third sequence of encoded bits to third decoder 1807. Further, the demultiplexer 1801 acquires data on motion vectors if available from the sequence of multiplexed bits, and supplies to the first decoder 1802.

[0272]

After that, the flow branches into a first parallel process (steps S602 and S603), a second parallel process (step S604), and a third parallel process (step S605), to enter parallel actions.

[0273]

In the first parallel process, first, the first decoder 1802 acquires from the demultiplexer 1801 the first sequence of encoded bits and, if available, data on motion vectors, and implements thereon a process for a first decoding at the standard resolution (step S602), to create a sequence of decoded pictures with the standard resolution, and supply to the second decoder 1805.

[0274]

Then, the second decoder 1805 acquires the sequence of decoded pictures created with the standard resolution at the first decoder 1802, and stores in a prescribed buffer for temporary accumulation (step S603). After that, it waits for completion of other parallel processes.

[0275]

In the second parallel process, the second decoder 1805 acquires the second sequence of encoded bits with the standard resolution from the demultiplexer 1801, and implements thereon a process for a prescribed second decoding (step S604), to create a set of decoded difference data at the standard resolution. After that, it waits for completion of other parallel processes.

[0276]

In the third parallel process, the third decoder 1807 acquires the third sequence of encoded bits with the high resolution from the demultiplexer 1801, and implements thereon a process for a prescribed third decoding (step S605), to create a set of decoded difference data at the high resolution. After that, it waits for completion of other parallel processes.

[0277]

With the first to the third parallel process completed, the flow branches into a fourth parallel process (steps S606, S607, S608, and S609), and a fifth parallel process (steps S610 and

S611), to enter parallel actions.

[0278]

In the fourth parallel process, the first super-resolution enlarger 1803 acquires the sequence of decoded pictures with the standard resolution from the first decoder 1802, and implements thereon a process for a prescribed super-resolution enlargement (step S606), to create a sequence of super-resolution enlarged decoded pictures with the high resolution being a resolution higher than the standard resolution, and supply to the first resolution converter 1804 and the third decoder 1807.

[0279]

Then, the third decoder 1807 acquires the sequence of super-resolution enlarged decoded pictures created with the high resolution at the first super-resolution enlarger 1803, and stores in a prescribed buffer for temporary accumulation (step S607).

[0280]

Then, the first resolution converter 1804 acquires the sequence of super-resolution enlarged decoded pictures with the high resolution from the first super-resolution enlarger 1803, and implements thereon a process for a prescribed resolution conversion (step S608) to create, from the sequence of super-resolution enlarged decoded pictures with the resolution higher than the standard resolution, a sequence of super-resolution decoded pictures with the standard resolution, and supply to the second decoder 1805.

[0281]

Then, the second decoder 1805 acquires the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter 1804, and stores in a prescribed buffer for temporary accumulation (step S609). After that, it waits for completion of the other parallel process.

[0282]

In the fifth parallel process, the second resolution converter 1806 acquires the sequence of decoded pictures with the standard resolution from the first decoder 1802, and implements thereon a process for a prescribed resolution conversion (step S610), to create a

sequence of enlarged decoded pictures with the high resolution, and supply to the third decoder 1807.

[0283]

Then, the third decoder 1807 acquires the sequence of enlarged decoded pictures created with the high resolution at the second resolution converter 1806, and stores in a prescribed buffer for temporary accumulation (step S611). After that, it waits for completion of the other parallel process.

[0284]

With the foregoing parallel processes completed, the flow branches into a sixth parallel process (step S612) and a seventh parallel process (step S613), to enter parallel actions.

[0285]

In the sixth parallel process, the second decoder 1805 implements a process for a prescribed prediction (step S612) to create a set of predictive pictures with the standard resolution, and makes an addition of created predictive pictures with the standard resolution and decoded difference data at the standard resolution, to create a sequence of super-resolution pictures as decoded with the standard resolution. After that, it waits for completion of the other parallel process.

[0286]

In the seventh parallel process, the third decoder 1807 implements a process for a prescribed prediction (step S613) to create a set of predictive pictures with the high resolution, and makes an addition of created predictive pictures with the high resolution and decoded difference data at the high resolution, to create a sequence of super-resolution enlarged pictures as decoded with the high resolution. After that, it waits for completion of the other parallel process.

[0287]

With the parallel processes completed, there is a set of sequences of decoded pictures created with described resolutions at the first decoder 1802, the first super-resolution enlarger 1803, the first resolution converter 1804, the second decoder 1805, the second resolution

converter 1806, and the third decoder 1807 each operable in response to a request for supply to an unshown external display system or the like, to provide an output for display of a variety of decoding results on demand (step S614). The present embodiment involves a series of actions to be complete through the foregoing steps.

[0288]

According to the ninth embodiment, there is a moving picture decoding system operable through execution of such the steps to create sequences of decoded pictures as necessary.

[0289]

It is noted that there have been operations described as being parallel processes according to the ninth embodiment, while those processed in parallel may well be consecutively processed in a configuration operable according to the present embodiment.

[0290]

Fig. 25 is a flowchart showing an example of operational procedure of the process for decoding at the standard resolution at the step S602 in Fig. 24.

[0291]

Referring to Fig. 25, there is a process for a prescribed decoding to be implemented at the first decoder 1802 that includes an entropy decoder, an inverse quantizer, an inverse orthogonal transformer, an intra-predictor, and a motion compensator, as they are prescribed.

[0292]

The first decoder 1802 first acquires a set of first sequences of encoded bits with the standard resolution from the demultiplexer 1801, and executes a first decoding for a current region of decoding target to be decoded (step S701), by use of the entropy decoder operating to implement a process for a prescribed decoding to create quantized data as decoded, the inverse quantizer operating on the quantized data to implement a process for a prescribed inverse quantization to create data on orthogonal transform coefficients as decoded, and the inverse orthogonal transformer operating on the data on orthogonal transform coefficients to implement a process for a prescribed inverse orthogonal transform to create decoded difference data.

[0293]

Next, the intra-predictor operates for creation of predictive data at the current region of decoding target, by implementing a process for a prescribed prediction based on data of a decoded region neighboring the current decoding target region, to create predictive data (step S702), and makes an addition of the created predictive data and the decoded difference data of the decoding target region, to create decoded data of the decoding target region.

[0294]

After that, there is a determination of whether or not the intra-decoding is complete, in combination with a determination of whether or not a decoded picture set is obtained with a set of decoded data created on whole regions in the planes (step S703).

[0295]

Providing a repetition of the processes for any remaining encoded bit streams to be decoded, if any intra-decoding gets complete (YES at the step S703), then the flow goes to a step S704. If no encoded bit stream to be decoded is left, the foregoing processes for decoding come to an end.

[0296]

After any intra-decoding, if this is in way to the end (NO at the step S703), there is a subsequent decoding target region identified, before the flow again goes to the step S701 for the repetition of processes.

[0297]

If the intra-decoding comes to the end, then the first decoder 1802 enters a service for inter-decoding, where it makes a first decoding (step S704) to create decoded difference data, like the intra-decoding.

[0298]

Further, the motion compensator operates to have a decoded picture set created as a reference picture set, acquire data on motion vectors from the demultiplexer 1801, and work on motion vector data using reference pictures to make a motion compensation (step S705) to create predictive pictures, and make an addition of created predictive pictures and decoded difference data, to create a set of decoded pictures.

[0299]

After that, on bases of encoded mode data or the like, there is a determination of whether the inter-decoding has come to an end (step S706).

[0300]

If there is any subsequent decoding left as an inter-decoding (NO at the step S706), the flow again goes to the step S704 to repeat processes for the inter-decoding to be repeated.

[0301]

If there is no subsequent decoding left as an inter-decoding (YES at the step S706), the inter-decoding goes to the end. Here, if there comes any encoded bit sequence to be decoded by a subsequent decoding to be an intra-decoding, the flow again goes to the step S701 to repeat the foregoing processes for decoding. If there is no encoded bit sequence to be decoded, the processes for decoding go to an end.

[0302]

Also in the ninth embodiment, there has been a moving picture decoding system depicted by a block diagram and described as a hardware configuration, whereas like the first to the eighth embodiment, there may well be a set of functions of the moving picture decoding system in Fig. 23 implemented as software processes using a CPU and a program.

[0303]

(Tenth Embodiment)

Description is now made of an embodiment of moving picture decoding system according to a tenth embodiment.

[0304]

Fig. 26 is a block diagram showing an example of configuration of the moving picture decoding system according to the tenth embodiment.

[0305]

Referring to Fig. 26, the moving picture decoding system according to the tenth embodiment is comprised of a set of component elements of the moving picture decoding system according to the ninth embodiment shown in Fig. 23, with the second resolution converter 1806 and the third decoder 1807 being omitted or kept from working, while

component elements shown in Fig. 26 are equivalent to those in Fig. 23, so redundant description is omitted.

[0306]

The moving picture decoding system configured as described is adapted to acquire multiplexed sequences of encoded bits created by any of moving picture encoding systems, moving picture encoding methods, moving picture encoding programs, moving picture reencoding systems, moving picture reencoding methods, and moving picture reencoding programs corresponding to this embodiment, the moving picture decoding system according to this embodiment being adapted for correct decoding, affording to acquire decoded picture sequences with more diverse spatial resolutions or frequency components and higher qualities than ever, such as decoded picture sequences with standard resolution, super-resolution enlarged decoded picture sequences, super-resolution decoded picture sequences, and super-resolution picture sequences as decoded. It also is possible to provide a configuration adapted to operate in accordance with a request for a selective output of such diverse decoded picture sequences to an unshown display system.

Also in the tenth embodiment described, there has been a hardware configuration depicted by a block diagram, whereas like the first to the ninth embodiment, there may well be a set of functions of the moving picture decoding system in Fig. 26 implemented as software processes using a CPU and a program.

[0307]

(Eleventh Embodiment)

Description is now made of a reencoding system according to an eleventh embodiment of the present invention.

[0308]

Fig. 27 is a block diagram showing an example of configuration of the reencoding system according to the eleventh embodiment.

[0309]

The reencoding system shown in Fig. 27 according to the eleventh embodiment is configured as a moving picture decoding system according to the tenth embodiment sown in

Fig. 26, as combined with a reencoder 1808 and a multiplexer 1809 additionally incorporated therein, for adaptation to a process for a re-encoding as a transcoding from a certain specific encoding style to a different encoding style else.

[0310]

For instance, the reencoding system shown in Fig. 27 according to the eleventh embodiment may be configured for an AVC rewriting (or AVC transcoding), that is, for adaptation to a process for a reencoding to an encoding style of AVC. It is noted that the moving picture decoding system shown in Fig. 23 according to the ninth embodiment may well be configured with a reencoder 1808 and a multiplexer 1809 additionally incorporated therein.

[0311]

The eleventh embodiment includes a demultiplexer 1801 adapted to provide a second sequence of encoded bits with a standard resolution, which may well be configured for a CGS (Coarse Grain Scalability) layer complying with MPEG-4 SVC. Further, this may well be adapted, subject to an encoding with a spatial resolution equalized between a picture sequence with a standard resolution belonging to a base layer and a super-resolution picture sequence with the standard resolution belonging to an extension layer referring to the base layer, to make the encoding for creation of an encoded bit sequence complying with such a prescribed syntax structure that meets the conditions for restriction to permit a facilitated conversion from SVC to AVC, as set forth in rare literatures on AVC rewriting (as literature files on AVC rewriting: JVT-U043, http://ftp3.itu.ch/av-arch/jvt-site/2006_10_Hangzhou/ JVT- U043.zip; and JVT-V035, http://ftp3.itu.ch/av-arch/jvt-site/2007_01_Marrakech/ JVT-V035.zip) in the JVT (Joint Video Team) being a joint group of MPEG and ITU-T. The eleventh embodiment may well be configured for services to acquire an encoded bit sequence thus created, and create an encoded bit sequence enabling a conversion from an encoding style adapted for a handling on an extension layer configured with a CGS layer according to this invention, without such a reencoding as making a combination of complete decoding and encoding.

[0312]

For encoded bit sequences non-adaptive to encoding services suitable to such the AVC

rewriting, there may be a configuration to make a reencoding based on an AVC encoding style for single layers, using a super-resolution picture sequence obtained by decoding an encoded bit sequence with a standard resolution and a second encoded bit sequence with the standard resolution, as well as data on motion vectors and data on encoding modes of respective types or such obtained in the decoding of the encoded bit sequence with the standard resolution, for creation of an encoded bit sequence.

[0313]

Accordingly, the reencoding system shown in Fig. 27 according to the eleventh embodiment may well have the component elements adapted for additional functions as described below.

[0314]

That is, there is a first decoder 1802 further adapted for functions to work on an encoded bit sequence acquired with the standard resolution, implementing processes for prescribed entropy decoding and inverse quantization, to make a decoding to the state of data on orthogonal transform coefficients at the standard resolution on a base layer, without making a complete decoding. Further, the first decoder 1802 is adapted for functions to supply the reencoder 1808 with data on orthogonal transform coefficients in way of the decoding when the AVC rewriting is determined as being possible, or with a decoded picture sequence with the standard resolution when the reencoding is determined as being necessary. The first decoder 1802 may be adapted for functions to supply the reencoder 1808 with data on encoding modes and data on parameters of respective types obtained in the decoding.

[0315]

There is a first resolution converter 1804 further adapted for functions to supply the reencoder 1808 with a super-resolution decoded picture sequence with the standard resolution when the reencoding is determined as being necessary.

[0316]

There is a second decoder 1805 further adapted for functions to work on an extension encoded bit sequence acquired with the standard resolution, implementing processes for prescribed entropy decoding and inverse quantization, to make a decoding to the state of data on

orthogonal transform coefficients at the standard resolution on an extension layer, without making a complete decoding, as well as for functions to supply the reencoder 1808 with data on orthogonal transform coefficients at the standard resolution on the extension layer in way of the decoding when the AVC rewriting is determined as being possible, or with a super-resolution picture sequence as decoded with the standard resolution when the reencoding is determined as being necessary.

[0317]

The reencoder 1808 is adapted for functions to work when the AVC rewriting is determined as being possible, to acquire from the first decoder 1802 data on orthogonal transform coefficients in way of the decoding, and from the second decoder 1805 data on orthogonal transform coefficients at the standard resolution on the extension layer in way of the decoding, make a synthesis of respective data on orthogonal transform coefficients, and afterward implement a process for a prescribed entropy decoding, to create an encoded bit sequence as reencoded, and supply to the multiplexer 1809. The reencoder 1808 is adapted for functions to work when the reencoding is determined as being necessary, to acquire from the first decoder 1802 a decoded picture sequence with the standard resolution, from the first resolution converter 1804 a super-resolution decoded picture sequence with the standard resolution, and from the second decoder 1805 a super-resolution picture sequence as decoded with the standard resolution, as necessary, to implement a process for a prescribed encoding, to create an encoded bit sequence as reencoded, and supply to the multiplexer 1809.

[0318]

The multiplexer 1809 is adapted for functions to acquire an encoded bit sequence as reencoded and supplied, and work complying with a prescribed syntax structure, to implement a process for a multiplexing, while inserting identification data for identification of sets of data used in the encoding, involving data on encoding modes and data on parameters of respective types, to create an encoded bit sequence as multiplexed to output.

[0319]

The moving picture reencoding system configured as described is adapted to acquire

multiplexed sequences of encoded bits created at a moving picture encoding system according to any of the first to the eighth embodiment or the like, in addition to adaptation of the moving picture reencoding system according to this invention to acquire from the first decoder 1802 data on orthogonal transform coefficients in way of the decoding and from the second decoder 1805 data on orthogonal transform coefficients in way of the decoding at the standard resolution on an extension layer, make a synthesis of respective data on orthogonal transform coefficients, and again implement a process for entropy encoding and a process for a multpilexing, to create an encoded bit sequence as reencoded, affording in a facilitated manner to reencod decoded components with more diverse spatial resolutions or frequency components and higher qualities than ever, without making a full decoding for creation of decoded picture sequences, and without consuming many operations for calculation.

[0320]

Further, it is possible to provide a configuration adapted to create an encoded bit sequence as reencoded for conversion into a different encoding style, permitting creation of an encoded bit sequence adaptive to a targeted encoding style.

[0321]

It is possible to provide decoded picture sequences obtained with more diverse spatial resolutions or frequency components and higher qualities than ever, such as a decoded picture sequence with standard resolution, a super-resolution decoded picture sequence, and a super-resolution picture sequence as decoded. Further, it is possible to make a reencodinng on such various decoded picture sequences, to create encoded bit sequences on a single layer.

[0322]

Accordingly, for instance, in application to those devices such as mobile terminal display devices having a moving picture decoding device mounted thereon under restrictions such as to calculation rate or power consumption, and simply adaptive to such a decoding as enabled with the lower calculation rate or power consumption, or lower encoding transmission rate, the moving picture reencoding system according to this invention can be configured for a reencodinng to permit creation of an encoded bit sequence adaptive to a targeted encoding style.

[0323]

The moving picture reencoding system configured as described is adapted to acquire multiplexed sequences of encoded bits created at a moving picture encoding system according to any of the first to the eighth embodiment or the like, in addition to adaptation of the moving picture reencoding system according to this invention to make a correct decoding, affording to obtain decoded picture sequences with more diverse spatial resolutions or frequency components and higher qualities than ever, such as decoded picture sequences with standard resolution, super-resolution decoded picture sequences, and super-resolution picture sequences as decoded.

[0324]

Further, it is possible to make a reencodinng on such various decoded picture sequences, to create encoded bit sequences on a single layer. Therefore, for instance, in application to those devices such as mobile terminal display devices having a moving picture decoding device mounted thereon under restrictions such as to calculation rate or power consumption, and simply adaptive to such a decoding as enabled with the lower calculation rate or power consumption, or lower encoding transmission rate, the moving picture reencoding system according to this invention can be configured to make a reencodinng for conversion to a different encoding style, permitting creation of an encoded bit sequence adaptive to a targeted encoding style.

[0325]

Description is now made of actions of the reencoding system according shown in Fig. 27, with reference to a flowchart of Fig. 28.

[0326]

First, the demultiplexer 1801 acquires a sequence of multiplexed bits input thereto, and works thereon complying with a prescribed syntax structure, to make a demultiplexing (step S701) while identifying identification data for identification of among others data on encoding modes and data on parameters of respective types used in encoding processes, on one hand to thereby obtain from the sequence of multiplexed bits a first sequence of encoded bits with the

standard resolution and a second sequence of encoded bits with the standard resolution, and on the other hand to further obtain, if available from the sequence of multiplexed bits, a sequence of bits of data on enlargement ratio, a sequence of bits of data on resolution conversion ratio, and a sequence of encoded bits of data on an extension prediction at the standard resolution. After that, the demultiplexer 1801 works to supply the first decoder 1802 with the first sequence of encoded bits and the second decoder 1805 with second sequence of encoded bits, as they are obtained, respectively, and further to obtain data on motion vectors, if available from the sequence of multiplexed bits, and supply to the first decoder 1802.

[0327]

After that, the demultiplexer 1801 determines whether the AVC rewriting is possible or impossible (step S702). This determination may be based on determination data contained in the sequence of multiplexed bits, for use to determine whether or not the AVC rewriting is possible.

[0328]

In this system, if the AVC rewriting is possible (YES at the step S702), then the flow branches into a first parallel process (steps S703) and a second parallel process (step S704), to enter subsequent parallel actions.

[0329]

To the contrary, in this system, if the AVC rewriting is impossible (NO at the step S702), then determining a reencoding as being necessary, the flow branches into a third parallel process (step S707 and step S708) and a fourth parallel process (step S709), to enter subsequent parallel actions.

[0330]

If the AVC rewriting is possible, the flow goes to the following processes.

[0331]

In the first parallel process, the first decoder 1802 acquires the first sequence of encoded bits, and implements thereon a process for a prescribed entropy decoding (step S703) combined with a process for an inverse quantization, to create data on orthogonal transform

coefficients on the base layer in way of the decoding, and supply to the reencoder 1808. After that, it waits for completion of the second parallel process.

[0332]

In the second parallel process, the second decoder 1805 acquires the second sequence of encoded bits, and implements thereon a process for a prescribed entropy decoding (step S704) combined with a process for an inverse quantization, to create data on orthogonal transform coefficients on the extension layer in way of the decoding, and supply to the reencoder 1808. After that, it waits for completion of the first parallel process.

[0333]

With the first and the second parallel process completed, the reencoder 1808 acquires from the first decoder 1802 data on orthogonal transform coefficients on the base layer in way of the decoding, and from the second decoder 1805 data on orthogonal transform coefficients on the extension layer in way of the decoding, and makes thereon a synthesis based on a process for a prescribed synthesizing (step S705), making a prescribed entropy encoding on a result of the synthesis (step S706), to create a sequence of encoded bits as reencoded, and supply to the multiplexer 1809. The foregoing processes are processes when the AVC rewriting is possible.

[0334]

If the AVC rewriting is impossible, that is when the reencoding is necessary, the flow goes to the following processes.

[0335]

In the third parallel process, the first decoder 1802 works to acquire from the demultiplexer 1801 a sequence of encoded bits with the standard resolution, and acquire, if available, data on motion vectors, and implements thereon a process for a decoding at the standard resolution (step S707), to create a sequence of decoded pictures, and supply to the second decoder 1805, and to the reencoder 1808 as necessary.

[0336]

Then, the second decoder 1805 acquires the sequence of decoded pictures created with the standard resolution at the first decoder 1802, and stores in a prescribed buffer for

temporary accumulation (step S708). After that, it waits for completion of the fourth parallel process.

[0337]

In the fourth parallel process, the second decoder 1805 acquires the second sequence of encoded bits from the demultiplexer 1801, and implements thereon a process for a prescribed decoding (step S709), to create decoded difference data with the standard resolution. After that, it waits for completion of the third parallel process.

[0338]

With the third and the fourth parallel process completed, a first super-resolution enlarger 1803 acquires the sequence of decoded pictures with the standard resolution from the first decoder 1802, and implements thereon a process for a prescribed super-resolution enlargement (step S710), to create a sequence of super-resolution enlarged decoded pictures with a high resolution being a resolution higher than the standard resolution, and supply to the first resolution converter 1804.

[0339]

Then, the first resolution converter 1804 acquires the sequence of super-resolution enlarged decoded pictures with the high resolution from the first super-resolution enlarger 1803, and implements thereon a process for a prescribed resolution conversion (step S711) to create, from the sequence of super-resolution enlarged decoded pictures with the high resolution being a resolution higher than the standard resolution, a sequence of super-resolution decoded pictures with the standard resolution, and supply to the second decoder 1805, and to the reencoder 1808 as necessary.

[0340]

Then, the second decoder 1805 acquires the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter 1804, and stores in a prescribed buffer for temporary accumulation (step S712).

[0341]

The second decoder 1805 implements a process for a prescribed prediction (step S713) to create predictive pictures with the standard resolution, and makes an addition of the

predictive pictures created with the standard resolution and decoded difference data at the standard resolution, to create a sequence of super-resolution pictures as decoded with the standard resolution, and supply to the reencoder 1808 as necessary.

[0342]

The reencoder 1808 thus acquires the sequence of decoded pictures with the standard resolution from the first decoder 1802, the sequence of super-resolution decoded pictures with the standard resolution from the first resolution converter 1804, and the sequence of super-resolution pictures with the standard resolution from the second decoder 1805, as necessary, and implements thereon a process for a prescribed encoding to thereby make a reencoding (step S714) to create a sequence of encoded bits, and supply to the multiplexer 1809.

[0343]

The multiplexer 1809 acquires sequences of encoded bit as reencoded and supplied, and works complying with a prescribed syntax structure, to implement a process for a multiplexing, while inserting identification data for identification of sets of data used in the encoding, involving data on encoding modes and data on parameters of respective types, to create a sequence of encoded bit as multiplexed to output (step S715). The present embodiment involves a series of actions to be complete through the foregoing steps.

[0344]

According to the present embodiment, there is a moving picture reencoding system operable by execution of the foregoing steps, permitting creation of a sequence of encoded bits as reencoded. It is noted that there have been operations described as being parallel processes according to the present embodiment, while those processed in parallel may be consecutively processed in a configuration operable according to the present embodiment.

[0345]

Also in the eleventh embodiment, there has been a configuration depicted by a block diagram and described as a hardware, whereas like the first to the tenth embodiment, there may well be a set of functions of the reencoding system in Fig. 27 implemented as software processes using a CPU and a program.

[0346]

According to the present invention, there are moving picture decoding systems, moving picture decoding methods, and moving picture decoding programs, as well as moving picture reencoding systems, moving picture reencoding methods, and moving picture reencoding programs, having their ranges of application to such apparatuses or systems, methods, and programs as adapted for encoding and decoding moving pictures, without specific limitations. For the present invention, applications cited may involve, for instance, broadcasting equipment typified by TV, mobile telephones, teleconferences, monitors, reproducing systems using a recording medium such as CD, DVD, or Blue-Ray Disc ®, recording and reproducing systems using a recordable and rewritable recording medium such as DVD-R / RW or BD-R / RW, HDD, or SD, imaging, recording and reproducing systems such as a camcorder, recording and editing systems such as a an authoring system, and delivering systems for moving pictures.

Industrial Applicability

[0347]

According to the present invention, there are systems such as a moving picture encoding system, having a first encoder working for services to encode moving pictures input with a standard resolution, in combination with a first super-resolution enlarger working on moving pictures input with the standard resolution, implementing a process for a super-resolution enlargement including information on frequency components in the spatial direction and the temporal direction that has been potentially contained in the input moving pictures but unable to express to a sufficient degree by the standard resolution, followed by implementing processes such as for a prescribed resolution conversion at a first resolution converter, thus permitting a second encoder to make an encoding of moving pictures based on an increased amount of information relative to an information amount of moving pictures input with the standard resolution, as a resultant effect. At the second encoder, as reference signals for the encoding there may be use of, among others, decoded signals as decoded at the first encoder or as additionally processed through processes such as for a second super-resolution enlargement and a second resolution conversion.

[0348]

Moreover, according to the present invention, there are systems such as a moving picture encoding system, having a first encoder working for services to encode moving pictures input with a standard resolution, in combination with a first super-resolution enlarger working on moving pictures input with the standard resolution, implementing a process for a super-resolution enlargement including information on frequency components in the spatial direction and the temporal direction that has been potentially contained in the input moving pictures but unable to express to a sufficient degree by the standard resolution, followed by an encoding of thus obtained signals at a third encoder, permitting the third encoder to make an encoding of moving pictures based on an increased amount of information relative to an information amount of moving pictures input with the standard resolution, as a resultant effect. At the third encoder, as reference signals for the encoding there may be use of decoded signals as decoded at the first encoder and processed through processes such as for a second super-resolution enlargement or a third resolution conversion to enhance the resolution up to the same resolution as first super-resolution enlarged signals. Still more, according to the present invention, there are systems such as a moving picture decoding system, adapted to input thus encoded moving pictures to decode, and yet more, according to the present invention, there are systems such as a moving picture reencoding system, adapted to input thus encoded moving pictures to decode and reencode.

Reference Signs List

[0349]

101 first accumulation buffer

102 first encoder

103 first super-resolution enlarger

104 first resolution converter

105 second super-resolution enlarger

106 second resolution converter

107 second encoder

108 third encoder

109 multiplexer

110	third resolution converter
1801	demultiplexer
1802	first decoder
1803	first super-resolution enlarger
1804	first resolution converter
1805	second decoder
1806	second resolution converter
1807	third decoder
1808	reencoder
1809	multiplexer

CLAIMS

1. A moving picture encoding system comprising:

a first encoder configured to work on a subsequence of a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the subsequence of the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution; and

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures to implement a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits.

2. The moving picture encoding system according to claim 1, wherein the second encoder is configured to have the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

3. The moving picture encoding system according to claim 1 or 2, further comprising:

a second super-resolution enlarger configured to acquire the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the second encoder is configured to have the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

4. The moving picture encoding system according to any one of claims 1 to 3, wherein the first super-resolution enlarger comprises:

a positioner configured to work in a processing for super-resolution enlargement, on a combination of a base picture constituting a base therein and one or more observation pictures to be based on, to make a positioning to pixel positions of a desirable high resolution, for an interval-unequal sampling to create nonhomogeneous high resolution pictures;

an interpolator configured to work on nonhomogeneous high resolution pictures created at the positioner, to implement a process for a prescribed nonhomogeneous interpolation to create interpolated pictures with a desirable high resolution;

an estimated picture creator configured to acquire interpolated pictures created at the interpolator, to implement thereon a process for a prescribed reconstruction to create estimated pictures with a desirable resolution; and

a repetition determiner configured to acquire a nonhomogeneous high resolution picture from the positioner and a nonhomogeneous estimated picture from the estimated picture creator, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the processing for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator with information for a control to continue the processing, and operate as the repetition is unnecessary, to provide the estimated picture creator with information for a control to output a set of estimated pictures with a high resolution after super-resolution enlargement.

5. The moving picture encoding system according to any one of claims 1 to 4, further comprising a multiplexer configured to operate complying with a prescribed syntax structure to multiplex the first sequence of encoded bits from the first encoder, the second sequence of encoded bits from the second encoder, and information on encoding parameters of respective types used in the encoding at the first encoder and the encoding at the second encoder.

6. The moving picture encoding system according to any one of claims 2 to 5, further comprising:

a first accumulation buffer configured to work in a course before the first encoder and the first super-resolution enlarger, to accumulate subsequences of the sequence of moving pictures with the standard resolution;

a second accumulation buffer configured to work in a course between the first encoder and the second encoder, to accumulate sets of decoded pictures from the first encoder;

an accumulation controller configured to work for detections of buffer accumulation amounts at the first accumulation buffer, the second accumulation buffer, the first encoder, and the second encoder, to control the buffer accumulation amounts; and

a code rate controller configured to work on bases of the detections of buffer accumulation amounts at the accumulation controller, to control code rates at the first encoder and the second encoder.

7. A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement

to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

8. A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of resolution converted enlarged decoded pictures from the third resolution converter as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

9. A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

10. A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution;

a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution;

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures, employing the set of decoded pictures from the first encoder and the set of super-resolution enlarged and converted decoded pictures with the standard resolution from the second resolution converter as sets of reference pictures, to implement thereon a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

11. A moving picture encoding method comprising:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution; and

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits.

12. A moving picture encoding program configured to have a computer execute:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution; and

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits.

13. A moving picture decoding system comprising:

a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output at least a first and a second sequence of encoded bits;

a first decoder configured to acquire the first sequence of encoded bits obtained with a standard resolution at the demultiplexer to implement thereon a process for a prescribed first decoding to create a sequence of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures;

a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution; and

a second decoder configured to acquire the second sequence of encoded bits obtained with the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution.

14. The moving picture decoding system according to claim 13, comprising:

the demultiplexer being configured to work on the sequence of input encoded bits to implement the process for the prescribed demultiplexing to further output a third sequence of encoded bits;

a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder to implement thereon a process for a prescribed resolution conversion to create a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution; and

a third decoder configured to acquire the third sequence of encoded bits obtained with the high resolution at the demultiplexer, the sequence of super-resolution enlarged decoded

pictures created at the first super-resolution enlarger, and the sequence of enlarged decoded pictures with the high resolution from the second resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed third decoding being a decoding with an extension of the high resolution, to create a sequence of super-resolution enlarged pictures as decoded.

15. A moving picture reencoding system comprising:

a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output at least a first and a second sequence of encoded bits;

a first decoder configured to acquire the first sequence of encoded bits obtained with a standard resolution at the demultiplexer to implement thereon a process for a prescribed first decoding to create a sequence of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures;

a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution;

a second decoder configured to acquire the second sequence of encoded bits obtained with the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution;

a reencoder configured to acquire from the first decoder information on coefficients of

orthogonal transform in a course of decoding thereof, and from the second decoder information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding thereof, to make a synthesis of respective information on coefficients of orthogonal transform and implement thereon a process for a prescribed entropy encoding to create a sequence of encoded bits as reencoded; and

a multiplexer configured to acquire the sequence of encoded bits reencoded at the reencoder, to implement thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, to create a sequence of encoded bits as multiplexed.

16. The moving picture reencoding system according to claim 15, wherein the reencoder is configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder, the sequence of super-resolution decoded pictures with the standard resolution from the first resolution converter, and the sequence of super-resolution pictures with the standard resolution from the second decoder, to implement thereon a process for a prescribed encoding to create a sequence of encoded bits as reencoded.

17. A moving picture decoding method comprising:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting at least a first and a second sequence of encoded bits;

a step of acquiring the first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution; and

a step of acquiring the second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

18. The moving picture decoding method according to claim 17, comprising:

a step of implementing the process for the prescribed demultiplexing on the sequence of input encoded bits, outputting a third sequence of encoded bits;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed resolution conversion, creating a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution; and

a step of acquiring the third sequence of encoded bits obtained with the high resolution through the process for the prescribed demultiplexing, the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, and the sequence of enlarged decoded pictures created with the high resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed third decoding being a decoding with an extension of the high resolution, creating a sequence of super-resolution enlarged pictures as decoded.

19. A moving picture reencoding method comprising:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits;

a step of acquiring a first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution;

a step of acquiring a second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution;

a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the prescribed first decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded; and

a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

20. A moving picture decoding program configured to have a computer execute:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting at least a first and a second sequence of encoded bits;

a step of acquiring the first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution; and

a step of acquiring the second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

21. A moving picture reencoding program configured to have a computer execute:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits;

a step of acquiring a first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution;

a step of acquiring a second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution;

a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the prescribed first decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a

sequence of encoded bits as reencoded; and

a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

FIG. 1

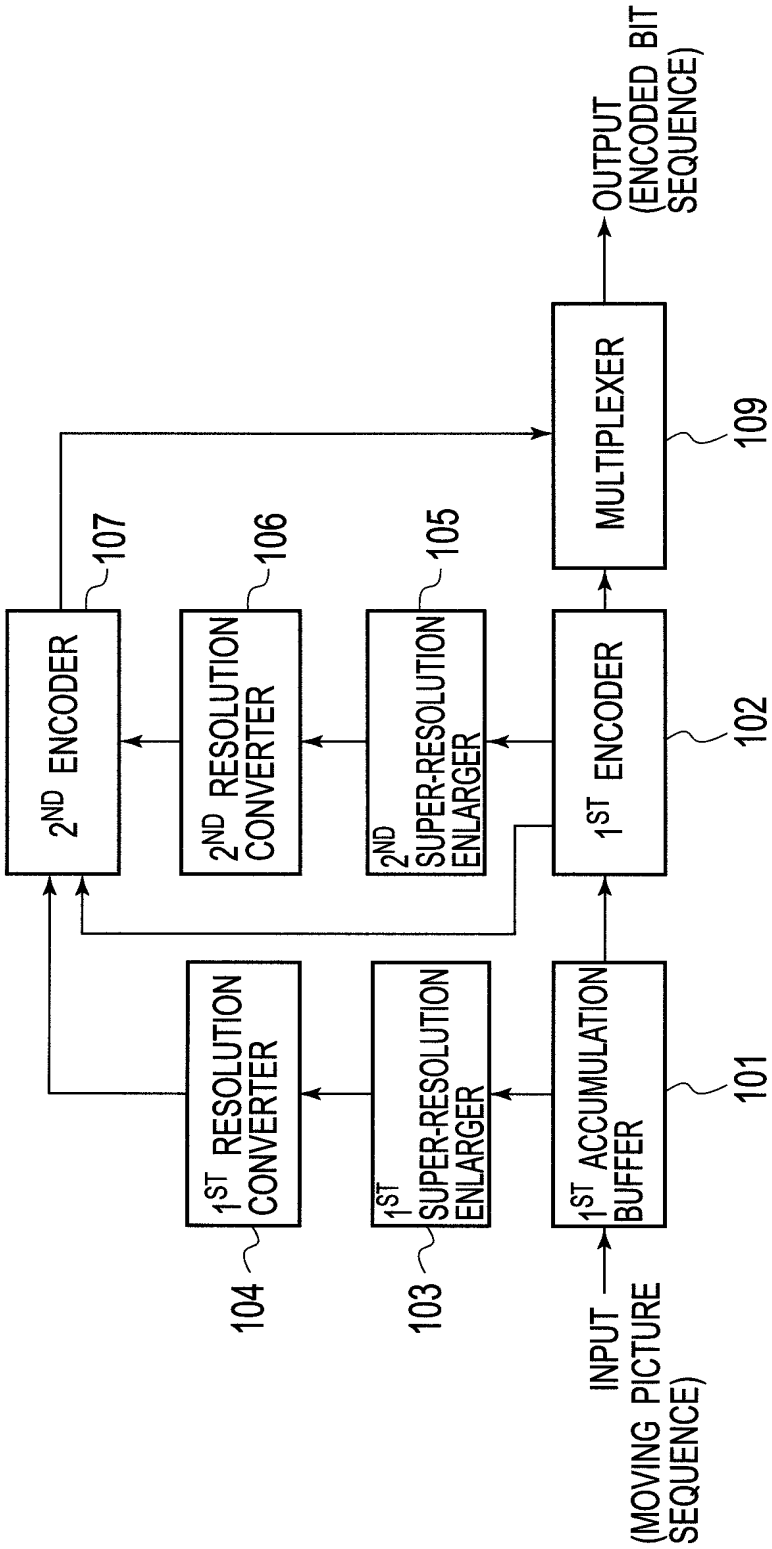

INPUT
(MOVING PICTURE
SEQUENCE)
1ST ACCUMULATION
BUFFER
101
1ST ENCODER
102
1ST SUPER-RESOLUTION
ENLARGER
103
1ST RESOLUTION
CONVERTER
104
2ND SUPER-RESOLUTION
ENLARGER
105
2ND RESOLUTION
CONVERTER
106
2ND ENCODER
107
MULTIPLEXER
109
OUTPUT
(ENCODED BIT
SEQUENCE)

FIG. 2

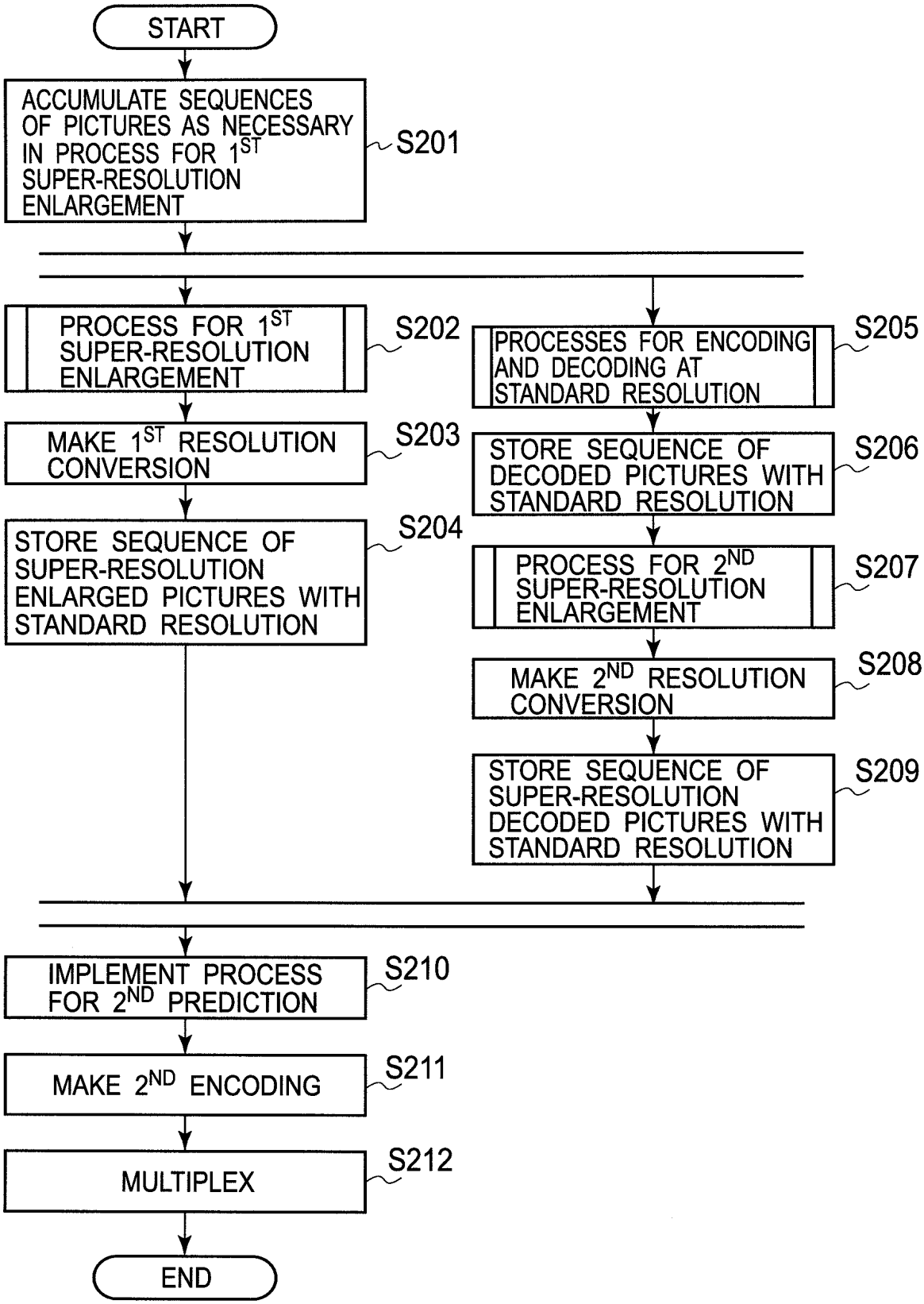

START
ACCUMULATE SEQUENCES OF PICTURES AS NECESSARY IN PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S201
PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S202
MAKE 1ST RESOLUTION CONVERSION
S203
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED PICTURES WITH STANDARD RESOLUTION
S204
PROCESSES FOR ENCODING AND DECODING AT STANDARD RESOLUTION
S205
STORE SEQUENCE OF DECODED PICTURES WITH STANDARD RESOLUTION
S206
PROCESS FOR 2ND SUPER-RESOLUTION ENLARGEMENT
S207
MAKE 2ND RESOLUTION CONVERSION
S208
STORE SEQUENCE OF SUPER-RESOLUTION DECODED PICTURES WITH STANDARD RESOLUTION
S209
IMPLEMENT PROCESS FOR 2ND PREDICTION
S210
MAKE 2ND ENCODING
S211
MULTIPLEX
S212
END

FIG. 3

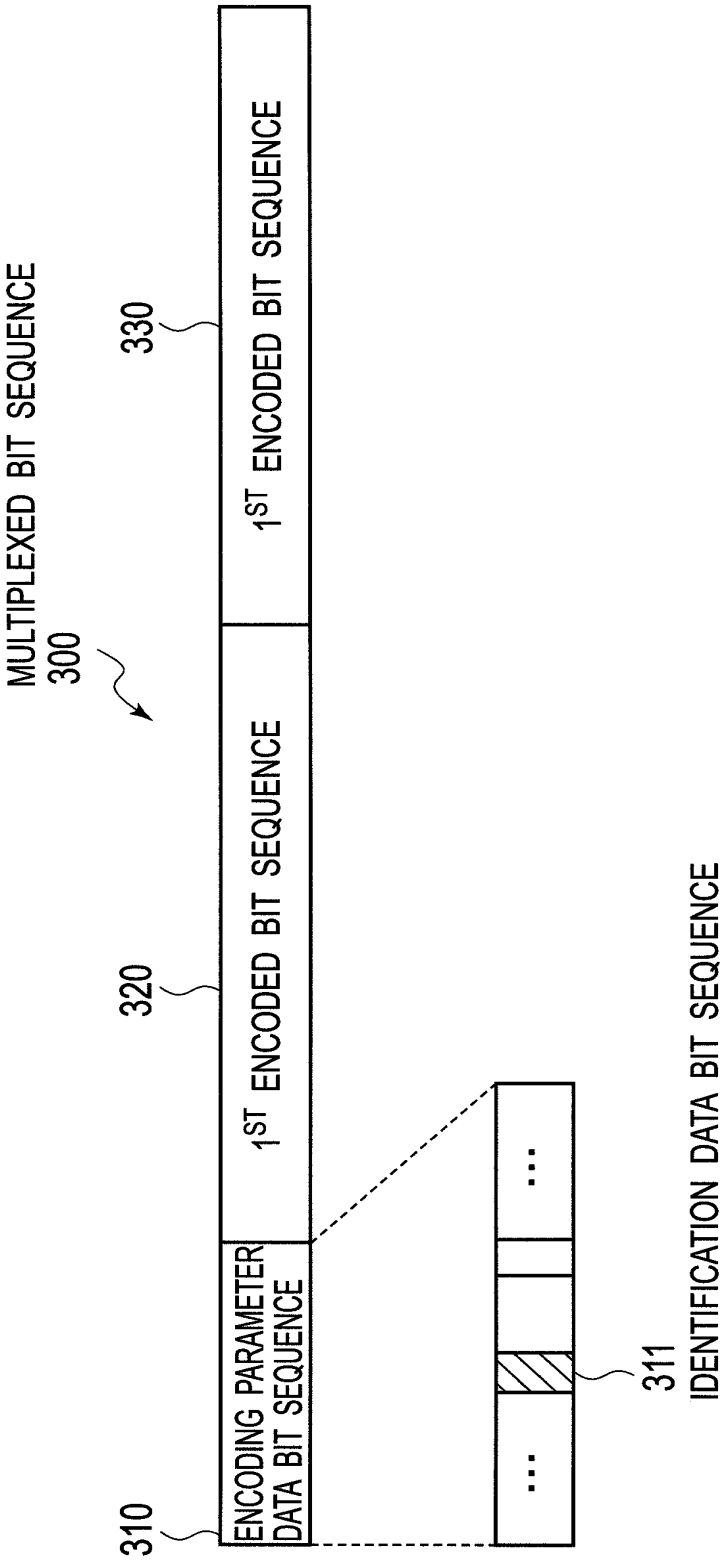

MULTIPLEXED BIT SEQUENCE
300
330
1ST ENCODED BIT SEQUENCE
320
1ST ENCODED BIT SEQUENCE
310
ENCODING PARAMETER DATA BIT SEQUENCE
...
...
311
IDENTIFICATION DATA BIT SEQUENCE

FIG. 4

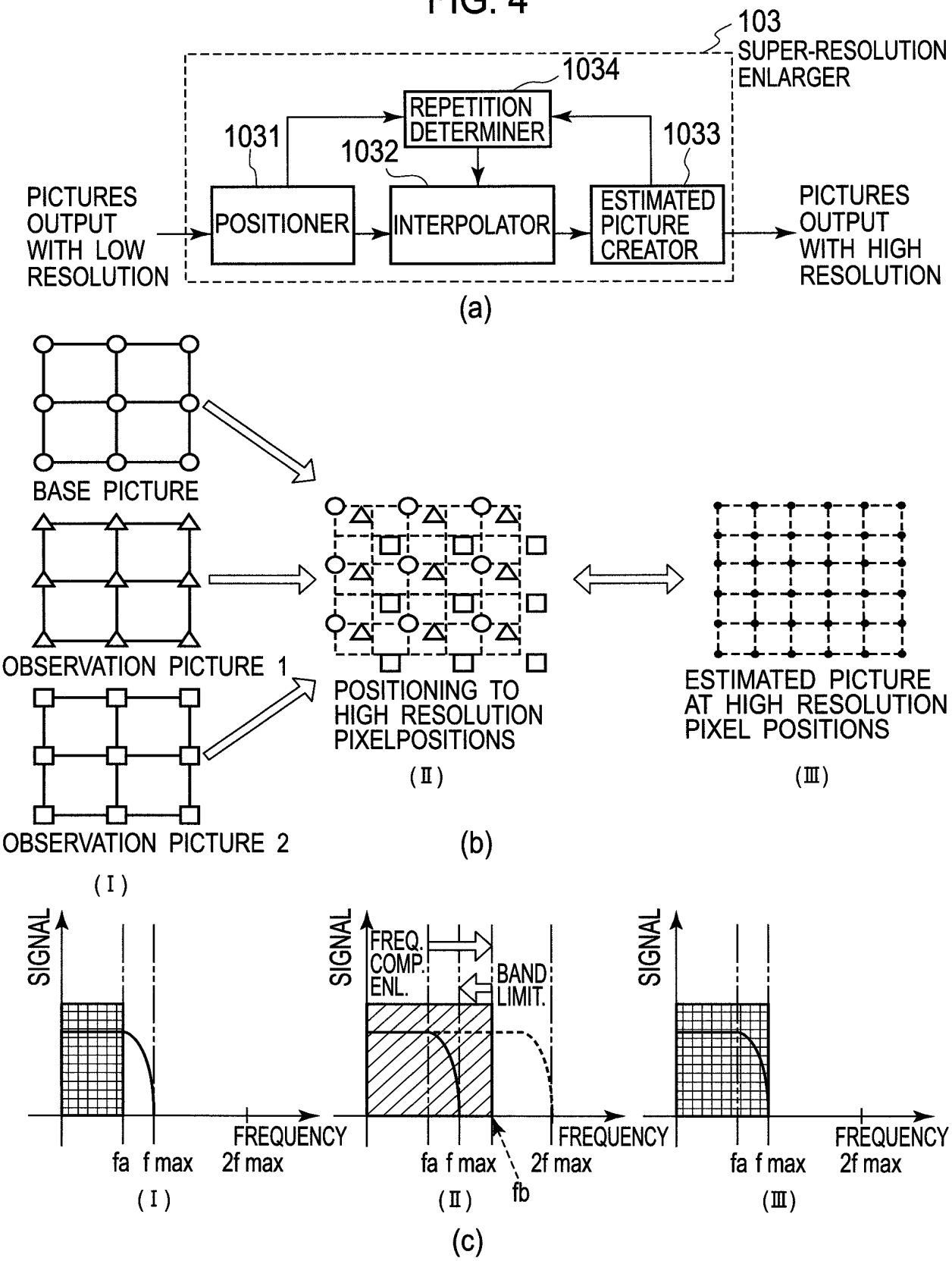

103
SUPER-RESOLUTION ENLARGER
1034
REPETITION DETERMINER
1031
1032
1033
PICTURES OUTPUT WITH LOW RESOLUTION
POSITIONER
INTERPOLATOR
ESTIMATED PICTURE CREATOR
PICTURES OUTPUT WITH HIGH RESOLUTION
(a)
BASE PICTURE
OBSERVATION PICTURE 1
OBSERVATION PICTURE 2
POSITIONING TO HIGH RESOLUTION PIXELPOSITIONS
(Ⅱ)
ESTIMATED PICTURE AT HIGH RESOLUTION PIXEL POSITIONS
(Ⅲ)
(b)
(Ⅰ)
SIGNAL
FREQUENCY
fa f max
2f max
(Ⅰ)
FREQ. COMP. ENL.
BAND LIMIT.
fb
(Ⅱ)
(Ⅲ)
(c)

FIG. 5

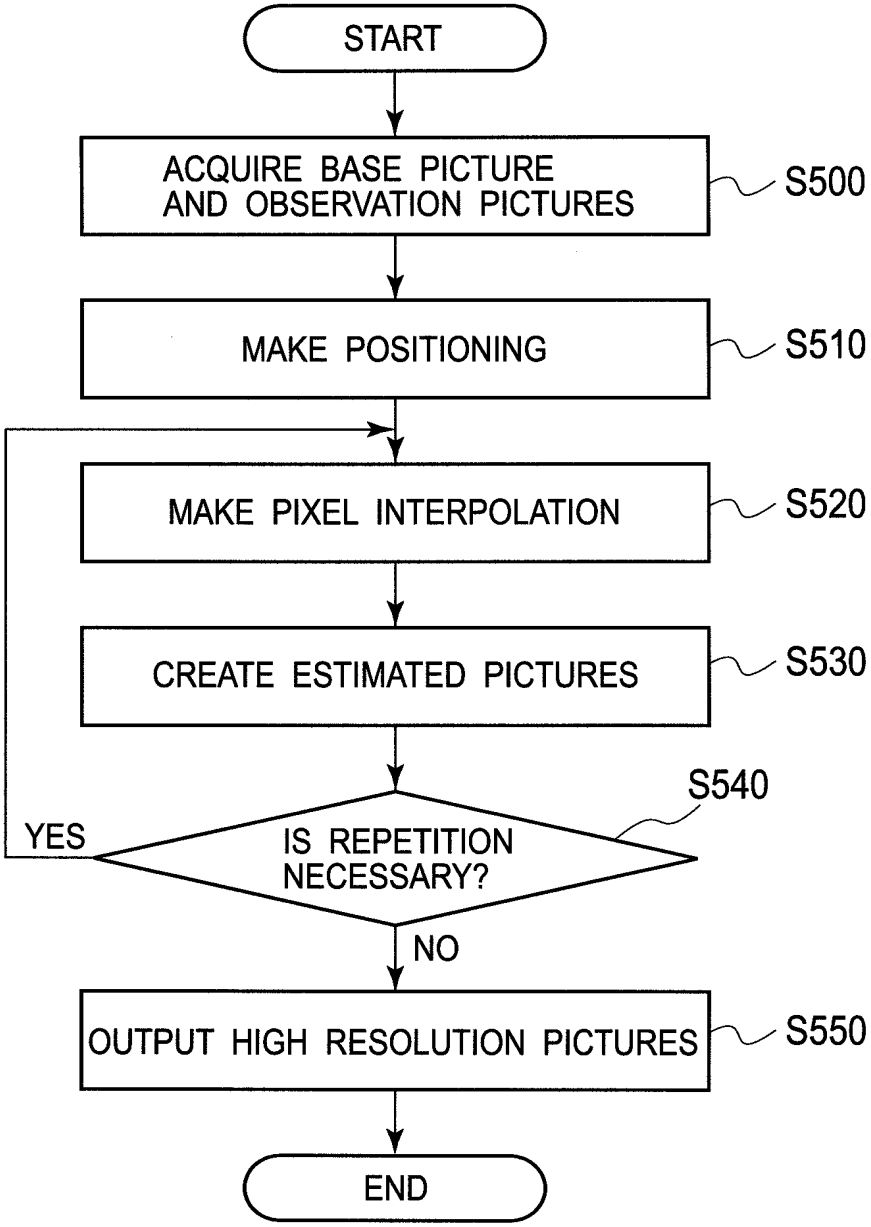
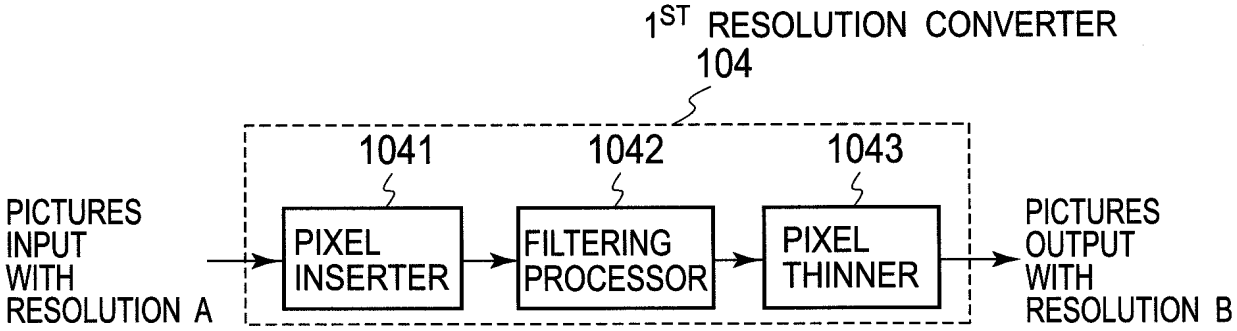
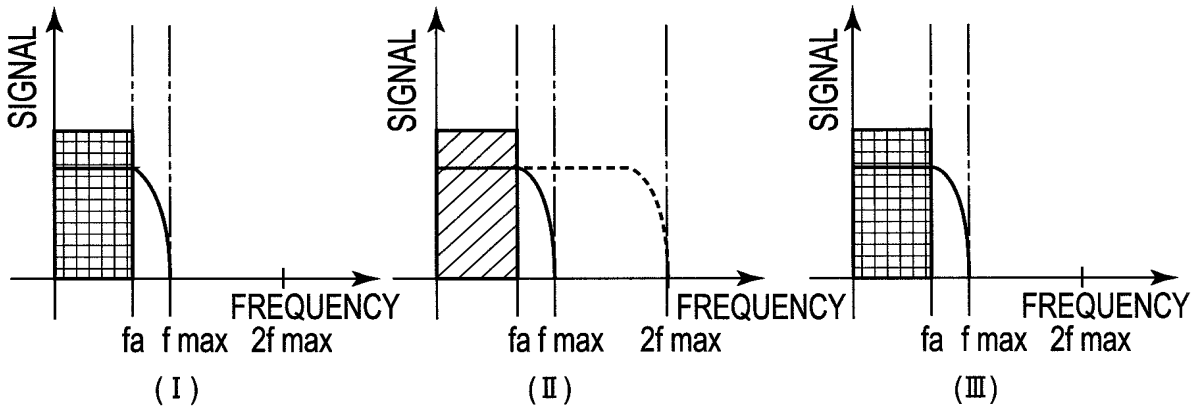

START
ACQUIRE BASE PICTURE AND OBSERVATION PICTURES
S500
MAKE POSITIONING
S510
MAKE PIXEL INTERPOLATION
S520
CREATE ESTIMATED PICTURES
S530
S540
YES
IS REPETITION NECESSARY?
NO
OUTPUT HIGH RESOLUTION PICTURES
S550
END

FIG. 6


1ST RESOLUTION CONVERTER
104
1041
1042
1043
PICTURES INPUT WITH RESOLUTION A
PIXEL INSERTER
FILTERING PROCESSOR
PIXEL THINNER
PICTURES OUTPUT WITH RESOLUTION B

(a)


SIGNAL
FREQUENCY
fa f max 2f max
(I)
SIGNAL
FREQUENCY
fa f max 2f max
(II)
SIGNAL
FREQUENCY
fa f max 2f max
(III)

(b)

FIG. 7

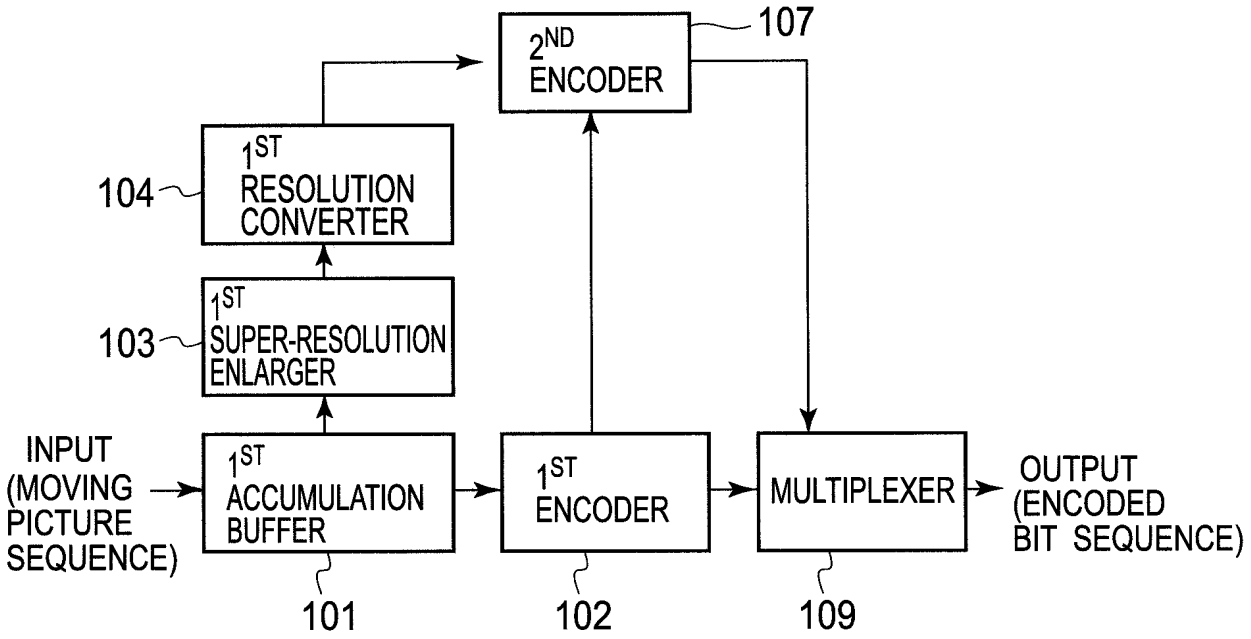

2ND ENCODER
107
1ST RESOLUTION CONVERTER
104
1ST SUPER-RESOLUTION ENLARGER
103
INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
1ST ENCODER
MULTIPLEXER
OUTPUT (ENCODED BIT SEQUENCE)
101
102
109

FIG. 8

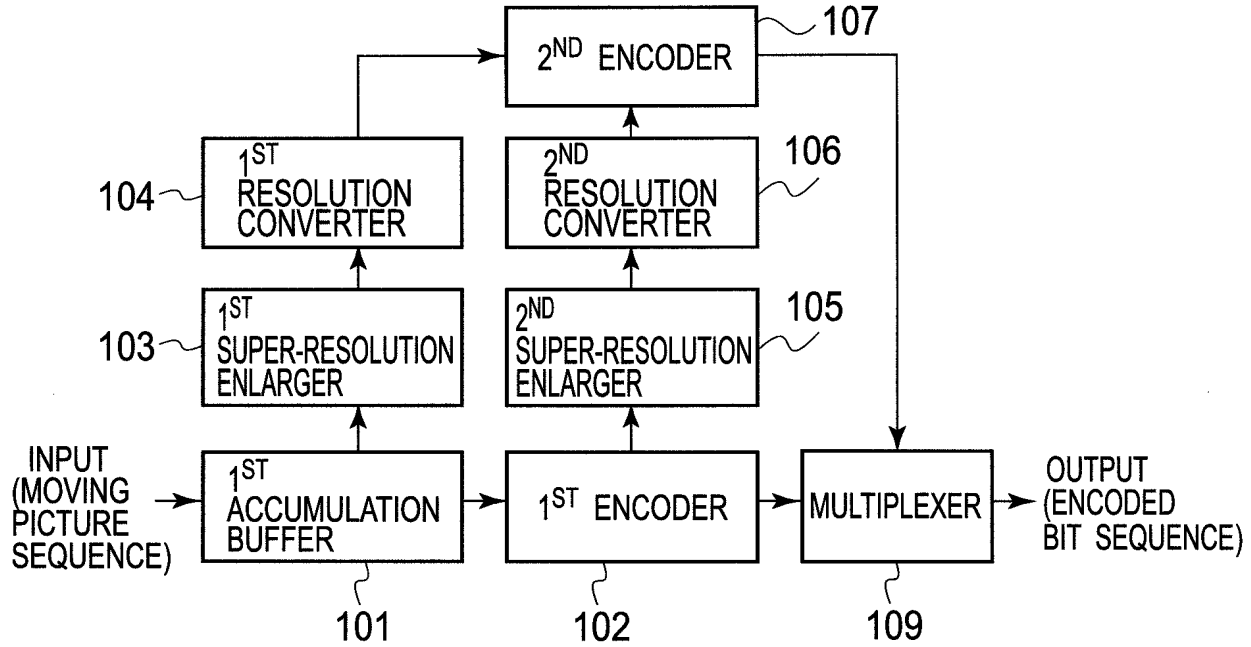

2ND ENCODER
107
1ST RESOLUTION CONVERTER
104
2ND RESOLUTION CONVERTER
106
1ST SUPER-RESOLUTION ENLARGER
103
2ND SUPER-RESOLUTION ENLARGER
105
INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
1ST ENCODER
MULTIPLEXER
OUTPUT (ENCODED BIT SEQUENCE)
101
102
109

FIG. 9

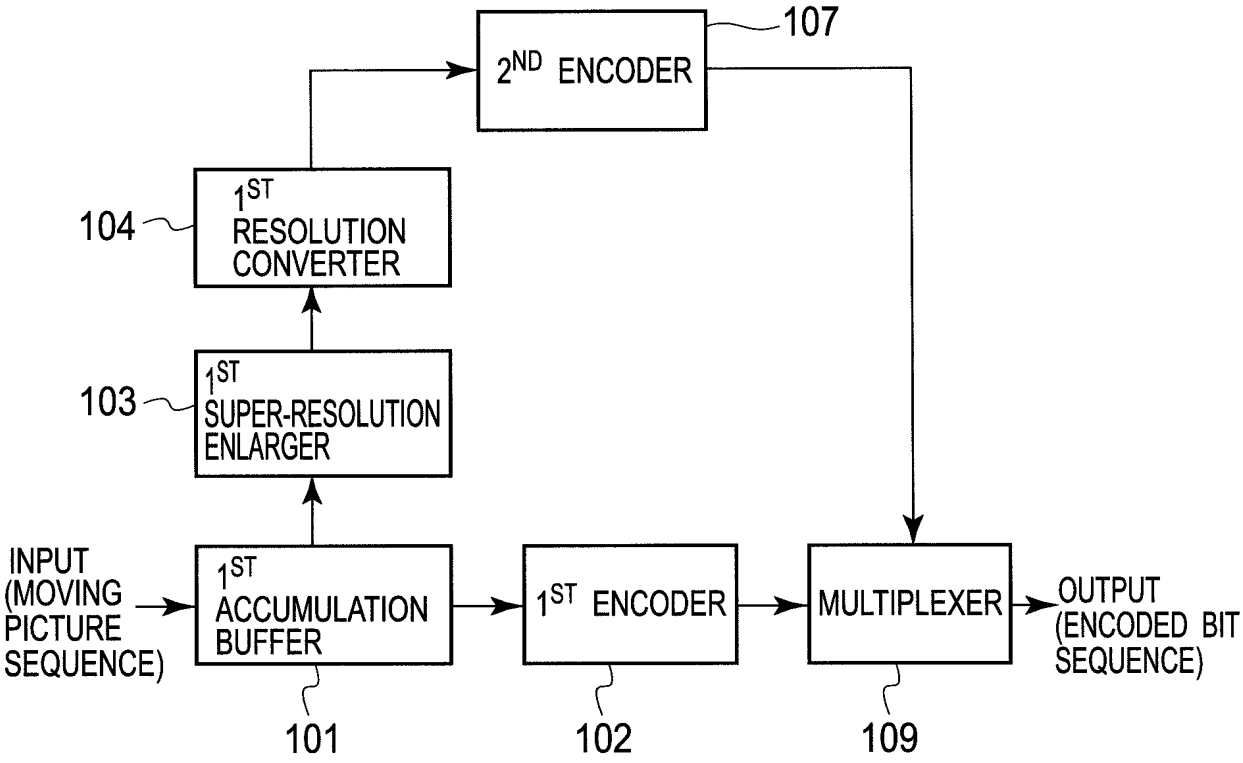

2ND ENCODER
107
1ST RESOLUTION CONVERTER
104
1ST SUPER-RESOLUTION ENLARGER
103
INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
101
1ST ENCODER
102
MULTIPLEXER
109
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 10

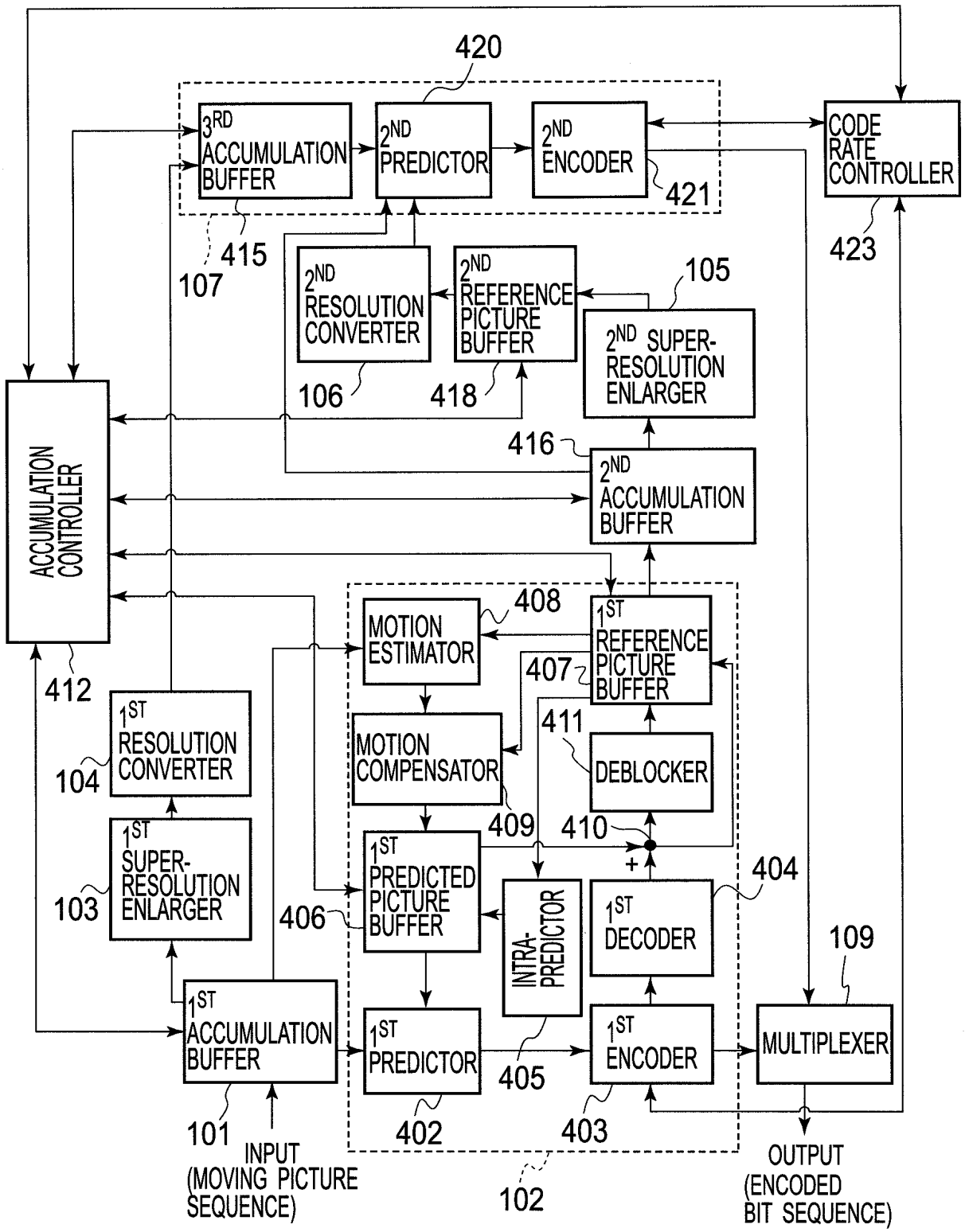

420
3RD ACCUMULATION BUFFER
2ND PREDICTOR
2ND ENCODER
421
CODE RATE CONTROLLER
423
415
107
2ND RESOLUTION CONVERTER
2ND REFERENCE PICTURE BUFFER
105
2ND SUPER-RESOLUTION ENLARGER
106
418
ACCUMULATION CONTROLLER
416
2ND ACCUMULATION BUFFER
408
MOTION ESTIMATOR
1ST REFERENCE PICTURE BUFFER
407
412
1ST RESOLUTION CONVERTER
411
MOTION COMPENSATOR
DEBLOCKER
104
409
410
1ST SUPER-RESOLUTION ENLARGER
1ST PREDICTED PICTURE BUFFER
404
103
406
INTRA-PREDICTOR
1ST DECODER
109
1ST ACCUMULATION BUFFER
1ST PREDICTOR
1ST ENCODER
MULTIPLEXER
405
101
402
403
INPUT (MOVING PICTURE SEQUENCE)
102
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 11

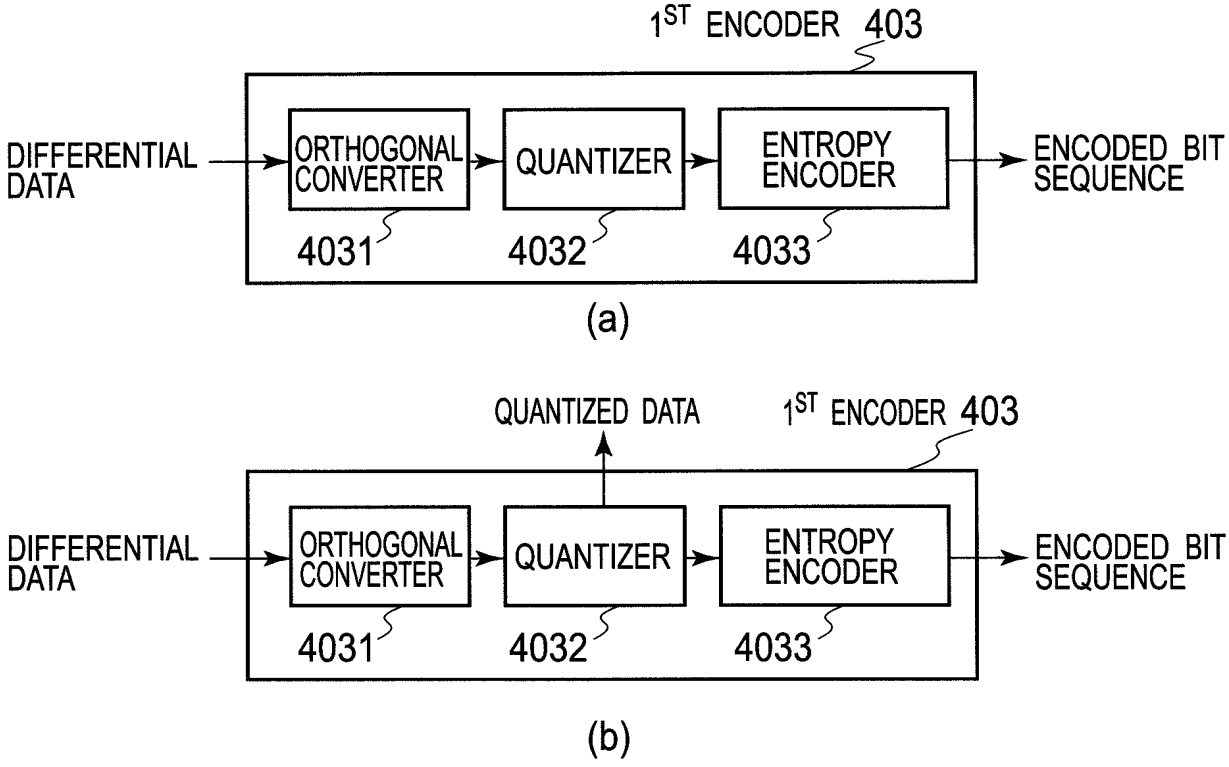

1ST ENCODER 403
DIFFERENTIAL DATA
ORTHOGONAL CONVERTER
QUANTIZER
ENTROPY ENCODER
ENCODED BIT SEQUENCE
4031
4032
4033
(a)
QUANTIZED DATA
1ST ENCODER 403
DIFFERENTIAL DATA
ORTHOGONAL CONVERTER
QUANTIZER
ENTROPY ENCODER
ENCODED BIT SEQUENCE
4031
4032
4033
(b)

FIG. 12

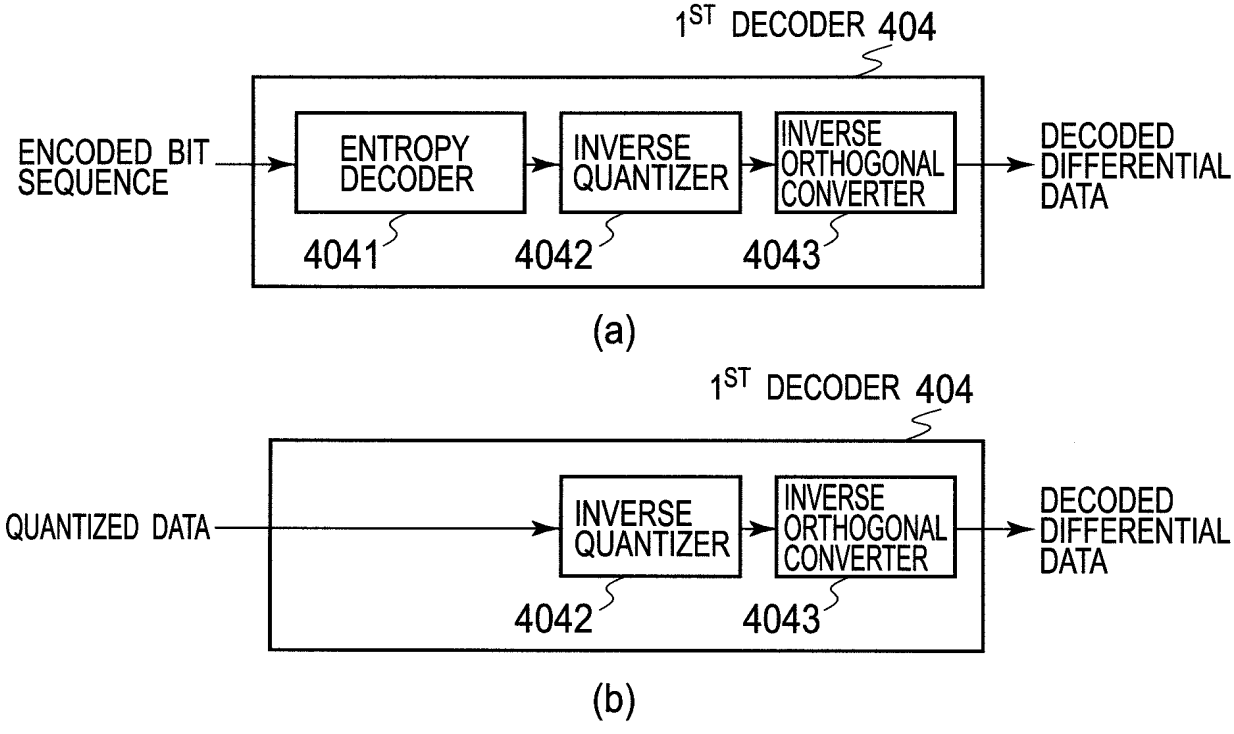

1ST DECODER 404
ENCODED BIT SEQUENCE
ENTROPY DECODER
INVERSE QUANTIZER
INVERSE ORTHOGONAL CONVERTER
DECODED DIFFERENTIAL DATA
4041
4042
4043
(a)
1ST DECODER 404
QUANTIZED DATA
INVERSE QUANTIZER
INVERSE ORTHOGONAL CONVERTER
DECODED DIFFERENTIAL DATA
4042
4043
(b)

FIG. 13

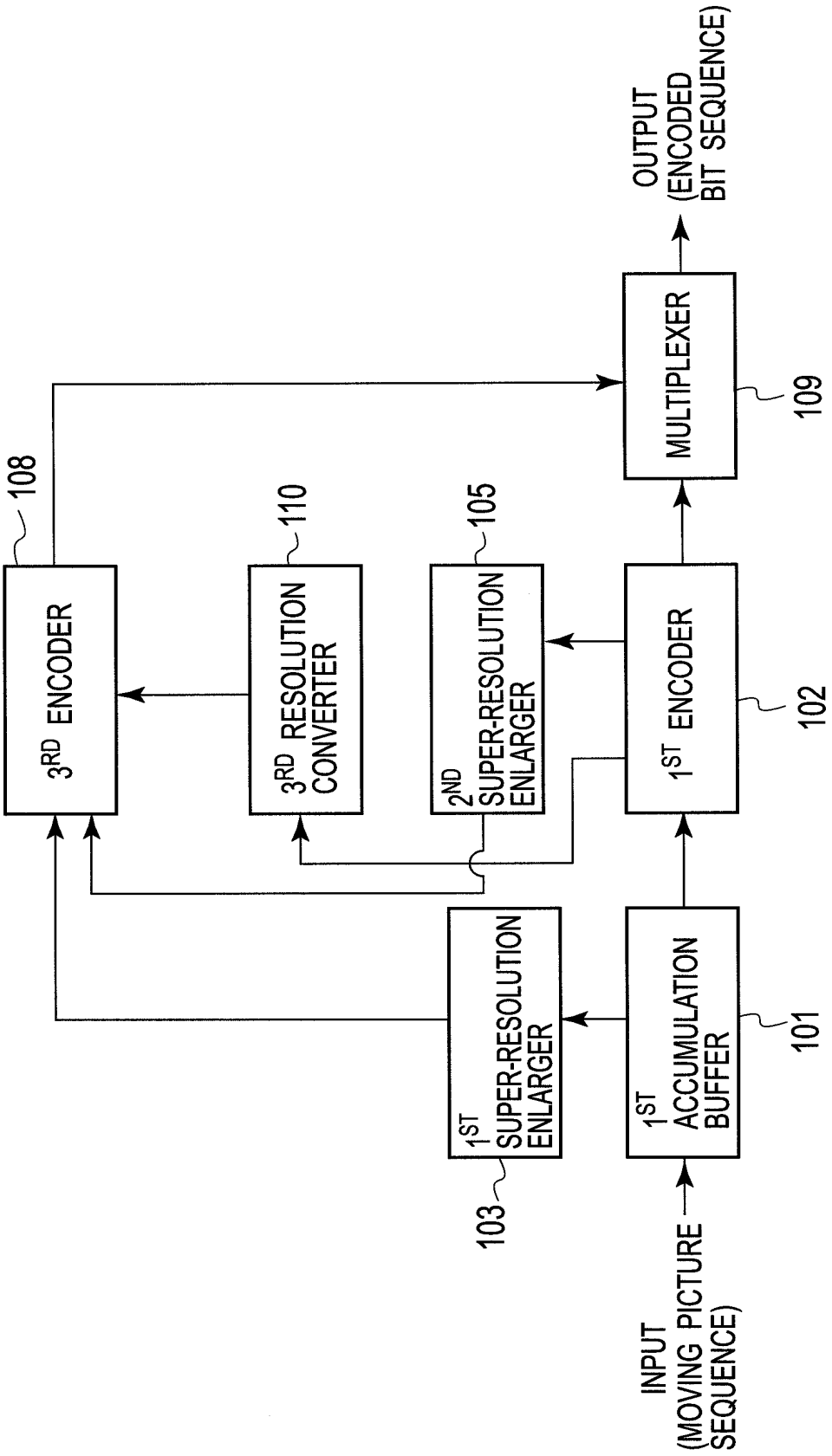

INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
101
1ST SUPER-RESOLUTION ENLARGER
103
1ST ENCODER
102
2ND SUPER-RESOLUTION ENLARGER
105
3RD RESOLUTION CONVERTER
110
3RD ENCODER
108
MULTIPLEXER
109
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 14

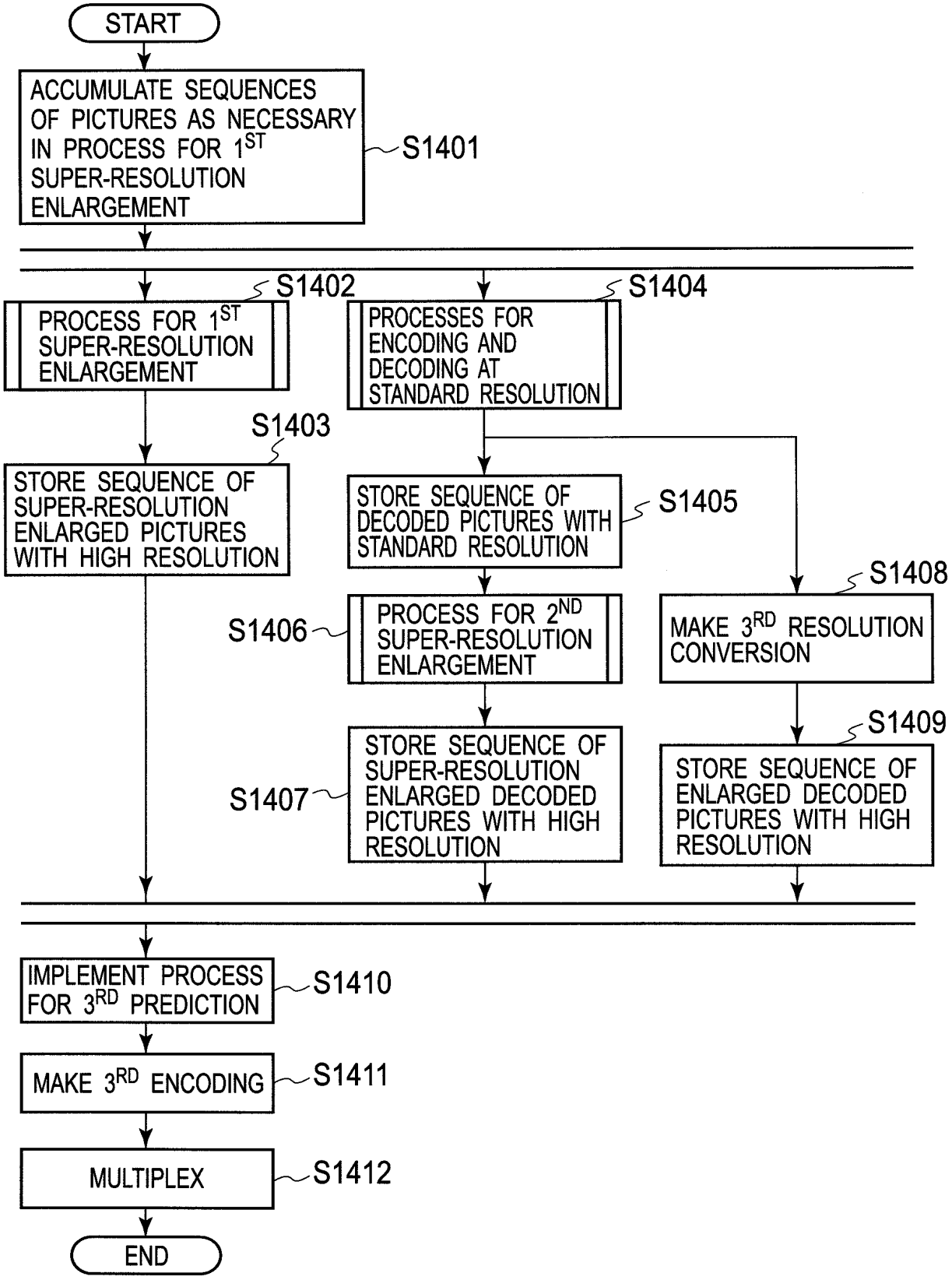

START
ACCUMULATE SEQUENCES OF PICTURES AS NECESSARY IN PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S1401
S1402
PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S1403
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED PICTURES WITH HIGH RESOLUTION
S1404
PROCESSES FOR ENCODING AND DECODING AT STANDARD RESOLUTION
STORE SEQUENCE OF DECODED PICTURES WITH STANDARD RESOLUTION
S1405
S1406
PROCESS FOR 2ND SUPER-RESOLUTION ENLARGEMENT
S1407
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
S1408
MAKE 3RD RESOLUTION CONVERSION
S1409
STORE SEQUENCE OF ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
IMPLEMENT PROCESS FOR 3RD PREDICTION
S1410
MAKE 3RD ENCODING
S1411
MULTIPLEX
S1412
END

FIG. 15

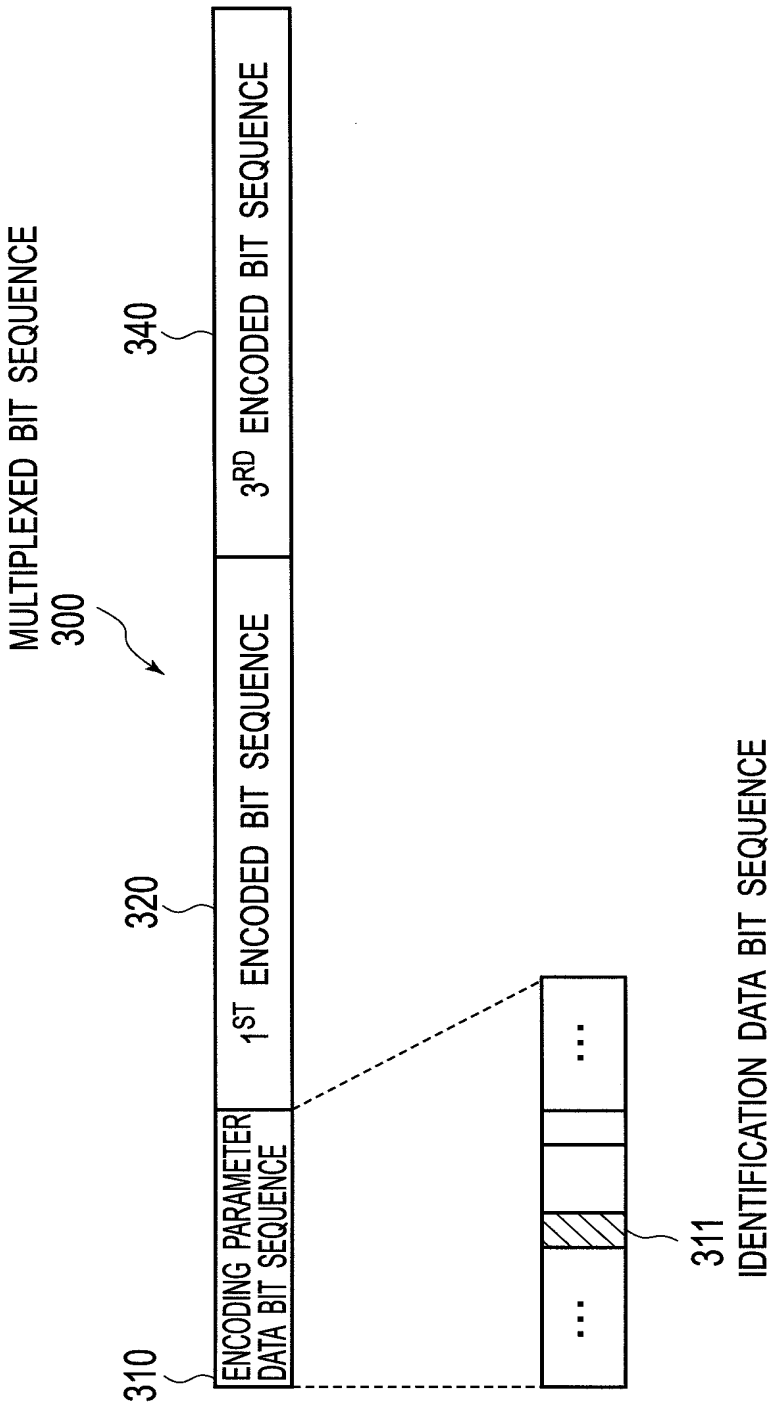

MULTIPLEXED BIT SEQUENCE
300
310
320
340
ENCODING PARAMETER DATA BIT SEQUENCE
1ST ENCODED BIT SEQUENCE
3RD ENCODED BIT SEQUENCE
311
IDENTIFICATION DATA BIT SEQUENCE

FIG. 16

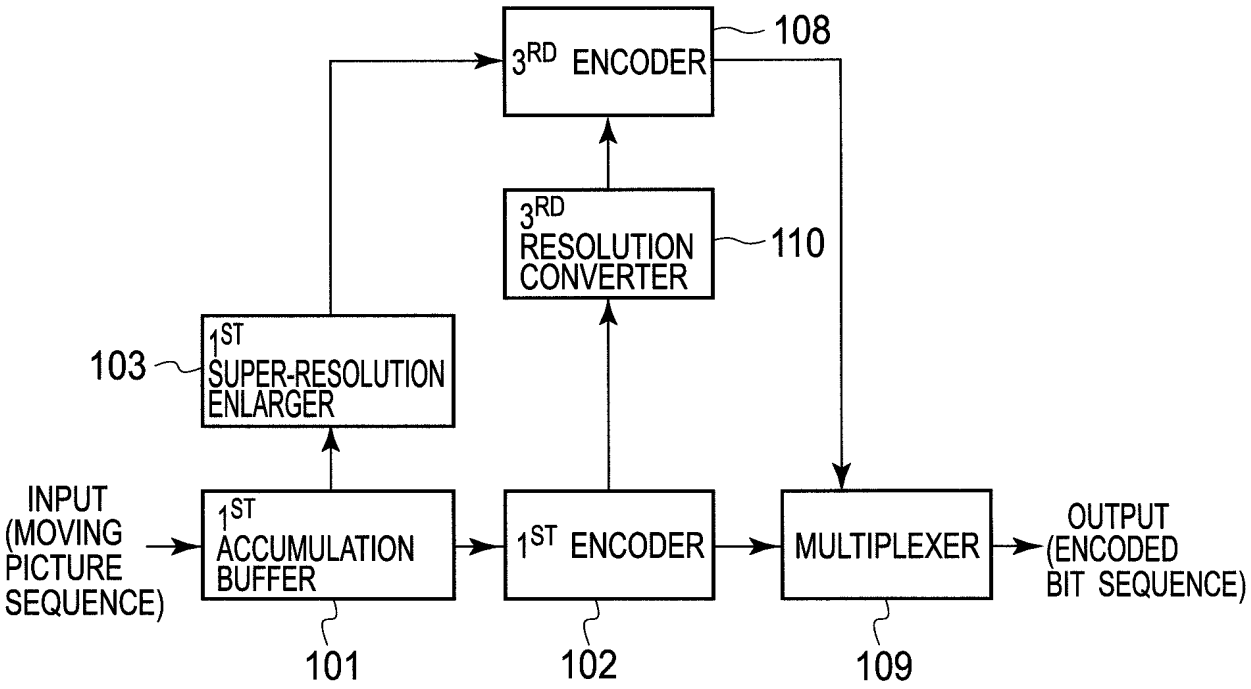

3RD ENCODER
108
3RD RESOLUTION CONVERTER
110
1ST SUPER-RESOLUTION ENLARGER
103
INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
1ST ENCODER
MULTIPLEXER
OUTPUT (ENCODED BIT SEQUENCE)
101
102
109

FIG. 17

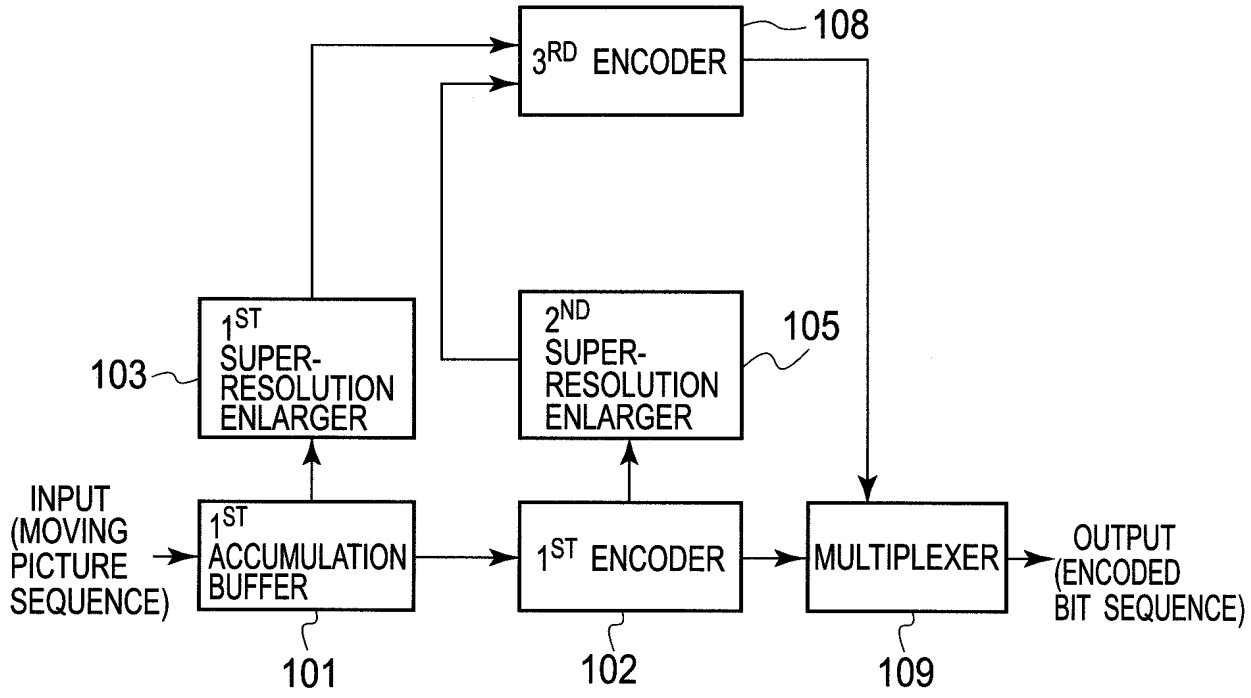

3RD ENCODER
108
1ST SUPER-RESOLUTION ENLARGER
103
2ND SUPER-RESOLUTION ENLARGER
105
INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
1ST ENCODER
MULTIPLEXER
OUTPUT (ENCODED BIT SEQUENCE)
101
102
109

FIG. 18

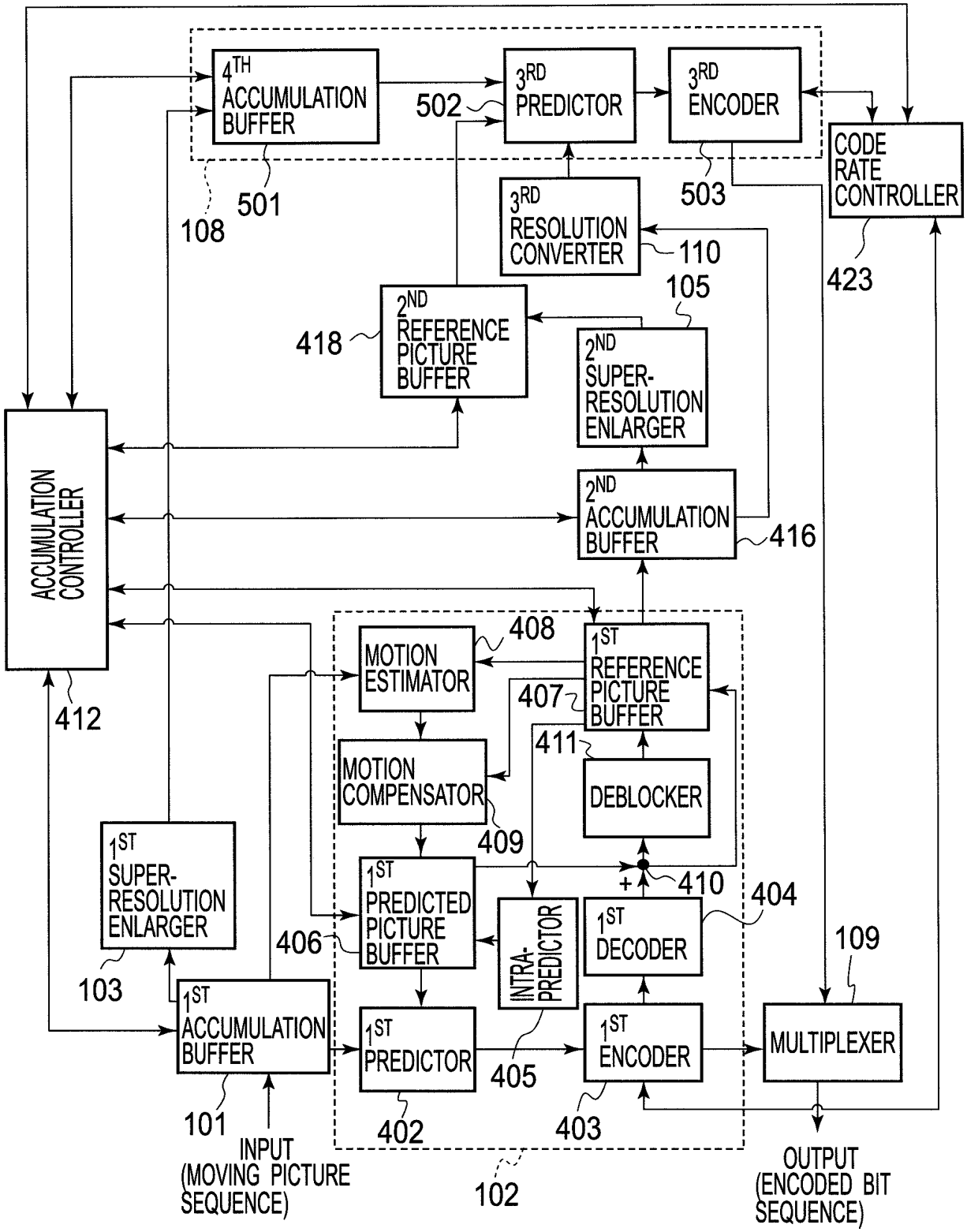

4TH ACCUMULATION BUFFER
502
3RD PREDICTOR
3RD ENCODER
CODE RATE CONTROLLER
501
503
108
3RD RESOLUTION CONVERTER
110
423
105
418
2ND REFERENCE PICTURE BUFFER
2ND SUPER-RESOLUTION ENLARGER
ACCUMULATION CONTROLLER
2ND ACCUMULATION BUFFER
416
408
MOTION ESTIMATOR
1ST REFERENCE PICTURE BUFFER
412
407
411
MOTION COMPENSATOR
DEBLOCKER
409
1ST SUPER-RESOLUTION ENLARGER
1ST PREDICTED PICTURE BUFFER
410
404
406
INTRA-PREDICTOR
1ST DECODER
109
103
1ST ACCUMULATION BUFFER
1ST PREDICTOR
405
1ST ENCODER
MULTIPLEXER
101
402
403
INPUT (MOVING PICTURE SEQUENCE)
102
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 19

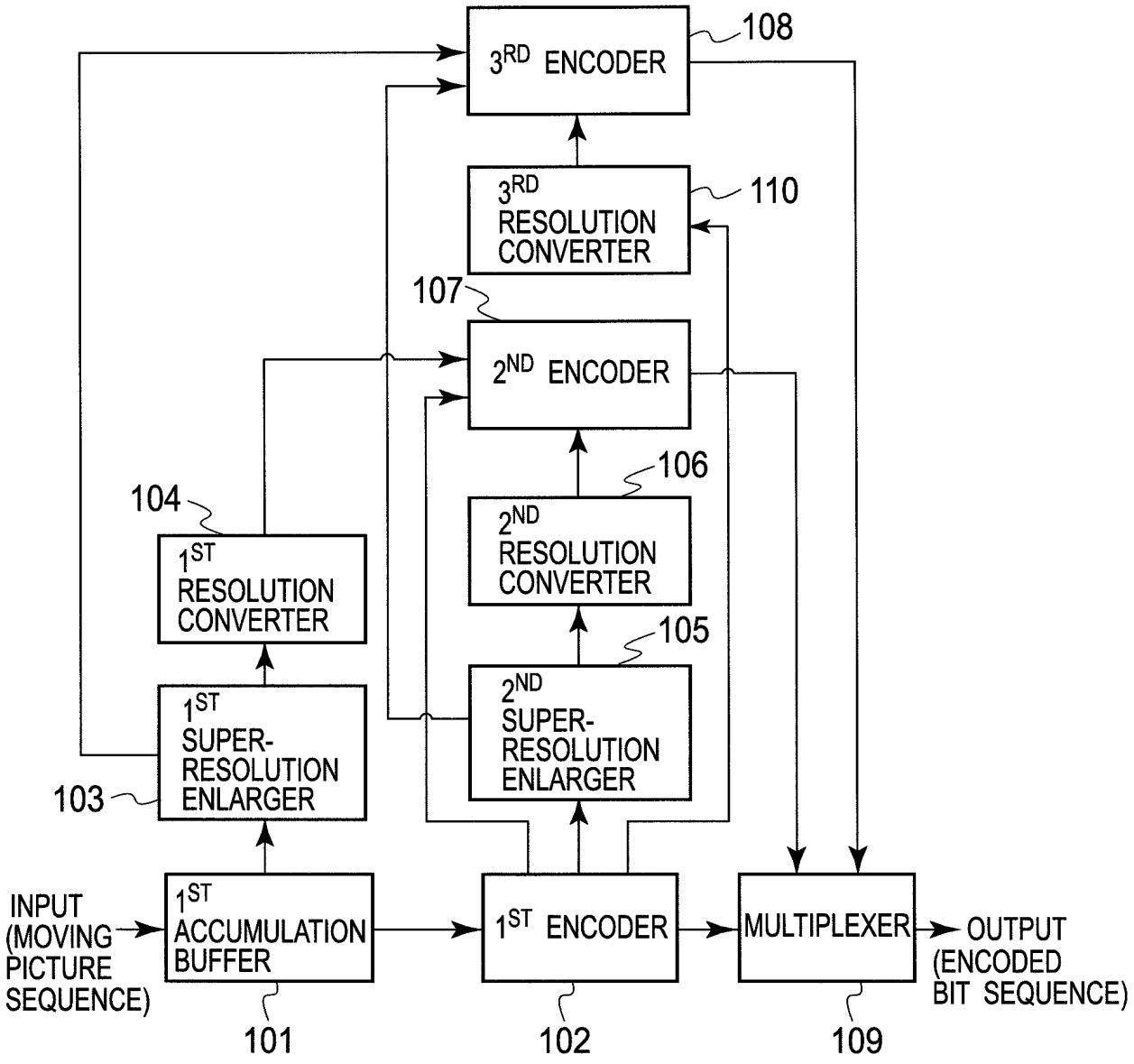

3RD ENCODER
108
3RD RESOLUTION CONVERTER
110
107
2ND ENCODER
106
2ND RESOLUTION CONVERTER
105
2ND SUPER-RESOLUTION ENLARGER
104
1ST RESOLUTION CONVERTER
1ST SUPER-RESOLUTION ENLARGER
103
INPUT (MOVING PICTURE SEQUENCE)
1ST ACCUMULATION BUFFER
101
1ST ENCODER
102
MULTIPLEXER
109
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 20

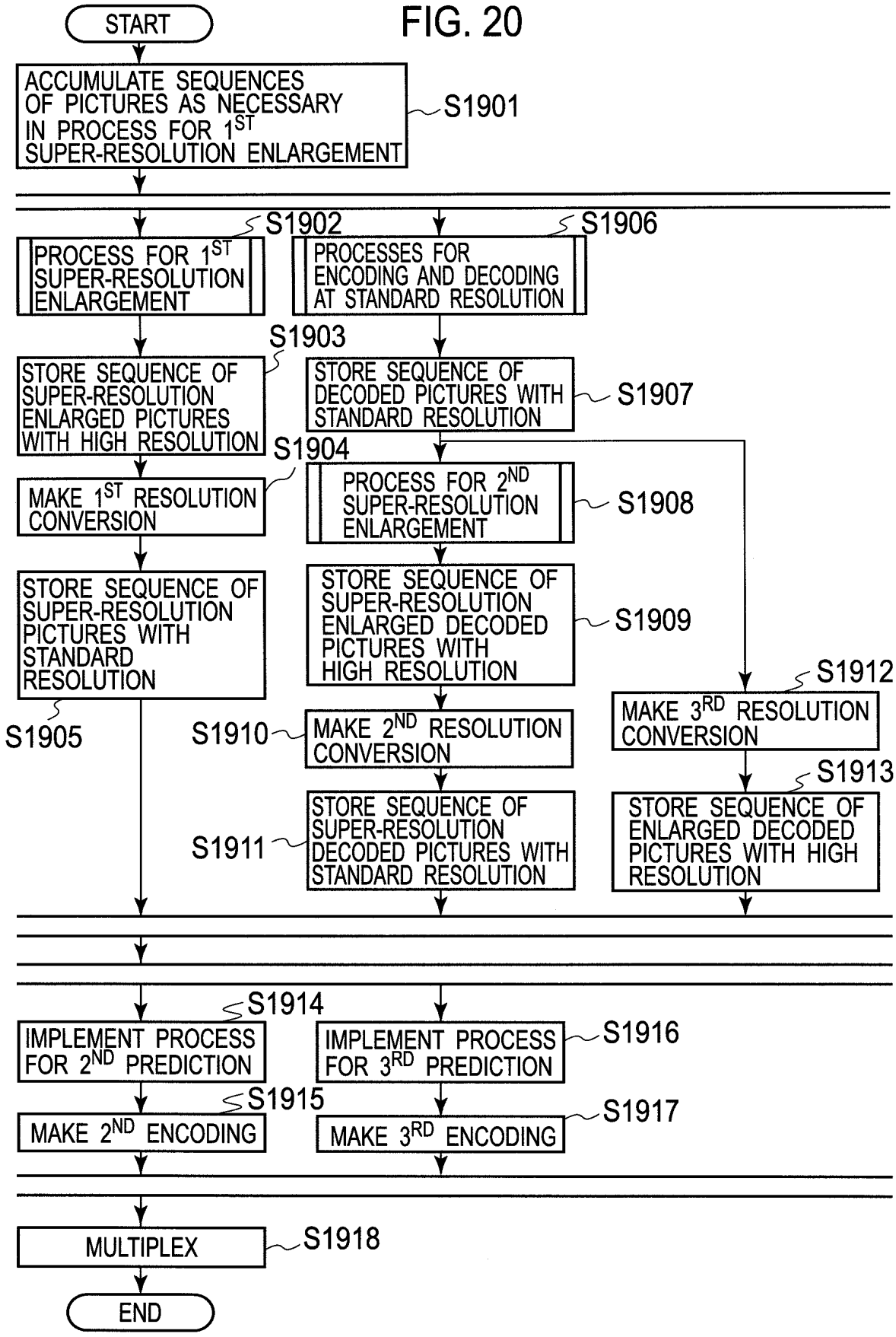

START
ACCUMULATE SEQUENCES OF PICTURES AS NECESSARY IN PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S1901
S1902
PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S1906
PROCESSES FOR ENCODING AND DECODING AT STANDARD RESOLUTION
S1903
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED PICTURES WITH HIGH RESOLUTION
STORE SEQUENCE OF DECODED PICTURES WITH STANDARD RESOLUTION
S1907
S1904
MAKE 1ST RESOLUTION CONVERSION
PROCESS FOR 2ND SUPER-RESOLUTION ENLARGEMENT
S1908
STORE SEQUENCE OF SUPER-RESOLUTION PICTURES WITH STANDARD RESOLUTION
S1905
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
S1909
S1912
MAKE 3RD RESOLUTION CONVERSION
S1910
MAKE 2ND RESOLUTION CONVERSION
S1913
STORE SEQUENCE OF SUPER-RESOLUTION DECODED PICTURES WITH STANDARD RESOLUTION
S1911
STORE SEQUENCE OF ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
S1914
IMPLEMENT PROCESS FOR 2ND PREDICTION
IMPLEMENT PROCESS FOR 3RD PREDICTION
S1916
S1915
MAKE 2ND ENCODING
MAKE 3RD ENCODING
S1917
MULTIPLEX
S1918
END

FIG. 21

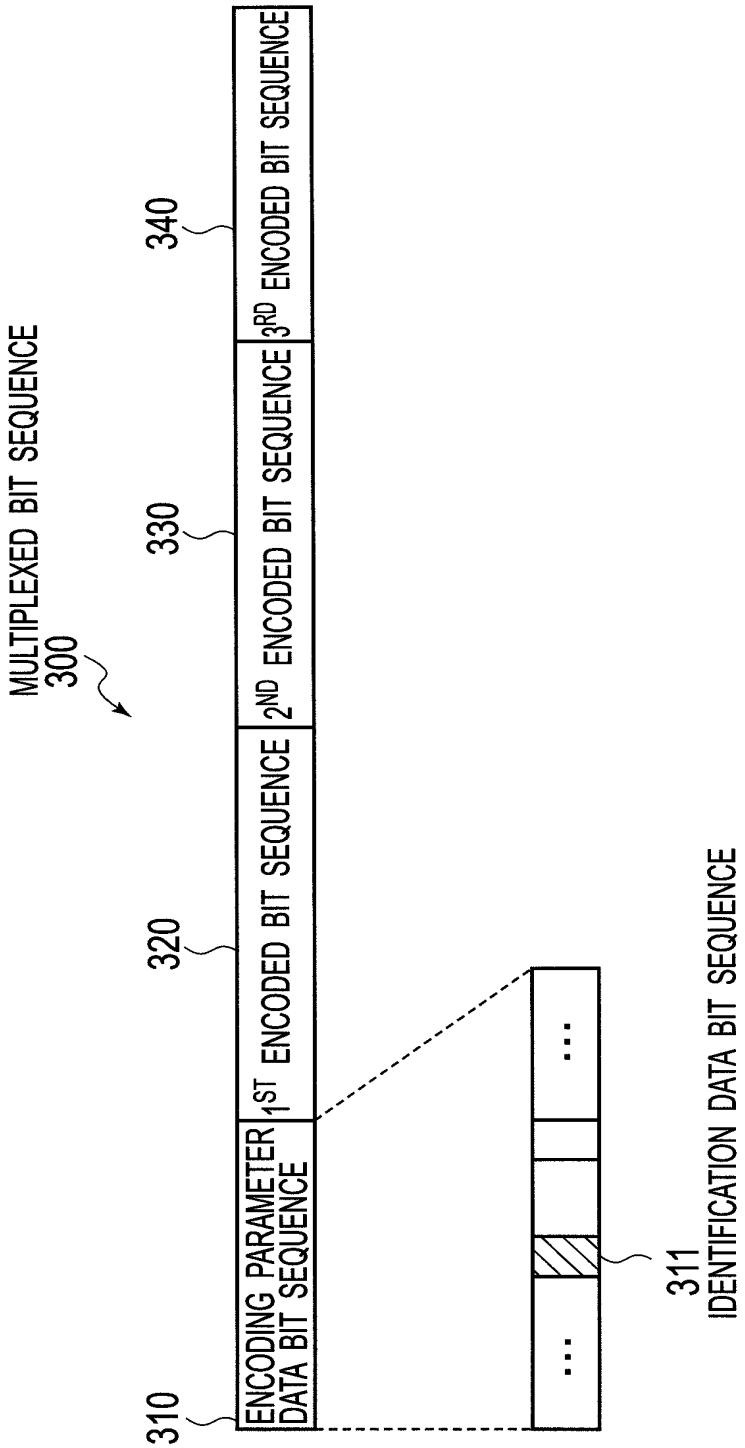

MULTIPLEXED BIT SEQUENCE
300
310
ENCODING PARAMETER DATA BIT SEQUENCE
320
1ST ENCODED BIT SEQUENCE
330
2ND ENCODED BIT SEQUENCE
340
3RD ENCODED BIT SEQUENCE
311
IDENTIFICATION DATA BIT SEQUENCE

FIG. 22

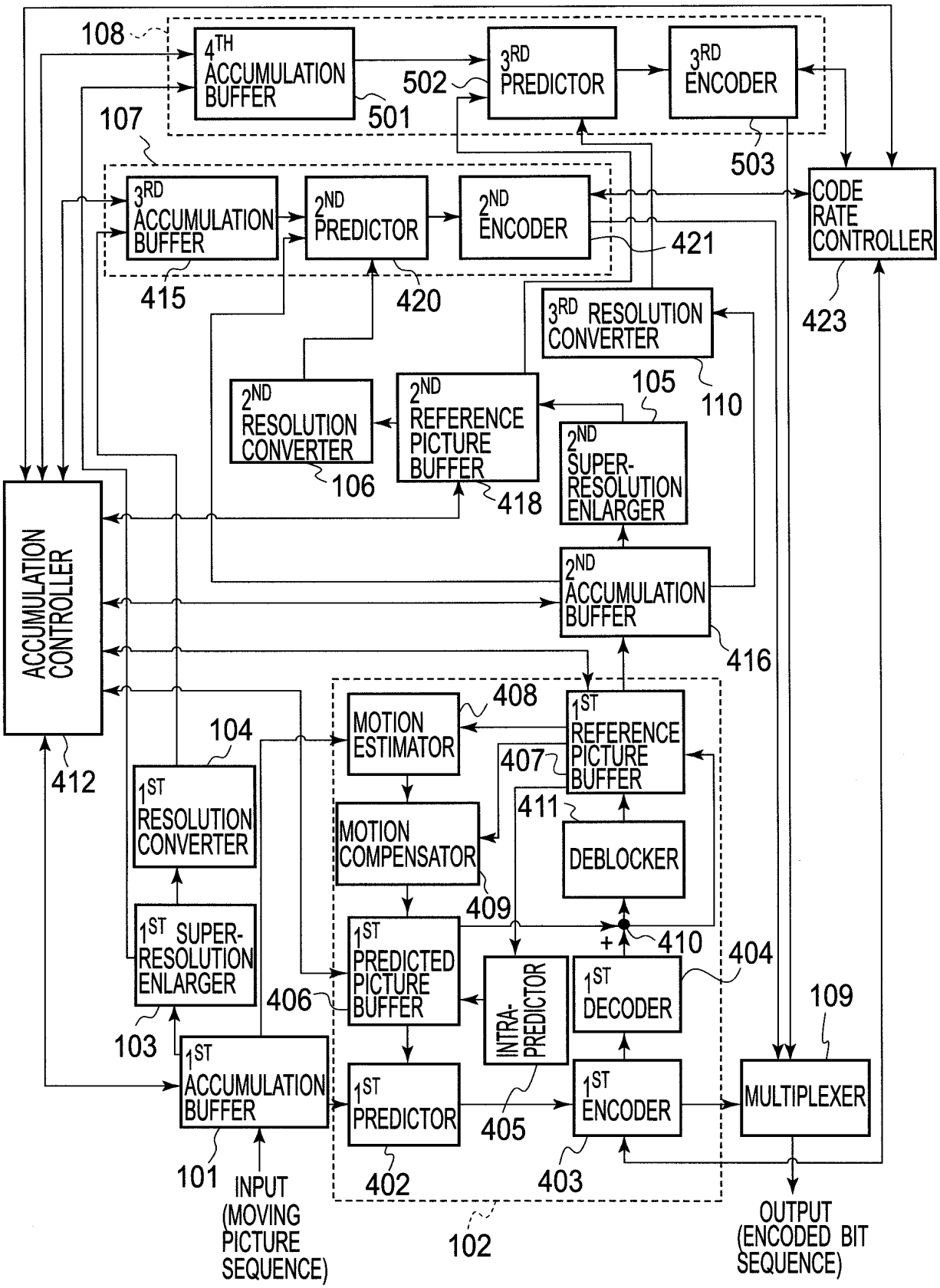

108
4TH ACCUMULATION BUFFER
501
502
3RD PREDICTOR
3RD ENCODER
503
107
3RD ACCUMULATION BUFFER
2ND PREDICTOR
2ND ENCODER
421
CODE RATE CONTROLLER
423
415
420
3RD RESOLUTION CONVERTER
110
105
2ND RESOLUTION CONVERTER
106
2ND REFERENCE PICTURE BUFFER
418
2ND SUPER-RESOLUTION ENLARGER
ACCUMULATION CONTROLLER
2ND ACCUMULATION BUFFER
416
408
MOTION ESTIMATOR
1ST REFERENCE PICTURE BUFFER
407
104
412
1ST RESOLUTION CONVERTER
411
MOTION COMPENSATOR
DEBLOCKER
409
1ST SUPER-RESOLUTION ENLARGER
1ST PREDICTED PICTURE BUFFER
410
404
406
INTRA-PREDICTOR
1ST DECODER
109
103
1ST ACCUMULATION BUFFER
1ST PREDICTOR
405
1ST ENCODER
MULTIPLEXER
101
INPUT (MOVING PICTURE SEQUENCE)
402
403
102
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 23

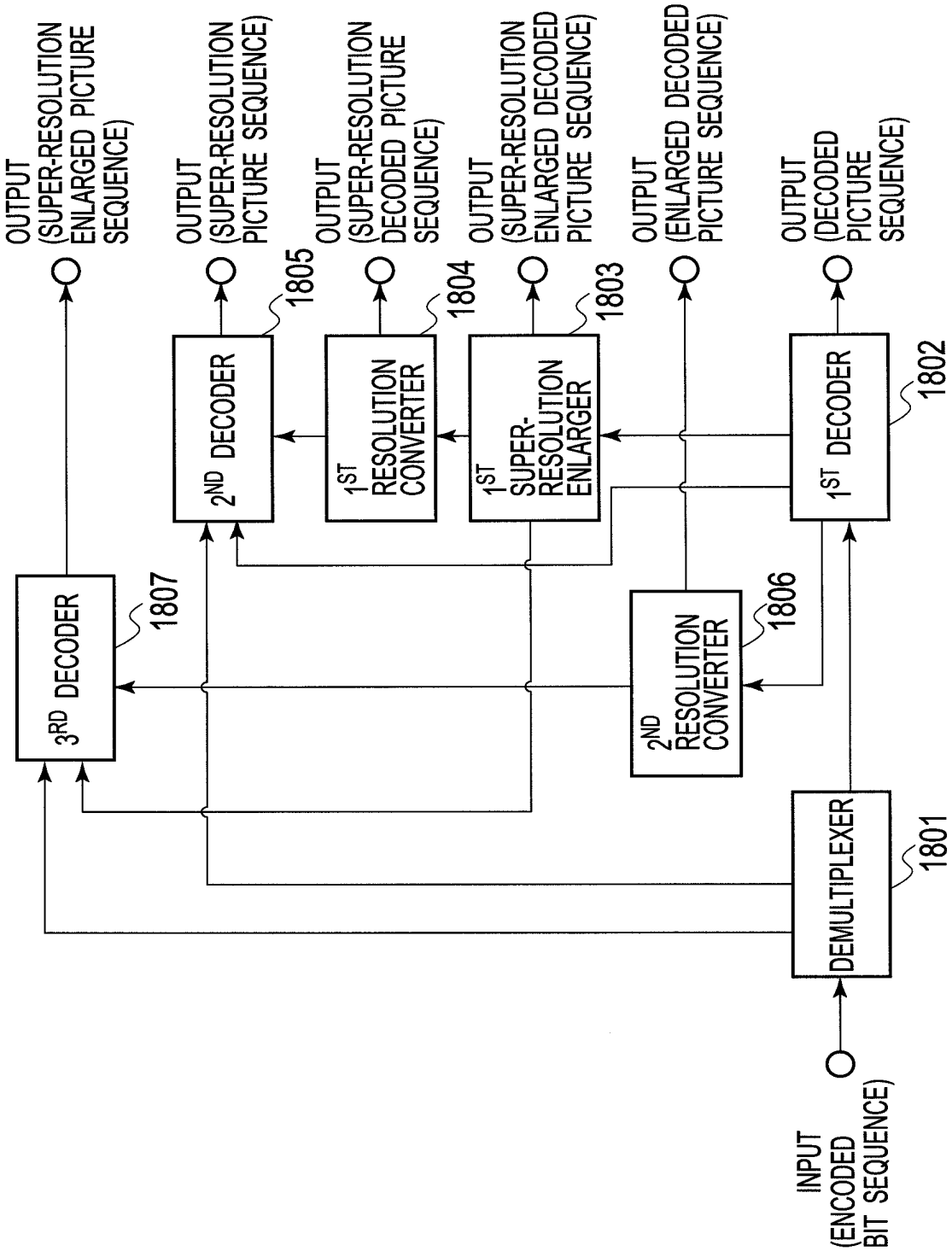

INPUT (ENCODED BIT SEQUENCE)
DEMULTIPLEXER
1801
1ST DECODER
1802
2ND RESOLUTION CONVERTER
1806
1ST SUPER-RESOLUTION ENLARGER
1803
1ST RESOLUTION CONVERTER
1804
2ND DECODER
1805
3RD DECODER
1807
OUTPUT (DECODED PICTURE SEQUENCE)
OUTPUT (ENLARGED DECODED PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION ENLARGED DECODED PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION DECODED PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION ENLARGED PICTURE SEQUENCE)

FIG. 24

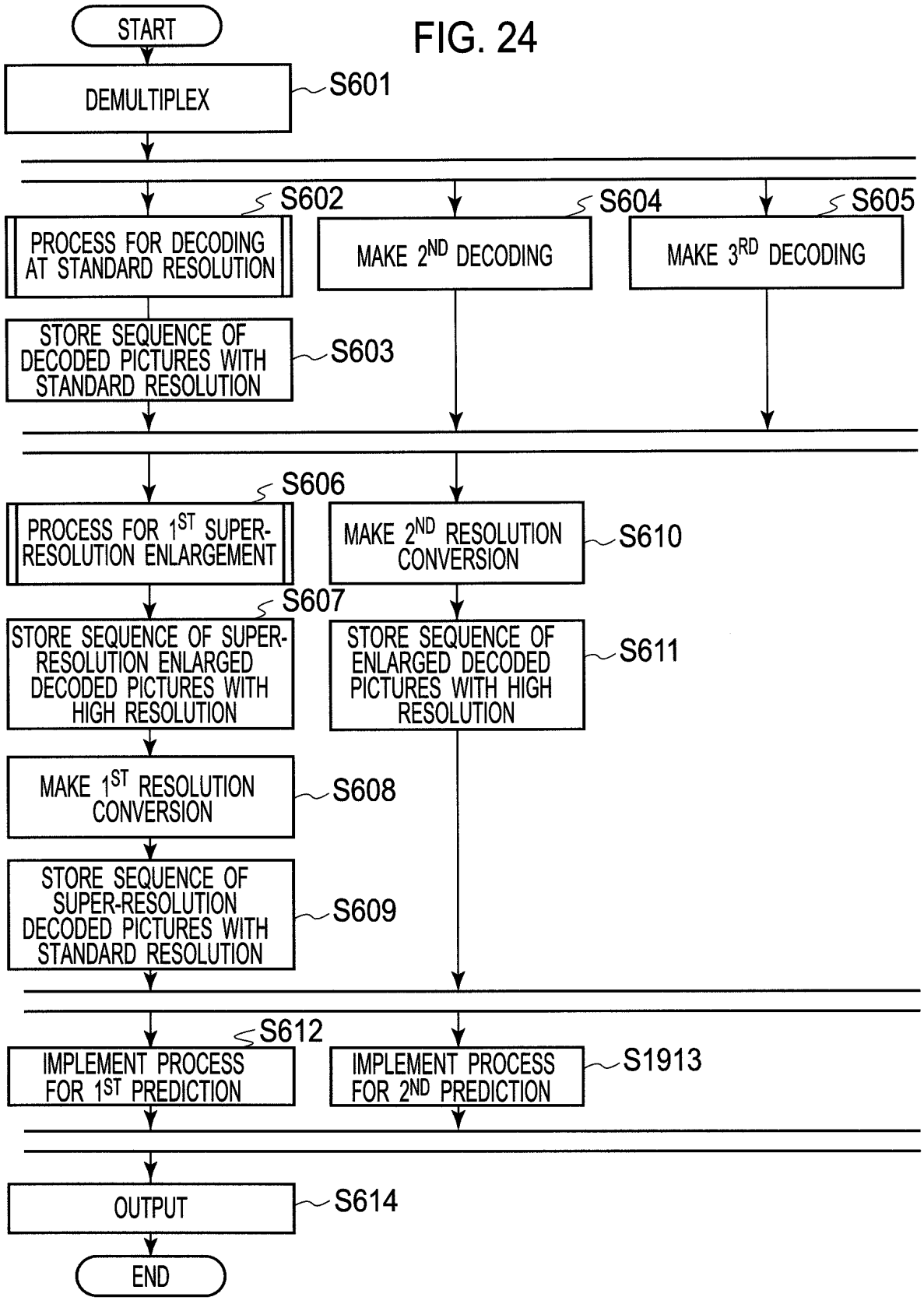

START
DEMULTIPLEX
S601
S602
S604
S605
PROCESS FOR DECODING AT STANDARD RESOLUTION
MAKE 2ND DECODING
MAKE 3RD DECODING
STORE SEQUENCE OF DECODED PICTURES WITH STANDARD RESOLUTION
S603
S606
PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
MAKE 2ND RESOLUTION CONVERSION
S610
S607
STORE SEQUENCE OF SUPER-RESOLUTION ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
STORE SEQUENCE OF ENLARGED DECODED PICTURES WITH HIGH RESOLUTION
S611
MAKE 1ST RESOLUTION CONVERSION
S608
STORE SEQUENCE OF SUPER-RESOLUTION DECODED PICTURES WITH STANDARD RESOLUTION
S609
S612
IMPLEMENT PROCESS FOR 1ST PREDICTION
IMPLEMENT PROCESS FOR 2ND PREDICTION
S1913
OUTPUT
S614
END

FIG. 25

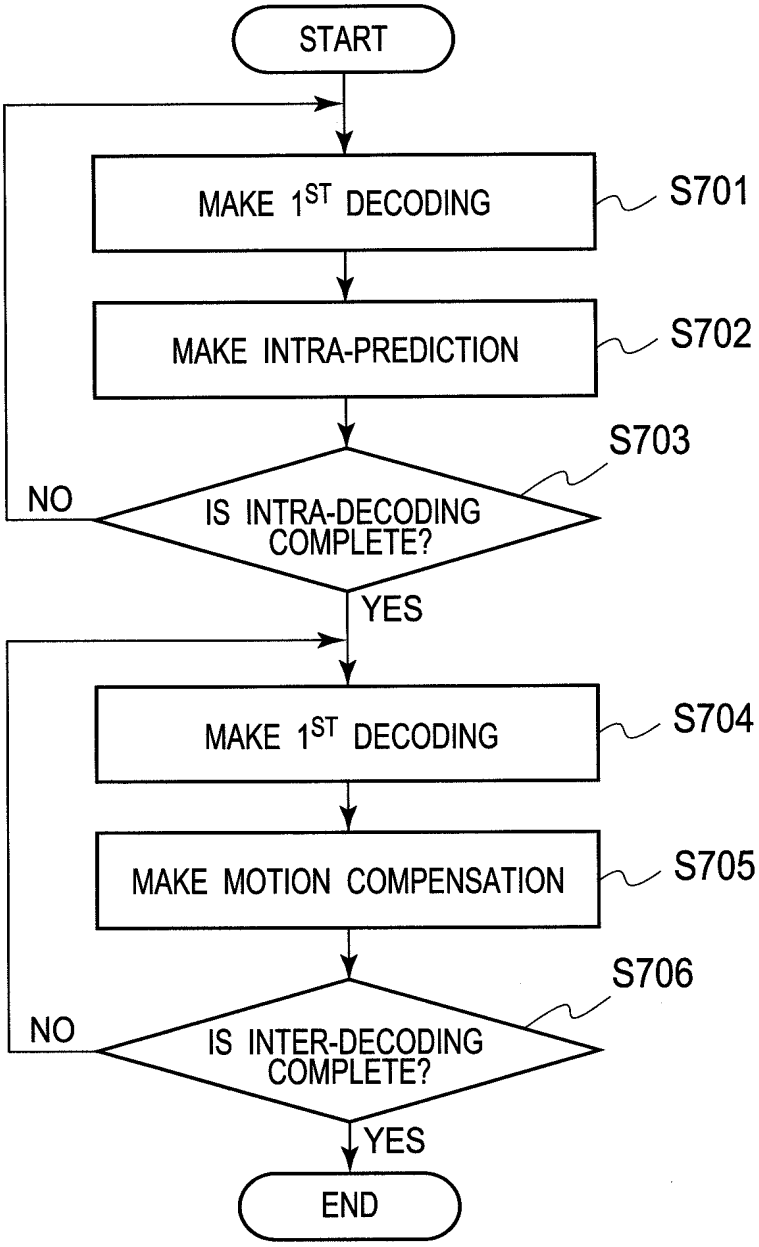

START
MAKE 1ST DECODING
S701
MAKE INTRA-PREDICTION
S702
S703
NO
IS INTRA-DECODING COMPLETE?
YES
MAKE 1ST DECODING
S704
MAKE MOTION COMPENSATION
S705
S706
NO
IS INTER-DECODING COMPLETE?
YES
END

FIG. 26

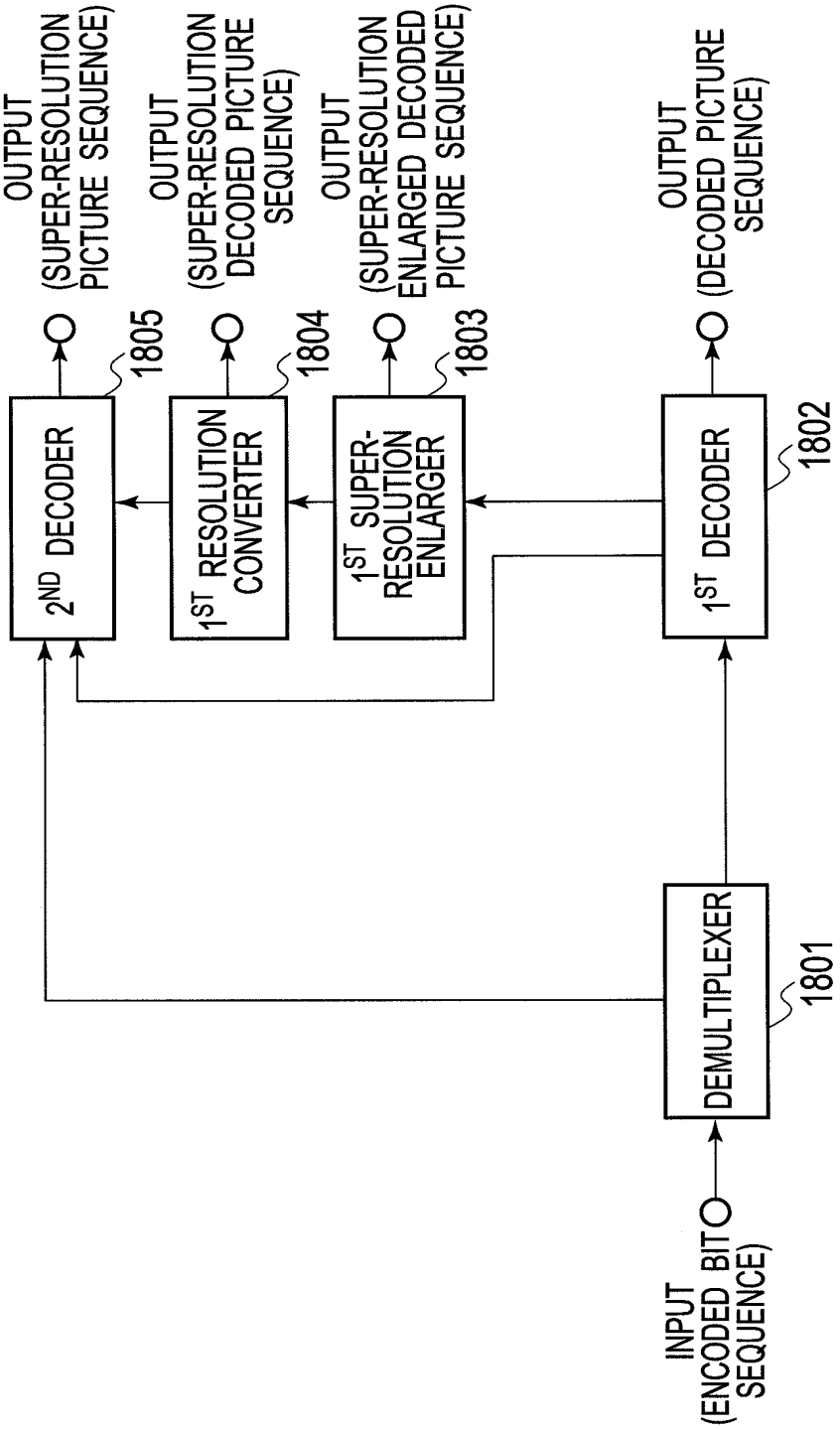

INPUT (ENCODED BIT SEQUENCE)
DEMULTIPLEXER
1801
1ST DECODER
1802
1ST SUPER-RESOLUTION ENLARGER
1803
1ST RESOLUTION CONVERTER
1804
2ND DECODER
1805
OUTPUT (DECODED PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION ENLARGED DECODED PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION DECODED PICTURE SEQUENCE)
OUTPUT (SUPER-RESOLUTION PICTURE SEQUENCE)

FIG. 27

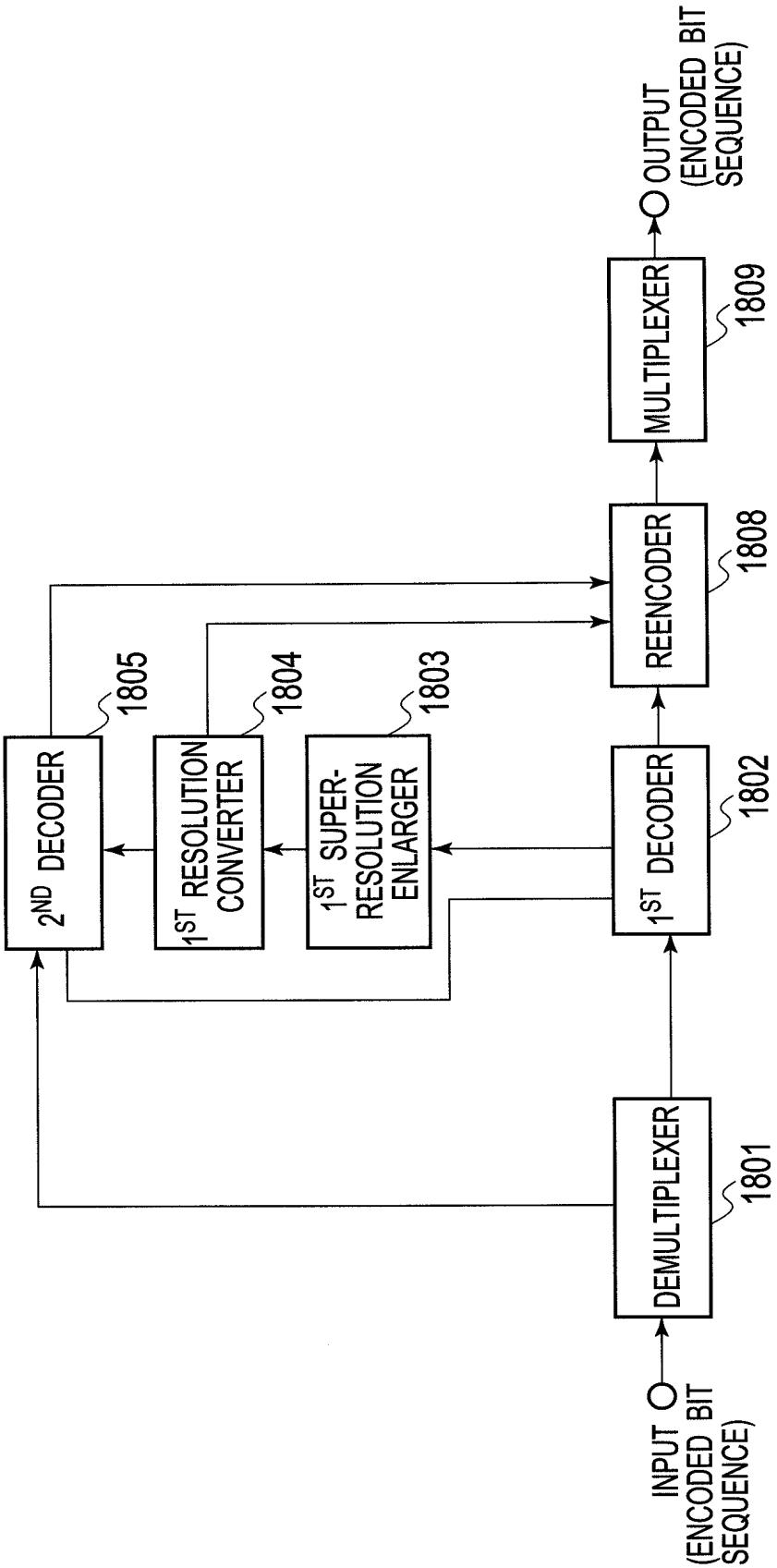
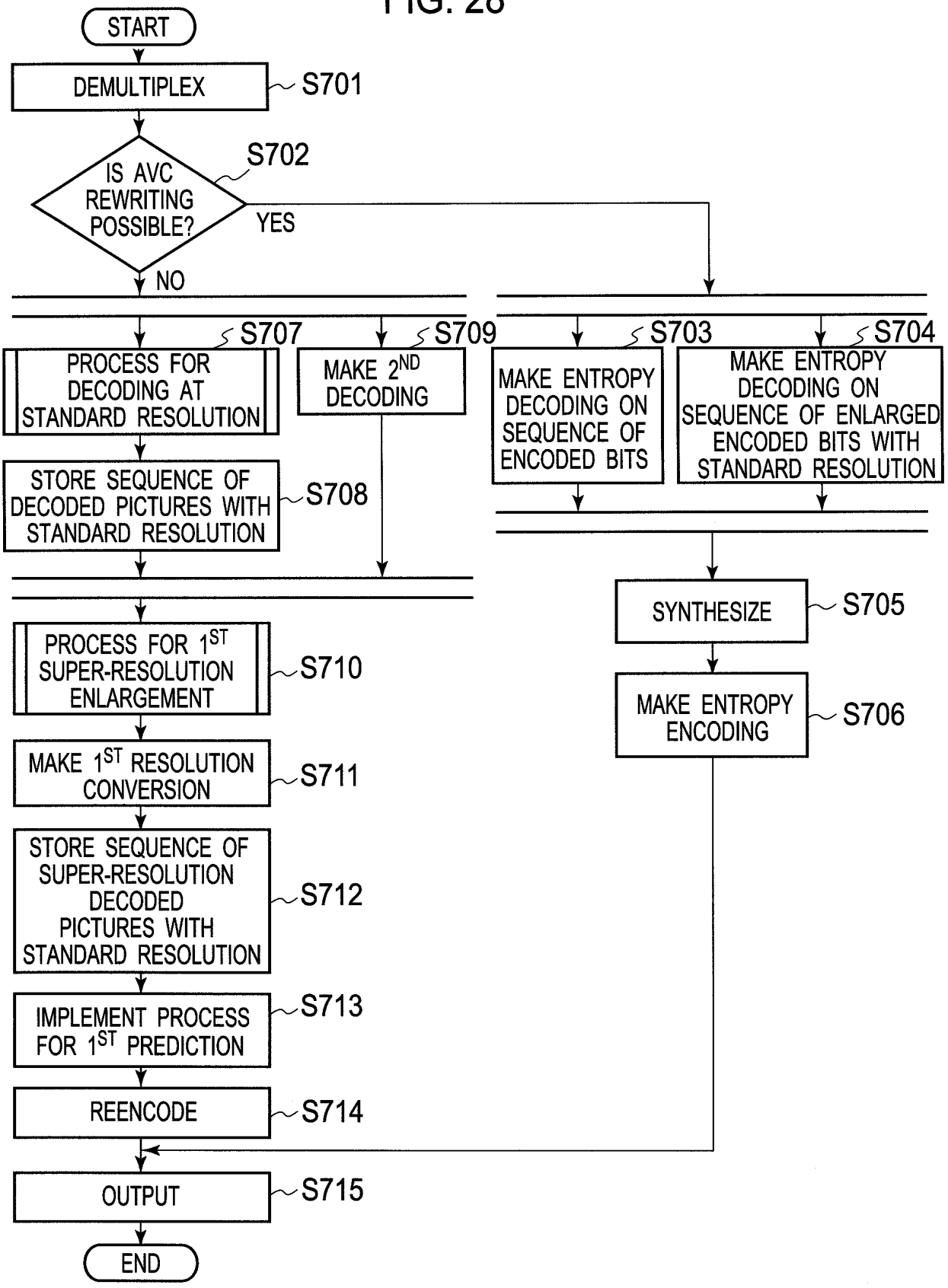

INPUT (ENCODED BIT SEQUENCE)
DEMULTIPLEXER
1801
1ST DECODER
1802
1ST SUPER-RESOLUTION ENLARGER
1803
1ST RESOLUTION CONVERTER
1804
2ND DECODER
1805
REENCODER
1808
MULTIPLEXER
1809
OUTPUT (ENCODED BIT SEQUENCE)

FIG. 28


START
DEMULTIPLEX
S701
IS AVC REWRITING POSSIBLE?
S702
YES
NO
S707
PROCESS FOR DECODING AT STANDARD RESOLUTION
S709
MAKE 2ND DECODING
S703
MAKE ENTROPY DECODING ON SEQUENCE OF ENCODED BITS
S704
MAKE ENTROPY DECODING ON SEQUENCE OF ENLARGED ENCODED BITS WITH STANDARD RESOLUTION
STORE SEQUENCE OF DECODED PICTURES WITH STANDARD RESOLUTION
S708
SYNTHESIZE
S705
PROCESS FOR 1ST SUPER-RESOLUTION ENLARGEMENT
S710
MAKE ENTROPY ENCODING
S706
MAKE 1ST RESOLUTION CONVERSION
S711
STORE SEQUENCE OF SUPER-RESOLUTION DECODED PICTURES WITH STANDARD RESOLUTION
S712
IMPLEMENT PROCESS FOR 1ST PREDICTION
S713
REENCODE
S714
OUTPUT
S715
END

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/995,039	Filing Date 11/29/2010	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	11/29/2010	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 16	Minus	***16	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**0**

AMENDMENT		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/ROLITA WIMBUSH/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
12/995,039	Satoru Sakazume	31181U

20529
THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314

INTERNATIONAL APPLICATION NO.	
PCT/JP2009/059801	
I.A. FILING DATE	PRIORITY DATE
05/28/2009	05/30/2008

CONFIRMATION NO. 7504
371 ACCEPTANCE LETTER

OC000000045089115

Date Mailed: 12/23/2010

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

11/29/2010	11/29/2010
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 11/29/2010
- English Translation of the IA filed on 11/29/2010
- Copy of the International Search Report filed on 11/29/2010
- Preliminary Amendments filed on 11/29/2010
- Information Disclosure Statements filed on 11/29/2010
- Oath or Declaration filed on 11/29/2010
- Request for Immediate Examination filed on 11/29/2010
- U.S. Basic National Fees filed on 11/29/2010
- Assignee Statement for PGPUB filed on 11/29/2010
- Priority Documents filed on 11/29/2010
- Specification filed on 11/29/2010
- Claims filed on 11/29/2010
- Abstracts filed on 11/29/2010
- Drawings filed on 11/29/2010

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

BRIAN A HARDEN

Telephone: (703) 756-1815

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 12/995,039

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	330
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	430
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	220
TOTAL CLAIMS (37 CFR 1.16(i))	25 minus 20 =	* 5			OR	x 52 =	260
INDEPENDENT CLAIMS (37 CFR 1.16(h))	16 minus 3 =	* 13				x 220 =	2860
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $270 ($135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						270
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	4370

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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United States Patent and Trademark Office
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/995,039	11/29/2010		4370	31181U	25	16

CONFIRMATION NO. 7504

20529
THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314

FILING RECEIPT



Date Mailed: 12/23/2010

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Satoru Sakazume, Kanagawa-ken, JAPAN;

Assignment For Published Patent Application

VICTOR COMPANY OF JAPAN, LIMITED, Yokohama-shi, Kanagawa, JP

Power of Attorney: The patent practitioners associated with Customer Number 20529

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/JP2009/059801 05/28/2009

Foreign Applications

JAPAN P2009-123960 05/22/2009
JAPAN P2008-142433 05/30/2008

If Required, Foreign Filing License Granted: 12/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/995,039**

Projected Publication Date: 03/31/2011

Non-Publication Request: No

Early Publication Request: No

Title

MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE

REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM

Preliminary Class

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
12995039	

Applicant(s) Satoru SAKAZUME

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1		---	---		
2		1	1			
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Total Depend	8	↵	9	↵	0	↵
Total Claims	22		25		0	

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/995,039	11/29/2010	Satoru Sakazume	31181U

CONFIRMATION NO. 7504

20529
THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314

PUBLICATION NOTICE

OC000000046870533

Title:MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM

Publication No.US-2011-0075734-A1
Publication Date:03/31/2011

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12995039
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	2482
Examiner Name	PICON-FELICIANO, ANA J
Attorney Docket Number	31181U

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	1	20070064795	A1	2007-03-22	Cho et al.	

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	1	2007-110348	JP	A	2007-04-26	NTT DOCOMO INC	English Abstract cover page attached separately.	☒

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12995039
	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
	Art Unit	2482
	Examiner Name	PICON-FELICIANO, ANA J
	Attorney Docket Number	31181U

	1	Office action issued on September 28, 2012 in the counterpart Chinese Application, ten (10) pages	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12995039
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	2482
Examiner Name	PICON-FELICIANO, ANA J
Attorney Docket Number	31181U

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jerald L. Meyer/	Date (YYYY-MM-DD)	2012-12-19
Name/Print	Jerald L. Meyer	Registration Number	41194

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	14508281
Application Number:	12995039
International Application Number:	
Confirmation Number:	7504
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
First Named Inventor/Applicant Name:	Satoru Sakazume
Customer Number:	20529
Filer:	Stanley Protigal/samuel woldeyesus
Filer Authorized By:	Stanley Protigal
Attorney Docket Number:	31181U
Receipt Date:	19-DEC-2012
Filing Date:	29-NOV-2010
Time Stamp:	12:34:58
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	2007110348_31181U.pdf	2424231 04814b537b0481b30c44a33aa7fc9ccf5942d20b	no	34

Warnings:	
Information:	

2	Non Patent Literature	OfficeAction_31181U.pdf	518456 9b2364b7ecb79fd7c18ff1e3728c4a8ea0656d4a	no	10
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	updated_IDS_31181U.pdf	612435 e2eaa59cacf0a8a237202d71371db2d95b7d454a	no	4
Warnings:					
Information:					
			Total Files Size (in bytes):	3555122	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12995039
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	2482
Examiner Name	PICON-FELICIANO, ANA J
Attorney Docket Number	31181U

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12995039
	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
	Art Unit	2482
	Examiner Name	PICON-FELICIANO, ANA J
	Attorney Docket Number	31181U

	1	Sung Cheol Park, et al."Super-Resolution Image Reconstruction: A Technical Overview", Signal Processing Magazine,Vol. 20, Issue 3, IEEE, pages 21-37. May, 2003.	☐
	2	Office Action issued on May 21, 2013, in the Counterpart Japanese Application No. 2009-123960, two pages.	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12995039
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	2482
Examiner Name	PICON-FELICIANO, ANA J
Attorney Docket Number	31181U

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jerald L. Meyer/	Date (YYYY-MM-DD)	2013-07-15
Name/Print	Jerald L. Meyer	Registration Number	41194

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	16311201
Application Number:	12995039
International Application Number:	
Confirmation Number:	7504
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
First Named Inventor/Applicant Name:	Satoru Sakazume
Customer Number:	20529
Filer:	Stanley Protigal/samuel woldeyesus
Filer Authorized By:	Stanley Protigal
Attorney Docket Number:	31181U
Receipt Date:	15-JUL-2013
Filing Date:	29-NOV-2010
Time Stamp:	15:47:32
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	OfficeAction_31181UII.pdf	79618 76f85e5a44bbf58f460f28e90a1c999f1c3b4100	no	2

Warnings:	
Information:	

2	Non Patent Literature	NPL_31181U.pdf	1116993 0ed346e8b222e04fc9f8e0dc2a859b04a2dedbe9	no	18
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	updated_IDS_31181UII.pdf	612389 6e26da7b1c7480b752646246ddbbf62ce0dd0819	no	4
Warnings:					
Information:					

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

Total Files Size (in bytes):	1809000

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

20529 7590 09/17/2013

NATH, GOLDBERG & MEYER
112 South West Street
Alexandria, VA 22314

EXAMINER	
PICON-FELICIANO, ANA J	
ART UNIT	PAPER NUMBER
2482	
MAIL DATE	DELIVERY MODE
09/17/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 12/995,039	Applicant(s) SAKAZUME, SATORU	
	Examiner ANA PICON-FELICIANO	Art Unit 2482	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 November 2010*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *2-26* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☒ Claim(s) *2-26* are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

REQUIREMENT FOR UNITY OF INVENTION

As provided in 37 CFR 1.475(a), a national stage application shall relate to one invention only or to a group of inventions so linked as to form a single general inventive concept ("requirement of unity of invention"). Where a group of inventions is claimed in a national stage application, the requirement of unity of invention shall be fulfilled only when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" shall mean those technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.

The determination whether a group of inventions is so linked as to form a single general inventive concept shall be made without regard to whether the inventions are claimed in separate claims or as alternatives within a single claim. See 37 CFR 1.475(e).

1. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

a. Species A: Figures 1 and 8

b. Species B: Figures 7 and 9

c. Species C: Figure 10

d. Species D: Figure 13

e. Species E: Figure 16

f. Species F: Figure 17

g. Species G: Figure 18

h. Species H: Figure 19

j. Species I: Figure 22

Applicant is required, in reply to this action, to elect a single species to which the claims shall be restricted if no generic claim is finally held to be allowable. The reply must also identify the claims readable on the elected species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered non-responsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise require all the limitations of an allowed generic claim. Currently, the following claim(s) are generic: **2-26**.

2. The groups of inventions listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

- Each species relate to an encoder and a respective decoder under class 375/240.12.
- Species would require a different search among them.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or a grouping of patentably indistinct species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species** or grouping of patentably indistinct species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANA PICON-FELICIANO whose telephone number is (571)272-5252. The examiner can normally be reached on Monday-Friday 9am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Kelley can be reached on 571-272-7331. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANA PICON-FELICIANO/
Examiner, Art Unit 2482

/CHRISTOPHER S KELLEY/
Supervisory Patent Examiner, Art Unit 2482

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	**Art Unit**
	ANA PICON-FELICIANO	2482

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/10/2013								
	1	-								
	2	÷								
	3	÷								
	4	÷								
	5	÷								
	6	÷								
	7	÷								
	8	÷								
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	25	÷								
	26	÷								

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

SAKAZUME — Conf. No.: 7504

Serial No. **12/995,039** — Art Unit: 2482

Filed: November 29, 2010 — Examiner: PICON-FELICIANO

For: MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM

RESPONSE TO RESTRICTION REQUIREMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This paper is prepared and filed in response to the outstanding Restriction Requirement bearing a mailing date of September 17, 2013 ("Office Action"). Applicants do not believe that any extension of time is necessary under 37 C.F.R. §1.136(a). Applicants believe that no fees are required at this time. However, if any fees are required for further extension of time, or any other additional fees are required, such fees are hereby authorized to be charged to Deposit Account No. 14-0112. In view of the following election and remarks, the Applicant respectfully requests the Examiner to conduct a first substantive examination of the application.

REMARKS

I. Elections/Restriction Summary

This Office Action alleges that this application contains claims directed to more than one species of the generic invention. These species are alleged to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1. The species are as follows:

a. Species A: Figures 1 and 8;

b. Species B: Figures 7 and 9;

c. Species C: Figure 10;

d. Species D: Figure 13;

e. Species E: Figure 16;

f. Species F: Figure 17;

g. Species G: Figure 18;

h. Species H: Figure 19; and

i. Species I: Figure 22.

Applicant is required to elect a single species to which the claims shall be restricted if no generic claim is finally held to be allowable. The reply must also identify the claims readable on the elected species, including any claims subsequently added.

Upon the allowance of a generic claim, Applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise require all the limitations of an allowed generic claim. Currently, the following claims are generic: 2-26.

II. Applicant's Response - Election and Identification of Claims

Applicant hereby elects Species D: Figure 13, without traverse, and identifies claims 2-26 as encompassing the elected species. Applicant submits that this election without traverse is not meant to concede any of the remarks made by the Examiner in the Office Action.

CONCLUSION

In light of the foregoing, Applicant respectfully requests that the Examiner conduct a first substantive examination of the application. In the event the Examiner finds any issues outstanding after considering this Response, the Examiner is invited to contact Applicants' undersigned representative at the number below. Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,

October 17, 2013

/Jerald L. Meyer/

NATH, GOLDBERG & MEYER
112 South West Street
Alexandria, VA 22314-2891
Tel: 703-548-6284
Fax: 703-683-8396

Jerald L. Meyer
Reg. No. 41,194
Scott C. Langford
Reg. No. 70,675
Customer No. 20529

Electronic Acknowledgement Receipt

EFS ID:	17145612
Application Number:	12995039
International Application Number:	
Confirmation Number:	7504
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
First Named Inventor/Applicant Name:	Satoru Sakazume
Customer Number:	20529
Filer:	Stanley Protigal/Lauren Lee
Filer Authorized By:	Stanley Protigal
Attorney Docket Number:	31181U
Receipt Date:	17-OCT-2013
Filing Date:	29-NOV-2010
Time Stamp:	10:16:43
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response to Election / Restriction Filed	31181U_RRR_mailed_09172013.pdf	84106 ad7f33f701ab250ac7829f921c020a0f871a1651	no	3
Warnings:					
Information:					

Total Files Size (in bytes):	84106

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

20529 7590 02/20/2014

NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

EXAMINER	
PICON-FELICIANO, ANA J	

ART UNIT	PAPER NUMBER
2482	

NOTIFICATION DATE	DELIVERY MODE
02/20/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@nathlaw.com

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/995,039	SAKAZUME, SATORU	
	Examiner	Art Unit	
	ANA PICON-FELICIANO	2482	

All participants (applicant, applicant's representative, PTO personnel):

(1) *ANA PICON-FELICIANO-Patent Examiner*. (3)_____.

(2) *Scott C. Langford-Attorney*. (4)_____.

Date of Interview: *27 January 2014*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *2-26*.

Identification of prior art discussed: *None*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant was informed that there was a typographical error in the Requirement for Restriction/Election mailed on 17 September 2013 regarding claims 2-26 pending in the application. Examiner clarified that claims 2-26 are not generic.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/ANA PICON-FELICIANO/ Examiner, Art Unit 2482	/CHRISTOPHER S KELLEY/ Supervisory Patent Examiner, Art Unit 2482

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

20529 7590 05/15/2014

NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

EXAMINER	
PICON-FELICIANO, ANA J	
ART UNIT	**PAPER NUMBER**
2482	

NOTIFICATION DATE	DELIVERY MODE
05/15/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@nathlaw.com

Office Action Summary	Application No. 12/995,039	Applicant(s) SAKAZUME, SATORU	
	Examiner ANA PICON-FELICIANO	Art Unit 2482	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 November 2010*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *2-26* is/are pending in the application.

5a) Of the above claim(s) *2-6 and 10-26* is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *7-9* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☒ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *11/29/2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *See Continuation Sheet*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Continuation of Attachment(s) 2). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :11/29/2010,12/19/2012,7/15/2013.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Election/Restrictions

2. Applicant's election *without traverse* of **Species D: Figure 13** in the reply filed on **17 October 2013** is acknowledged. Applicant indicated that claims 2-26 read on the elected Species. However, claims 2-6 and 10-26 does not read on the elected species. During a telephone interview on **27 January 2014**, the applicant was informed that the claims 2-26 were not generic. The reasons for these claims not being generic are the following:

Regarding claim 2, the claim recites elements such as a first resolution converter and a second encoder that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 3, the claim recites elements such as a first resolution converter, a second encoder, and a second super-resolution converter that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claims 4-6, they are dependent on claim 2, therefore, these claims are not generic for the same reasons as explained above.

Regarding claims 7-9, the claims recite elements included in Figure 13. Therefore, these claims read on Figure 13.

Regarding claim 10, the claim recites elements such as a first resolution converter, a second resolution converter and a second encoder that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 11, the claim recites a method that includes elements such as a first resolution conversion and a second encoding that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 12, the claim recites a recording medium that includes elements such as a first resolution conversion and a second encoding that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 13, the claim recites elements such as a first resolution converter and a second decoder that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 14, the claim is dependent on claim 13, therefore, this claim is not generic for the same reasons as explained above.

Regarding claim 15, the claim recites elements such as a first resolution converter, a second decoder and a reencoder that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 16, the claim is dependent on claim 15, therefore, this claim is not generic for the same reasons as explained above.

Regarding claim 17, the claim recites a method that includes elements such as a first resolution conversion and a second decoding that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 18, the claim is dependent on claim 17, therefore, this claim is not generic for the same reasons as explained above.

Regarding claim 19, the claim recites a method that includes elements such as first resolution conversion, second decoding and reencoding that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 20, the claim recites a recording medium that includes elements such as a first resolution conversion and a second decoding that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 21, the claim recites a recording medium that includes elements such as a first resolution conversion, a second decoding and reencoding that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claims 22-24, they are dependent on claim 3, therefore, these claims are not generic for the same reasons as explained above.

Regarding claim 25, the claim recites a method that includes elements such as a first resolution conversion and a second resolution conversion that are not included in Figure 13. Therefore, this claim is not generic.

Regarding claim 26, the claim recites a recording medium that includes elements such as a first resolution conversion and a second resolution conversion that are not included in Figure 13. Therefore, this claim is not generic.

4. Accordingly, **claims 2-6 and 10-26** do not read on the elected **Species D: Figure 13**. Therefore, claims 2-6 and 10-26 have been withdrawn from consideration.

5. **Claims 7-9** have been examined.

Priority

6. Applicant's claim for the benefit of a prior-filed application **PCT/JP2009/059801** field on **28 May 2009** under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged.

7. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119 (a)-(d). The certified copy has been filed in parent Application No. **JP P2009-123960**, filed on **22 May 2009** and Application No. **JP P2008-142433**, filed on **30 May 2008**.

Information Disclosure Statement

8. The information disclosure statement (IDS) submitted on 29 November 2010, 19 December 2012 and 15 July 2013 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

9. The abstract of the disclosure is objected to because "***exceeds 150 words***". Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained through the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 7-9 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over **Wan et al. (US 6,580,754 B1)** (hereinafter Wan) in view of **ONG CHIN PHEK et al.(JP 2007-316161 A)** (hereinafter Ong), and further in view of **Holcomb et al.(US 7,379,496 B2)**(hereinafter Holcomb).

Regarding claim 7, Wan teaches a moving picture encoding system **[See Fig. 1 and abstract regarding scalable codec with two layers for video]** comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution **[See Fig. 1 and col. 4 lines 45-65 regarding base layer encoder 110 and base layer decoder 170 for encoding and decoding of an input sequence that is a base video stream]**; and

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion

to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution **[See Fig. 1 and col. 4 lines 45-65 regarding midprocessor 120 configured to provide an upsampled reference image for predictive coding of the input enhanced video stream or layer at an enhancement layer encoder 130].**

Wan does not explicitly teach a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution; and a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution.

However, the use of super-resolution processors in scalable video coding systems was well known in the art at the time of the invention was made as evident from the teaching of Ong **[See Figs. 4a-4b and pages 16-17, sections: "Inter-layer prediction encoding apparatus and decoding apparatus" and "Super Resolution processor", regarding super resolution processor 410/430 used to enhance additional reference images for coding of the enhancement layer images]**. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Wan with Ong teachings by including "a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to

implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution" for providing super resolution processing in image and video processing for getting good super-resolved images**[See Ong: page 14 sections: "Problems to be solved" and "Means of Solving the Problems"]**.

Neither Wan nor Ong explicitly teach a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution.

However, the use of resolution converters for multi-resolution encoding and decoding to enhance current and reference frames was well known in the art at the time of the invention was made as evident from the teaching of Holcomb **[See Figs. 2-3, col. 6 lines 8-27 and col. 7 lines 23-48 regarding resolution converter 210 that receives a current frame (205), converts the frame into another resolution and communicates with other encoder module for prediction and other encoding processes. Further on, the resolution converter 230 receives reference frame 225 and executes similarly]**. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Wan with Ong super-resolution and Holcomb teachings by including "a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution" for providing a video

encoder that adaptively changes video frame sizes to reduced blocking artifacts at low bitrates**[See Holcomb: col. 1 lines 13-16]**.

Further on, when combined with Ong and Holcomb as explained above, Wan also teaches a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits**[See Fig. 1 and col. 4 lines 45-65 regarding enhancement layer encoder 130 that receives a target or enhanced current frame or input enhanced video and enhanced reference frames for efficiently code the enhancement layer].**

Regarding claim 8, Wan teaches a moving picture encoding system **[See Fig. 1 and abstract regarding scalable codec with two layers for video]** comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution **[See Fig. 1 and col. 4 lines 45-65 regarding base layer encoder 110 and base layer decoder 170 for encoding and decoding of an input sequence that is a base video stream]**; and

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution**[See Fig. 1 and col. 4 lines 45-65 regarding midprocessor 120 configured to provide an upsampled reference image for predictive coding of the input enhanced video stream or layer at an enhancement layer encoder 130]**.

Wan does not explicitly teach a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

However, the use of super-resolution processors in scalable video coding systems was well known in the art at the time of the invention was made as evident from the teaching of Ong **[See Figs. 4a-4b and pages 16-17, sections: "Inter-layer prediction encoding apparatus and decoding apparatus" and "Super Resolution processor", regarding super resolution processor 410/430 used to enhance additional reference images for coding of the enhancement layer images]**. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Wan with Ong teachings by including "a super-resolution enlarger" for providing super resolution processing in image and video processing for getting good super-resolved images **[See Ong: page 14 sections: "Problems to be solved" and "Means of Solving the Problems"]**.

Neither Wan nor Ong explicitly teach whether the first super-resolution enlarger is configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution.

However, the use of resolution converters for multi-resolution encoding and decoding to enhance current and reference frames was well known in the art at the time of the invention was made as evident from the teaching of Holcomb **[See Figs. 2-3, col. 6 lines 8-27 and col. 7 lines 23-48 regarding resolution converter 210 that receives a current frame (205), converts the frame into another resolution and communicates with other encoder module for prediction and other encoding processes. Further on, the resolution converter 230 receives reference frame 225 and executes similarly]**. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Wan with Ong super-resolution and Holcomb teachings by including "a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution" for providing a video encoder that adaptively changes video frame sizes to reduced blocking artifacts at low bitrates**[See Holcomb: col. 1 lines 13-16]**.

Further on, when combined with Ong and Holcomb as explained above, Wan also teaches a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures,

employing the set of resolution converted enlarged decoded pictures from the third resolution converter as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits**[See Fig. 1 and col. 4 lines 45-65 regarding enhancement layer encoder 130 that receives a target or enhanced current frame or input enhanced video and enhanced reference frames for efficiently code the enhancement layer]**.

Regarding claim 9, Wan teaches a moving picture encoding system **[See Fig. 1 and abstract regarding scalable codec with two layers for video]** comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution **[See Fig. 1 and col. 4 lines 45-65 regarding base layer encoder 110 and base layer decoder 170 for encoding and decoding of an input sequence that is a base video stream]**.

Wan does not explicitly teach a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution; and a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to

create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution.

However, the use of super-resolution processors in scalable video coding systems was well known in the art at the time of the invention was made as evident from the teaching of Ong **[See Figs. 4a-4b and pages 16-17, sections: "Inter-layer prediction encoding apparatus and decoding apparatus" and "Super Resolution processor", regarding super resolution processor 410/430 used to enhance additional reference images for coding of the enhancement layer images]**. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Wan with Ong teachings by including "a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution" for providing super resolution processing in image and video processing for getting good super-resolved images**[See Ong: page 14 sections: "Problems to be solved" and "Means of Solving the Problems"]**.

Neither Wan nor Ong explicitly teach a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution.

However, the use of resolution converters for multi-resolution encoding and decoding to enhance current and reference frames was well known in the art at the time

of the invention was made as evident from the teaching of Holcomb **[See Figs. 2-3, col. 6 lines 8-27 and col. 7 lines 23-48 regarding resolution converter 210 that receives a current frame (205), converts the frame into another resolution and communicates with other encoder module for prediction and other encoding processes. Further on, the resolution converter 230 receives reference frame 225 and executes similarly]**. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Wan with Ong super-resolution and Holcomb teachings by including "a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution" for providing a video encoder that adaptively changes video frame sizes to reduced blocking artifacts at low bitrates**[See Holcomb: col. 1 lines 13-16]**.

Further on, when combined with Ong and Holcomb as explained above, Wan also teaches a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits**[See Fig. 1 and col. 4 lines 45-65 regarding enhancement layer encoder 130 that receives a target or enhanced current frame or input enhanced**

video and enhanced reference frames for efficiently code the enhancement layer].

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Hosaka et al.(US 6,091,855)
- Tipping et al.(US 7,106,914 B2)
- Demos (US 7,428,639, B2)
- Han(US 2005/0195899 A1)
- Kobayashi et al.(US 2005/0128307 A1)
- Bruls et al.(US 2005/0105814 A1)
- Fogg et al.(US 2007/0091997 A1)
- Gong et al.(US 2007/0103595 A1)
- Kimoto(US 2007/0133680 A1)
- Park et al.(US 2007/0189385 A1)
- Toma et al.(US 2007/0247529 A1)
- Sullivan(US 2007/0160153 A1)
- KAGEYAMA et al.(US 2009/0034941 A1)

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANA PICON-FELICIANO whose telephone number is (571)272-5252. The examiner can normally be reached on Monday-Friday 9am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Kelley can be reached on 571-272-7331. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANA PICON-FELICIANO/
Examiner, Art Unit 2482

/CHRISTOPHER S KELLEY/
Supervisory Patent Examiner, Art Unit 2482

Notice of References Cited	Application/Control No. 12/995,039	Applicant(s)/Patent Under Reexamination SAKAZUME, SATORU	
	Examiner ANA PICON-FELICIANO	Art Unit 2482	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,580,754	06-2003	Wan et al.	375/240.01
*	B	US-7,379,496	05-2008	Holcomb et al.	375/240.03
*	C	US-6,091,855	07-2000	Hosaka et al.	382/240
*	D	US-7,106,914	09-2006	Tipping et al.	382/299
*	E	US-7,428,639	09-2008	Demos, Gary A.	713/176
*	F	US-2005/0195899	09-2005	Han, Woo-jin	375/240.21
*	G	US-2005/0128307	06-2005	Kobayashi et al.	348/208.1
*	H	US-2005/0105814	05-2005	Bruls et al.	382/240
*	I	US-2007/0091997	04-2007	Fogg et al.	375/240.1
*	J	US-2007/0103595	05-2007	Gong et al.	348/620
*	K	US-2007/0133680	06-2007	Kimoto, Takahiro	375/240.12
*	L	US-2007/0189385	08-2007	Park et al.	375/240.12
*	M	US-2007/0247529	10-2007	Toma et al.	348/222.1

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	JP 2007316161 A	12-2007	Japan	ONG et al.	
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Machine Translation of JP 2007316161 A.
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 12/995,039	Applicant(s)/Patent Under Reexamination SAKAZUME, SATORU	
	Examiner ANA PICON-FELICIANO	Art Unit 2482	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2007/0160153	07-2007	Sullivan, Gary J.	375/240.29
*	B	US-2009/0034941	02-2009	KAGEYAMA et al.	386/126
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	W	
	X	

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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BIB DATA SHEET

CONFIRMATION NO. 7504

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/995,039	11/29/2010 RULE	375	2482	31181U

APPLICANTS

INVENTORS

Satoru Sakazume, Kanagawa-ken, JAPAN;

**** CONTINUING DATA ***************************

This application is a 371 of PCT/JP2009/059801 05/28/2009

**** FOREIGN APPLICATIONS ***************************

JAPAN P2009-123960 05/22/2009
JAPAN P2008-142433 05/30/2008

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

12/21/2010

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☑ Yes ☐ No	☑ Yes ☐ No	/ANA J PICON-FELICIANO/ Examiner's Signature	☐ Initials	JAPAN	3	25	16

ADDRESS

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Joshua Goldberg
112 South West Street
Alexandria, VA 22314
UNITED STATES

TITLE

MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
4370	No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	12/995039.app.	US-PGPUB; USPAT; USOCR	OR	ON	2014/05/01 14:19
L2	18844	(H04N19/00436 OR H04N19/00472 OR H04N19/00521 OR H04N19/00757 OR H04N19/00781 OR H04N19/00884 OR H04N19/0089).CPC.	US-PGPUB; USPAT; USOCR	OR	ON	2014/05/01 14:19
L3	36	l2 and (super near2 resolution) and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/05/01 14:20
L4	9246	375/240.12,240.18,E7.243,E7.226.ccls.	US-PGPUB; USPAT	OR	ON	2014/05/01 15:49
L5	13	L4 and (super$1resolution or "super resolution") and (cod$4 or encod$4 or decod$4) and (image$1 or video) and ((point near2 spread near2 function) or "PSF")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/05/01 15:49
L6	76	L4 and (super$1resolution or "super resolution") and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/05/01 15:49
L7	1	L4 and ((super$1resolution or "super resolution" or high$1resolution or "high resolution") near2 (convert$4 and enlarg$4)) and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/05/01 15:49
L8	10	L4 and ((super$1resolution or "super resolution" or high$1resolution or "high resolution") near5 ((convert$4 or transform$4) and (enlarg$4 or increas$4))) and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/05/01 15:49

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12995039
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	2482
Examiner Name	PICON-FELICIANO, ANA J
Attorney Docket Number	31181U

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Receipt date: 07/15/2013	Application Number	12995039 12995039 - GAU: 2482
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date	2010-11-29
(Not for submission under 37 CFR 1.99)	First Named Inventor	Satoru SAKAZUME
	Art Unit	2482
	Examiner Name	PICON-FELICIANO, ANA J
	Attorney Docket Number	31181U

	1	Sung Cheol Park, et al."Super-Resolution Image Reconstruction: A Technical Overview", Signal Processing Magazine,Vol. 20, Issue 3, IEEE, pages 21-37. May, 2003.	☐
	2	Office Action issued on May 21, 2013, in the Counterpart Japanese Application No. 2009-123960, two pages.	☐

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EXAMINER SIGNATURE

Examiner Signature	/Ana Picon-feliciano/	Date Considered	05/01/2014

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.F./

Receipt date: 07/15/2013	Application Number	12995039 12995039 - GAU: 2482
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
	Art Unit	2482
	Examiner Name	PICON-FELICIANO, ANA J
	Attorney Docket Number	31181U

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jerald L. Meyer/	Date (YYYY-MM-DD)	2013-07-15
Name/Print	Jerald L. Meyer	Registration Number	41194

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S47	1000	(("20010010707") or ("20130163673") or ("20130163676") or ("20130170558") or ("20130182776") or ("20130170544") or ("20130163679") or ("20130170564") or ("20130163661") or ("20020181595") or ("20040264566") or ("20110157470") or ("20110176604") or ("20110298974") or ("20040017853") or ("20040022318") or ("20110229046") or ("20040017852") or ("20130170746") or ("20100189418") or ("20070263731") or ("20110229028") or ("20090010559") or ("20110096226") or ("20070230914") or ("20070077023") or ("20110007823") or ("20080095228") or ("20060262861") or ("20020061184") or ("20090168866") or ("6792045") or ("20070116130") or ("20040264580") or ("20100061445") or ("20090016437") or ("20090110056") or ("20080260026") or ("20110164676") or ("20110216836") or ("6785464") or ("20110002382") or ("20090168900") or ("8145006") or ("20070047661") or ("20070047662") or ("20070165715") or ("20020159755") or ("20070154185") or ("20030067989") or ("20070058729") or ("7957628") or ("20090129759") or ("20050084162") or ("20010006562") or ("20050084159") or ("20050089230") or ("20050084165") or ("20050084163") or ("20060204112") or ("20050084160") or ("20050084164") or ("20020090135") or ("20030038982") or ("20030053704") or ("20100054338") or ("20070153912") or ("20080019444") or ("20070153894") or ("20070153895") or ("20060126952") or ("20040080669") or ("20030142747") or ("20070153913") or ("20070153893") or ("20070160141") or ("20030128292") or ("20020081094") or ("20060291570") or ("20110142129") or ("20070153911") or ("20020059643") or ("20080075164") or ("20030080980") or ("20060045467") or ("20030002583") or ("20060045188") or ("20120195365") or ("20110194604") or ("20100086048") or ("20060120466") or ("20120294355") or ("20090285307") or ("20060215765") or ("20050226325") or ("20010053182") or ("20050002454") or ("20030012561") or ("20040086190") or ("20020181793") or ("20040086189") or ("20130058414") or ("20080253450") or ("20120262630") or ("20040131118") or ("20080232464") or	US-PGPUB; USPAT	OR	OFF	2013/08/28 16:07

("20040008774") or ("20120275512") or ("20030202604") or ("7715477") or ("7656950") or ("20070127846") or ("20010028404") or ("20070002946") or ("20070263719") or ("20080013626") or ("20080013625") or ("20060256868") or ("20080008237") or ("8213516")).PN. or (("20080013627") or ("20060088098") or ("7397858") or ("20020001411") or ("8023561") or ("7386049") or ("20010055336") or ("20040170330") or ("20030128766") or ("20010033619") or ("20100290537") or ("20090207844") or ("20030016755") or ("20050063473") or ("20070263087") or ("20130016790") or ("20120014434") or ("20130051456") or ("20060072673") or ("7925108") or ("20050286640") or ("20050058198") or ("20090232223") or ("20050249289") or ("20060146931") or ("20130051458") or ("20080253448") or ("20110249738") or ("20100124278") or ("20020006165") or ("20060072672") or ("6795499") or ("7394851") or ("20050232497") or ("20020030684") or ("20100188581") or ("20080031328") or ("20060190625") or ("20070200923") or ("6271774") or ("20090244392") or ("20020067768") or ("20120002728") or ("20020118760") or ("20070053444") or ("20070053665") or ("20110064321") or ("20070206930") or ("20070206932") or ("20090202162") or ("20040141653") or ("20090225853") or ("20070041441") or ("20070230568") or ("20070286289") or ("20050002458") or ("6574274") or ("20090103603") or ("20100061446") or ("20070147789") or ("20110158322") or ("20110075738") or ("20010008544") or ("20130136190") or ("20050243919") or ("20100191832") or ("20060274075") or ("20060193384") or ("6141059") or ("20080152020") or ("20080130758") or ("20060280244") or ("20080095450") or ("20070009024") or ("20130089135") or ("20090154816") or ("20080240503") or ("20120082227") or ("20030142872") or ("20060140276") or ("20080089428") or ("20060023964") or ("20120014432") or ("20120013717") or ("20030012552") or ("6456661") or ("20130010863") or ("20110211122") or ("20060013297") or ("20070160153") or ("20120128072") or ("6959042") or ("20130077882") or ("20050018770") or ("20020064226") or ("20090202219") or ("20110044387") or ("20100329351") or ("20110194619") or ("20060034369") or ("20050084167") or ("20060088094") or ("20030202592") or ("20100329331") or ("20020009150") or ("20010021273") or ("20020172428") or ("20080019438") or ("20110142131") or ("20100020883") or ("20110216823") or ("20110007818") or ("20100329330") or ("20100220939") or

		("20110216822") or ("20110176616") or ("20060034522") or ("20060171463") or ("20120294369") or ("20110216825") or ("20080008245")).PN. or (("20050259733") or ("20110216824") or ("20060233248") or ("20110222599") or ("20020037161") or ("20130089154") or ("20100202511") or ("20110164570") or ("20090210894") or ("20080044157") or ("20080044156") or ("20110243252") or ("20020054638") or ("20040190624") or ("20090245384") or ("20080205508") or ("20050229231") or ("20090180702") or ("20070025438") or ("20100226567") or ("6483945") or ("20040252982") or ("20120057635") or ("20090285302") or ("20080056383") or ("20010021303") or ("8036268") or ("20050053133") or ("20090034625") or ("20120063692") or ("20100205322") or ("6038256") or ("20060120463") or ("20090263108") or ("20100080291") or ("20010021260") or ("20060109900") or ("7366240") or ("20100226437") or ("20030103562") or ("20090103619") or ("6094457") or ("20080260024") or ("20090252425") or ("20060280250") or ("20050254010") or ("20060140264") or ("5969768") or ("20090097551") or ("20020135608") or ("20070177519") or ("20100034254") or ("20090080533") or ("20110280311") or ("20070036218") or ("20020136295") or ("20110170556") or ("20070177677") or ("20050276325") or ("20090141810") or ("20090252231") or ("20040170395") or ("20130039411") or ("20090268805") or ("20100100900") or ("20090122859") or ("20040101049") or ("20080144720") or ("20080152013") or ("20080144714") or ("20130028333") or ("20120328019") or ("20070262979") or ("20110286513") or ("20070286283") or ("6192083") or ("20110268185") or ("20060192698") or ("5828421") or ("20120201308") or ("20120183065") or ("20020168006") or ("20020094025") or ("20120230439") or ("20100220785") or ("20120063511") or ("20120051439") or ("20040141553") or ("20090196517") or ("20020122492") or ("20040228409") or ("20030133512") or ("20060165180") or ("20130208793") or ("20050271140") or ("20070098079") or ("20120230440") or ("20120230441") or ("20090034627") or ("20090010333") or ("20120076200") or ("20120057639") or ("20110280316") or ("20130108248") or ("20030133502") or ("20110013889") or ("20020118750") or ("20020114391") or ("20020122486") or ("20120314965") or ("20030063668") or ("20070122045") or ("20130077674") or ("20130163674") or ("20120057638") or ("20080144719") or ("20120069912") or ("20080152007") or ("20080144718") or				

		("20050249202")).PN. or (("20060133507") or ("20100296572") or ("20020191959") or ("20080063073") or ("20060174303") or ("20060233252") or ("20050100092") or ("20050244070") or ("20060285819") or ("20060262216") or ("20030215011") or ("20040228413") or ("20120294367") or ("20020110192") or ("20120275515") or ("20040146107") or ("20130077880") or ("20090202000") or ("20050031033") or ("6393059") or ("20130044813") or ("20050238105") or ("20020163967") or ("20070058948") or ("20130089156") or ("20020064230") or ("20050238104") or ("20020114392") or ("20100034256") or ("20010036230") or ("6141447") or ("7711051") or ("20100002761") or ("6567471") or ("20040268222") or ("20050243923") or ("20100189181") or ("6310915") or ("20090168886") or ("20070247529") or ("20080285938") or ("20110044386") or ("20110292995") or ("20080240236") or ("20120133736") or ("8135234") or ("20080285644") or ("20100150394") or ("20010048719") or ("20120027078") or ("7139316") or ("20070147804") or ("5987179") or ("20070116126") or ("20050025249") or ("20110080944") or ("8023754") or ("20110038417") or ("20070076801") or ("20120147972") or ("20120229670") or ("20050063466") or ("20080056378") or ("20060233259") or ("20080056379") or ("20080056380") or ("20040252981") or ("20090245386") or ("20120213287") or ("20110058793") or ("20120269275") or ("20070058712") or ("20050100318") or ("20100046635") or ("20120224628") or ("20100208801") or ("20050163214") or ("20110216830") or ("20080013620") or ("20050163478") or ("20050152457") or ("20050147395") or ("20080144711") or ("20100247066") or ("20100067580") or ("20080123970") or ("20070147502") or ("20080232452") or ("20100142614") or ("20040218671") or ("20070297507") or ("20030156640") or ("20040218672") or ("20020126752") or ("20050058206") or ("7933494") or ("20080267287") or ("20130083847") or ("20060224762") or ("20100150229") or ("20110064322") or ("20060165298") or ("20030185456") or ("20130089267") or ("20050254577") or ("20090323826") or ("20060140269") or ("6674796") or ("20020164152") or ("20110063409") or ("20020154698") or ("20060039473") or ("20110310979") or ("20060203917") or ("20010003478") or ("20120008677") or ("20040076235") or ("20130089155") or ("20060061497") or ("20060062300") or ("20080069202")).PN. or (("20120224641") or ("20020021752") or ("20060227868") or ("20050123056")				

		or ("20100086225") or ("7643690") or ("20090190662") or ("8223847") or ("20120069909") or ("20010016009") or ("8019169") or ("20060029129") or ("20080260042") or ("20100002767") or ("20100202535") or ("20020001344") or ("20070206678") or ("20010017891") or ("20090034633") or ("20060072669") or ("20090136145") or ("20070223909") or ("20040179619") or ("20040223548") or ("20010040926") or ("20090097555") or ("20080205852") or ("20090274217") or ("6580755") or ("20030156198") or ("20010031002") or ("20020186774") or ("20030174771") or ("20060182176") or ("20040150747") or ("20080037628") or ("20120075436") or ("8107528") or ("20130114715") or ("20080291997") or ("20080170622") or ("20080043832") or ("6414999") or ("20100246683") or ("20080080621") or ("20120177126") or ("20020044603") or ("20020176508") or ("20130114741") or ("20130051478") or ("20120063516") or ("20060133491") or ("20100271463") or ("20060256232") or ("20090316787") or ("20060153299") or ("20030007556") or ("20130107941") or ("20060093032") or ("20070263722") or ("20100054699") or ("20110019747") or ("20100061447") or ("20090103816") or ("20060233528") or ("20050105814") or ("20130128981") or ("20050201471") or ("20060082474") or ("20030103566") or ("20090052543") or ("8270494") or ("20040105501") or ("20090034626") or ("20110170615") or ("20060133490") or ("20070189392") or ("7126993") or ("8170118") or ("20080025414") or ("20120121016") or ("20010040700") or ("6556627") or ("20050232500") or ("20030099290") or ("20100150239") or ("20110228840") or ("20040008893") or ("20060140277") or ("20080152241") or ("20020080875") or ("20090187960") or ("20060188023") or ("20060083298") or ("20100046636") or ("20080240255") or ("20120314771") or ("20020136461") or ("20090220010") or ("20050111541") or ("20040228404") or ("20020037111") or ("20030194140") or ("7830409") or ("20120106623") or ("20030156647") or ("20120069905") or ("20130038686") or ("20080253447") or ("20030161404") or ("20050069039") or ("20010036319") or ("6687296") or ("20040141732") or ("20060251169") or ("20110211642") or ("20020090136") or ("20070189398") or ("20100246684") or ("20100020871") or ("20120269267")).PN. or (("20050201469") or ("20080267299") or ("6724436") or ("20070274384") or ("20100166060") or ("20080008453") or ("20110216837") or ("20110222601") or ("20100166074") or ("20080219356") or				

("20020016970") or ("20120294373") or ("5473380") or ("20090296808") or ("20120288015") or ("20110134991") or ("20110176562") or ("20070286244") or ("20050093869") or ("20010048721") or ("20060072668") or ("20120200663") or ("20010050958") or ("20080192826") or ("20100080534") or ("20090041130") or ("20020034254") or ("20010001016") or ("20110310955") or ("20030095594") or ("20020021843") or ("20040125204") or ("20090010331") or ("20040202250") or ("20090141809") or ("20060120453") or ("8266251") or ("20090002379") or ("20030174770") or ("20130089141") or ("20100104022") or ("20060133479") or ("20070230574") or ("20060256861") or ("20120320977") or ("20090003446") or ("20040190614") or ("20090003447") or ("20050100093") or ("20060018378") or ("20050163230") or ("20050163231") or ("20090028245") or ("20130188708") or ("20100061451") or ("20070110163") or ("20130156101") or ("20080069204") or ("20070291840") or ("20030103604") or ("20050083218") or ("20010026589") or ("20060062297") or ("20080062287") or ("20020101921") or ("20060285589") or ("20030067637") or ("20090323811") or ("20040008788") or ("20130010866") or ("20130188743") or ("20040218668") or ("20100232498") or ("20130016769") or ("20090238264") or ("20100118948") or ("20030058946") or ("20010001621") or ("20090180550") or ("20060285592") or ("20050047507") or ("20080002239") or ("6339619") or ("20100208827") or ("20060165182") or ("20080304567") or ("20070195203") or ("20010048768") or ("20030067984") or ("20010031009") or ("20060204221") or ("20090175355") or ("20040047417") or ("20090141814") or ("20050008240") or ("20030133510") or ("20070211798") or ("20060222069") or ("20060013308") or ("7920634") or ("20040086040") or ("20050089102") or ("20060233249") or ("20120201516") or ("20100128799") or ("20110268175") or ("20040012510") or ("20080063081") or ("20090010553") or ("20100266012") or ("20120281763") or ("20080122862") or ("20090232199") or ("20020009141") or ("20100246662") or ("20120114039") or ("20130114735") or ("20080117985") or ("20040218816") or ("20090074070")).PN. or (("20100272184") or ("20060233246") or ("20120219063") or ("20070097147") or ("20070140664") or ("20030154687") or ("20070140358") or ("20050180505") or ("20020097797") or ("20120148169") or ("20090323820") or ("20120106625") or ("20020054641") or ("20120236115") or ("20080253671") or ("7305040") or

		("20080124057") or ("20100296585") or ("20120148168") or ("20050013372") or ("20100150241") or ("20080137742") or ("20080069226") or ("20050036549") or ("20100027621") or ("20110026607") or ("20050254692") or ("20120148166") or ("20090180551") or ("20050111544") or ("20120148167") or ("20120155782") or ("20060140271") or ("20120148170") or ("6466624") or ("20060126948") or ("20130142257") or ("20080069209") or ("20110032856") or ("20110150084") or ("20080037656") or ("7609900") or ("20070248165") or ("20050057687") or ("20050152452") or ("20040218669") or ("20100091839") or ("20080062187") or ("20060215757") or ("20080117975") or ("20050036548") or ("20090116555") or ("20090129481") or ("20120328023") or ("20100272188") or ("20100215093") or ("20100208828") or ("20100322316") or ("20120144143") or ("20110268186") or ("20120224779") or ("20080192830") or ("20090207912") or ("20060222070") or ("20130135431") or ("20060271990") or ("20090196346") or ("20120147964") or ("20060098952") or ("20120230594") or ("20080107184") or ("8442120") or ("20070189377") or ("20120163476") or ("20040179607") or ("20120147956") or ("20130148731") or ("20080063082") or ("20050088324") or ("20080075171") or ("20020191116") or ("20080063071") or ("20060104356") or ("20100034473") or ("20080260034") or ("20100322311") or ("20050089232") or ("20050207501") or ("20040252758") or ("20020037049") or ("20080063072") or ("20090238261") or ("20130202050") or ("20110064142") or ("20110075726") or ("20130142256") or ("20090310680") or ("20110075733") or ("20050041734") or ("20080089404") or ("20110150080") or ("8295347") or ("20050147161") or ("20060233263") or ("20070140355") or ("20090257684") or ("20080250470") or ("20080069225") or ("20050244137") or ("20120128070") or ("20100150231") or ("20100061456") or ("20090196354") or ("20100195721") or ("20120237132") or ("20130089140") or ("20110280310") or ("20070286281") or ("20110085604") or ("20090185627")).PN. or (("20080123738") or ("20020051493") or ("20060233245") or ("20090092186") or ("20060133677") or ("20060222067") or ("20120213286") or ("20080123751") or ("20130034156") or ("20130129237") or ("20110310972") or ("20080212942") or ("20060088097") or ("20050141620") or ("20130107953") or ("20100039555") or ("20060262651") or ("20030215018") or ("20120147973") or ("20080069244") or ("20130114680") or ("20060227871")				

		or ("20070189385") or ("20060050974") or ("20110228857") or ("6122433") or ("20090296809") or ("20100020870") or ("20080304562") or ("20090147857") or ("7957465") or ("20080130740") or ("20120230393") or ("20080123737") or ("20020191851") or ("20010016010") or ("6301428") or ("20060045491") or ("20090296811") or ("20080137731") or ("20110170001") or ("20070280350") or ("20080130756") or ("20080137732") or ("20080123972") or ("20060268982") or ("20080123736") or ("20080111897") or ("20040120404") or ("20130135433") or ("20040234145") or ("20050147174") or ("20050025250") or ("20110051811") or ("6047100") or ("7181131") or ("20060133480") or ("20030007559") or ("20020039384") or ("20120163449") or ("20020041632") or ("20080124050") or ("20130136169") or ("20090190666") or ("20090028239") or ("20110038412") or ("20070223575") or ("20070003149") or ("20050281334") or ("20090180537") or ("20120099644") or ("20110032999") or ("20100086059") or ("20060114995") or ("20010046263") or ("20110019973") or ("20090010332") or ("20110249749") or ("20110235714") or ("20050094728") or ("20110142123") or ("20030138052") or ("20080304561") or ("20070160152") or ("20120002720") or ("20090080534") or ("20090220008") or ("20090147848") or ("20040156438") or ("20020031184") or ("20110255594") or ("20030138050") or ("20130170548") or ("20080170627") or ("6081295") or ("20120027087") or ("20060048193") or ("20090225866") or ("20060098215") or ("6480630") or ("20100215100") or ("20100158116") or ("20130170561") or ("20040091159") or ("20100135385") or ("20090122877") or ("20070121722") or ("20120230394") or ("20050147172") or ("20070195737") or ("20020122495") or ("20010019585") or ("20090129471") or ("20110096713") or ("20060149763") or ("20070189395") or ("20120027082") or ("20110299600") or ("20090116820") or ("20060280372")).PN. or (("20100316124") or ("20080317136") or ("20060029132") or ("20110194621") or ("20100195714") or ("20100303369") or ("6707778") or ("20090220000") or ("20020159526") or ("20090323803") or ("20110293017") or ("20070126853") or ("20070296826") or ("20070053425") or ("20110293008") or ("20060239359") or ("20110293016") or ("20060034371") or ("20090028427") or ("20050147160") or ("20090232221") or ("20110188572") or ("20040228403") or ("20100034269") or ("20060126728") or ("20100135394") or ("20040208481") or ("20110286530") or				

		("6990244") or ("20020090030") or ("20020145702") or ("7072491") or ("20080212683") or ("7212576") or ("20040013399") or ("20050281329") or ("20020181597")).PN.				
S48	82	S44 and (super$1resolution or "super resolution") and (svc or (scalab$6 near2 (cod$4 or encod$4 or decod$4))) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 16:11
S49	15	S47 and (super$1resolution or "super resolution") and (svc or (scalab$6 near2 (cod$4 or encod$4 or decod$4))) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 16:11
S50	63	S47 and (super$1resolution or "super resolution") and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 16:13
S51	35	(super$1resolution or "super resolution") and (enhancement near2 layer) and (base near2 layer) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 17:21
S52	4698	victor near2 company near2 japan.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 18:09
S53	1	S52 and (super$1resolution or "super resolution") and (svc or (scalab$6 near2 (cod$4 or encod$4 or decod$4))) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 18:09
S54	104	S52 and (super$1resolution or "super resolution")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 18:09
S55	29	S52 and (super$1resolution or "super resolution") and video	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/28 18:09

S59	4920	sung near2 park.in.	US-PGPUB; USPAT	OR	ON	2013/08/29 14:39
S60	1462	S59 and imag$4	US-PGPUB; USPAT	OR	ON	2013/08/29 14:39
S61	264	S60 and resolution	US-PGPUB; USPAT	OR	ON	2013/08/29 14:39
S62	3	S60 and (super near2 resolution)	US-PGPUB; USPAT	OR	ON	2013/08/29 14:40
S63	7	S59 and (super near2 resolution)	US-PGPUB; USPAT	OR	ON	2013/08/29 14:40
S64	7	S59 and (super near2 resolution)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/29 14:41
S66	11	satoru near2 sakazume.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/29 14:47
S67	55	shimauchi near2 kazuhiro.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/29 14:48
S68	80	kumakura near2 toru.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/29 14:54
S69	171	ueda near2 motoharu.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/29 14:58
S70	94	S69 and cod$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/29 14:58
S71	1	(pixel near2 insert$4) and filter$4 and (pixel near2 thin$4) and resolution and position$$ and interpolat$4 and enlarg$6 and repetition	US-PGPUB; USPAT	OR	ON	2013/08/29 15:57
S72	19	(pixel near2 insert$4) and filter$4 and (pixel near2 thin$4) and resolution and position$$ and interpolat$4 and enlarg$6	US-PGPUB; USPAT	OR	ON	2013/08/29 15:58

S73	455	(resolution near2 enlarg$6) and (resolution near2 conver$4)	US-PGPUB; USPAT	OR	ON	2013/08/29 16:02
S74	18	(super near2 resolution near2 enlarg$6) and (resolution near2 conver$4)	US-PGPUB; USPAT	OR	ON	2013/08/29 16:03
S76	59339	(H04N19/00436 OR H04N19/00472 OR H04N19/00521 OR H04N19/00757 OR H04N19/00781 OR H04N19/00884 OR H04N19/0089).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:00
S77	5	S76 and (super near2 resolution near2 enlarg$6) and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:01
S80	39	S76 and (super near2 resolution) and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:07
S81	7827	(h04n7/50 or h04n7/26244 or h04n7/26271 or h04n7/26015 or h04n7/26031).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:29
S82	4	S81 and (super near2 resolution) and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:29
S83	22	S81 and (super near2 resolution)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:30
S84	41	S81 and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 14:51
S85	2193	(parallel near3 (process$4 or encod$4 or cod$4 or decod$4)) and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 15:11

S86	82	(parallel near3 (process$4 or encod$4 or cod$4 or decod$4)) and (resolution near2 conver$4) and ("super-resolution" or "super resolution")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 15:13
S87	117	(S76 or S81) and (parallel near3 (process$4 or encod$4 or cod$4 or decod$4)) and (resolution near2 conver$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 15:40
S88	11	CN102084657B US20130163673 US20130182776 US20130163676 US20130170558 CN102084657A WO2012033962A2 JP2010220001A WO2012033966A1 EP0935395A2 US20110176604 US20130170544 US6483945 US20020181595 US20090010559 US20130163661 WO2012033967A1 US20010010707 US6792045 US7925108 US20130163679 WO2012033963A2 US20090110056 US20110229046 US6574274 US20130170564 US6271774 US20070263731	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 15:46
S89	37	US20110229028 US20130170746 US20110292995 WO2012033965A1 WO2012033970A1 EP1811784A1 WO2012033964A1 US6310915 EP1860886A1 US20110298974 WO2012033972A1 WO2006038679A1 US6785464 US6456661 US20040022318 WO2012033971A1 US8559526 US8145006 US7715477 US20070116130 WO1998010593A2 US8023561 US20040017852 US7386049 US20110096226 US7656950 US20040017853 US5987179 WO2009145271A1 CN102823242A US8036268 US20040264566 JP2003153271A US20110002382 US20070077023 US6915018 CN102986220A US20020061184 US20080095228 US20080031328 WO2008053557A1 JP2010011448A WO2008047257A2 US20060262861 WO2000030359A1 US6141059 US6414999 US7397858 US6795499 US20040264580 US7394851 WO2011090790A8 US8428116 AU2009299222A1 US7366240 US20070047662 US6339619 WO2001035411A4 US20070165715 US20070154185 US20010006562 US20090168866 WO2009005071A1 US6959042 US20070153913 US20070153893 WO2007095640A2 US20020001411 US20070153895 US20040080669 US6567471 US20070153911 US20070160141	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/16 15:48

		US20070153894 US6097842 US20100061445 US8223847 US20030067989 US5828421 US20070047661 EP1773065A2 US20070058729 US8023754 US7139316 US6459812 US20070153912				
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S107	30	(video with	US-PGPUB;	OR	ON	2014/01/24

		resolution)and((enhancement and base) with layer)and(scalable or scalability) and (standard with resolution) and (high with resolution) and ((target and reference) with (frame or image))	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			14:03
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S109	314	(video with resolution)and((enhancement and base) with layer)and(scalable or scalability) and ((standard or low or lower or reduced or original) with resolution) and ((higher or high or enhanced or greater) with resolution) and (target and reference)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/24 14:07
S110	240	S109 not S108	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/24 14:47
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S113	66	(("20130163673") or ("20130182776") or ("20130163676") or ("20130170558") or ("20110176604") or ("20130170544") or ("6483945") or ("20020181595") or ("20090010559") or ("20130163661") or ("20010010707") or ("6792045") or ("7925108") or ("20130163679") or ("20090110056") or ("20110229046") or ("6574274") or ("20130170564") or ("6271774") or ("20070263731") or ("20110229028") or ("20130170746") or ("20110292995") or ("6310915") or ("20110298974") or ("6785464") or ("6456661") or ("20040022318") or ("8559526") or ("8145006") or ("7715477") or ("20070116130") or ("8023561") or ("20040017852") or ("7386049") or ("20110096226") or ("7656950") or ("20040017853") or ("5987179") or ("8036268") or ("20040264566") or ("20110002382") or ("20070077023") or ("6915018") or ("20020061184") or ("20080095228") or ("20080031328") or ("20060262861") or ("6141059") or ("6414999") or ("7397858") or ("6795499") or ("7394851") or ("20040264580") or ("8428116") or ("7366240") or ("6339619") or ("20070047662") or ("20070165715") or ("20070154185") or ("20010006562") or ("20090168866") or ("6959042") or ("20070153893") or ("20070153913") or ("20020001411")).PN.	US-PGPUB; USPAT	OR	OFF	2014/01/24 16:45
S114	0	S111 and (video with resolution) and	US-PGPUB;	OR	ON	2014/01/24

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S115	0	S111 and (video with resolution) and (super$1resolution with (enlarger or converter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/24 16:56
S116	2	S111 and video and (super$1resolution with (enlarger or converter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/24 16:56
S117	52	S111 and video and super$1resolution	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/24 16:57
S118	77	video and (superresolution or super-resolution) and (scalable or scalability) and enhancement and base	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/24 17:37

5/1/2014 4:35:32 PM
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	**Art Unit**
	ANA PICON-FELICIANO	2482

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/10/2013	05/07/2014							
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	Art Unit
	ANA PICON-FELICIANO	2482

CPC- SEARCHED		
Symbol	Date	Examiner
H04N	1/16/2014	AP
H04N(Update)	5/1/2014	AP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
H04N 7/50,7/26244,7/26271,7/26015,7/26031,19/00436,19/00472,19/00521,19/00757,19/00781,19/00884,19/0089	1/16/2014	AP
H04N 19/00436,19/00472,19/00521,19/00757,19/00781,19/00884,19/0089(Update)	5/1/2014	AP

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	240.12,240.18,E7.243,E7.226	7/23/2013	AP
375	240.12,240.18,E7.243,E7.226(Update)	5/1/2014	AP

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search on USPC class/subclass	7/23/2013	AP
EAST Search on Assignee	8/28/2013	AP
EAST Search on Inventor	8/29/2013	AP
EAST Search on CPC class/subclass	1/16/2014	AP
EAST Search on keywords	1/24/2014	AP
Consulted Christopher Kelley (SPE Art Unit 2482)	9/10/2013	AP
Consulted Christopher Kelley (SPE Art Unit 2482)	4/29/2014	AP
EAST Search Update on classifications	5/1/2014	AP
Consulted Christopher Kelley(SPE Art Unit 2482)	5/7/2014	AP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S22	45	super$1resolution and encoder and ((point near2 spread near2 function) or "PSF")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/23 14:44
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S39	0	S38 and S37 and ((first and second and third) near3 (super$1resolution or "super resolution" or high$1resolution or "high resolution")) and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/23 18:57
S40	0	S38 and S37 and (super$1resolution or "super resolution" or high$1resolution or "high resolution") and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/23 18:58
S41	1	S38 and (super$1resolution or "super resolution" or high$1resolution or "high resolution") and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/23 18:59
S42	5	S37 and (super$1resolution or "super resolution" or high$1resolution or "high resolution") and (cod$4 or encod$4 or decod$4) and (image$1 or video)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/23 18:59
S43	1	12/995039.app.	US-PGPUB; USPAT	OR	ON	2013/07/23 20:21

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(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	31181U

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	1	2008-042407	JP	A	2008-02-21	NIPPON HOSO KYOKAI <NHK>		☒
	2	2008-053848	JP	A	2008-03-06	OKI ELECTRIC IND CO LTD		☒
	3	07-162870	JP	A	1995-06-23	AT & T CORP BELL COMMUN RES INC		☒

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Receipt date: 11/29/2010	Application Number	12995039 - GAU: 2482
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
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Examiner Signature	/Ana Picon-feliciano/	Date Considered	05/01/2014

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12995039
Filing Date	2010-11-29
First Named Inventor	Satoru SAKAZUME
Art Unit	2482
Examiner Name	PICON-FELICIANO, ANA J
Attorney Docket Number	31181U

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	1	20070064795	A1	2007-03-22	Cho et al.	

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	1	2007-110348	JP	A	2007-04-26	NTT DOCOMO INC	English Abstract cover page attached separately.	☒

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Receipt date: 12/19/2012	Application Number	12995039 12995039 - GAU: 2482
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2010-11-29
	First Named Inventor	Satoru SAKAZUME
	Art Unit	2482
	Examiner Name	PICON-FELICIANO, ANA J
	Attorney Docket Number	31181U

	1	Office action issued on September 28, 2012 in the counterpart Chinese Application, ten (10) pages	☐

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Examiner Signature	/Ana Picon-feliciano/	Date Considered	05/01/2014

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	First Named Inventor	Satoru SAKAZUME
	Art Unit	2482
	Examiner Name	PICON-FELICIANO, ANA J
	Attorney Docket Number	31181U

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jerald L. Meyer/	Date (YYYY-MM-DD)	2012-12-19
Name/Print	Jerald L. Meyer	Registration Number	41194

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Mail Stop Amendment
Attorney Docket No. **31181U**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Satoru SAKAZUME	Confirmation No.: 7504
Application No. **12/995,039**	Group Art Unit: 2482
Filed: November 29, 2010	Examiner: PICON-FELICIANO, Ana J.

For: **MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM**

REPLY AND AMENDMENT UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Office Action mailed May 15, 2014 ("Office Action"), with an accompanying one-month Extension of Time, Applicant respectfully requests reconsideration of the application in view of the following Remarks.

Amendments to the Claims begin on page **2** of this paper.
Remarks begin on page **22** of this paper.
A Conclusion begins on page **28** of this paper.

If an additional extension of time is necessary to prevent abandonment of this application and is not filed herewith, then such extension of time is hereby petitioned for under 37 C.F.R. §1.136(a). Applicant believes that no further fees for net addition of claims are required. Any fees required for further extensions of time and any fees for the net addition of claims are hereby authorized to be charged to Deposit Account No. 14-0112.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Canceled)

2. (Withdrawn) A moving picture encoding system comprising:

a first encoder configured to work on a subsequence of a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the subsequence of the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution; and

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures to implement a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits,

wherein the second encoder is configured to have the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

3. (Withdrawn) A moving picture encoding system comprising:

a first encoder configured to work on a subsequence of a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the subsequence of the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution;

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures to implement a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits;

a second super-resolution enlarger configured to acquire the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the second encoder is configured to have the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

4. (Withdrawn) The moving picture encoding system according to claim 2, wherein the first super-resolution enlarger comprises:

a positioner configured to work in a processing for super-resolution enlargement, on a combination of a base picture constituting a base therein and one or more observation pictures to be based on, to make a positioning to pixel positions of a desirable high resolution, for an interval-unequal sampling to create nonhomogeneous high resolution pictures;

an interpolator configured to work on nonhomogeneous high resolution pictures created at the positioner, to implement a process for a prescribed nonhomogeneous interpolation to create interpolated pictures with a desirable high resolution;

an estimated picture creator configured to acquire interpolated pictures created at the interpolator, to implement thereon a process for a prescribed reconstruction to create estimated pictures with a desirable resolution; and

a repetition determiner configured to acquire a nonhomogeneous high resolution picture from the positioner and a nonhomogeneous estimated picture from the estimated picture creator, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the processing for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator with information for a control to continue the processing, and operate as the repetition is unnecessary, to provide the estimated picture creator with information for a control to output a set of estimated pictures with a high resolution after super-resolution enlargement.

5. (Withdrawn) The moving picture encoding system according to claim 2, comprising a multiplexer configured to operate complying with a prescribed syntax structure to multiplex the first sequence of encoded bits from the first encoder, the second sequence of encoded bits from the second encoder, and information on encoding parameters of respective types used in the encoding at the first encoder and the encoding at the second encoder.

6. (Withdrawn) The moving picture encoding system according to claim 2, comprising:

a first accumulation buffer configured to work in a course before the first encoder and the first super-resolution enlarger, to accumulate subsequences of the sequence of moving pictures with the standard resolution;

a second accumulation buffer configured to work in a course between the first encoder and the second encoder, to accumulate sets of decoded pictures from the first encoder;

an accumulation controller configured to work for detections of buffer accumulation amounts at the first accumulation buffer, the second accumulation buffer, the first encoder, and the second encoder, to control the buffer accumulation amounts; and

a code rate controller configured to work on bases of the detections of buffer accumulation amounts at the accumulation controller, to control code rates at the first encoder and the second encoder.

7. (Currently Amended) A moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits,

wherein a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal; and

wherein the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.

8. (Currently Amended) A moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of resolution converted enlarged decoded pictures from the third resolution converter as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits,

wherein a spatial resolution of the set of super-resolution enlarged pictures, and that of the set of resolution converted enlarged decoded pictures are made equal; and

wherein the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.

9. (Currently Amended) A moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to

create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger as a set of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits,

wherein a spatial resolution of the set of super-resolution enlarged pictures, and that of the set of super-resolution enlarged decoded pictures are made equal; and

wherein the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.

10. (Withdrawn) A moving picture encoding system comprising:

a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a first resolution converter configured to work on the set of super-resolution enlarged pictures to implement a process for a first resolution conversion to create a set of super-resolution enlarged and converted pictures with the standard resolution;

a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution;

a second resolution converter configured to work on the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution;

a second encoder configured to have the set of super-resolution enlarged and converted pictures from the first resolution converter as a set of encoding target pictures, employing the set of decoded pictures from the first encoder and the set of super-resolution enlarged and converted decoded pictures with the standard resolution from the second resolution converter as sets of reference pictures, to implement thereon a second combination of processes for a prediction and an encoding to create a second sequence of encoded bits;

a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and

a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits.

11. (Withdrawn) A moving picture encoding method comprising:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution; and

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

12. (Withdrawn) A recording medium storing a moving picture encoding program configured to have a computer execute:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution; and

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of decoded pictures from the first encoder as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

13. (Withdrawn) A moving picture decoding system comprising:

a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output at least a first and a second sequence of encoded bits;

a first decoder configured to acquire the first sequence of encoded bits obtained with a standard resolution at the demultiplexer to implement thereon a process for a prescribed first decoding to create a sequence of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures;

a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution; and

a second decoder configured to acquire the second sequence of encoded bits obtained with the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution.

14. (Withdrawn) The moving picture decoding system according to claim 13, comprising:

the demultiplexer being configured to work on the sequence of input encoded bits to implement the process for the prescribed demultiplexing to further output a third sequence of encoded bits;

a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder to implement thereon a process for a

prescribed resolution conversion to create a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution; and

a third decoder configured to acquire the third sequence of encoded bits obtained with the high resolution at the demultiplexer, the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger, and the sequence of enlarged decoded pictures with the high resolution from the second resolution converter, to implement thereon a combination of processes for a prescribed prediction and a prescribed third decoding being a decoding with an extension of the high resolution, to create a sequence of super-resolution enlarged pictures as decoded.

15. (Withdrawn) A moving picture reencoding system comprising:

a demultiplexer configured to work on a sequence of input encoded bits to implement a process for a prescribed demultiplexing to output at least a first and a second sequence of encoded bits;

a first decoder configured to acquire the first sequence of encoded bits obtained with a standard resolution at the demultiplexer to implement thereon a process for a prescribed first decoding to create a sequence of decoded pictures with the standard resolution;

a first super-resolution enlarger configured to acquire the sequence of decoded pictures created with the standard resolution at the first decoder to implement thereon a process for a prescribed super-resolution enlargement to create a sequence of super-resolution enlarged decoded pictures;

a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to implement thereon a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with the standard resolution;

a second decoder configured to acquire the second sequence of encoded bits obtained with the standard resolution at the demultiplexer, the sequence of decoded pictures created with the standard resolution at the first decoder, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter, to implement thereon a

process for a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution;

a reencoder configured to acquire from the first decoder information on coefficients of orthogonal transform in a course of decoding thereof, and from the second decoder information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding thereof, to make a synthesis of respective information on coefficients of orthogonal transform and implement thereon a process for a prescribed entropy encoding to create a sequence of encoded bits as reencoded; and

a multiplexer configured to acquire the sequence of encoded bits reencoded at the reencoder, to implement thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, to create a sequence of encoded bits as multiplexed.

16. (Withdrawn) The moving picture reencoding system according to claim 15, wherein the reencoder is configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder, the sequence of super-resolution decoded pictures with the standard resolution from the first resolution converter, and the sequence of super-resolution pictures with the standard resolution from the second decoder, to implement thereon a process for a prescribed encoding to create a sequence of encoded bits as reencoded.

17. (Withdrawn) A moving picture decoding method comprising:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting at least a first and a second sequence of encoded bits;

a step of acquiring the first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution; and

a step of acquiring the second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

18. (Withdrawn) The moving picture decoding method according to claim 17, comprising:

a step of implementing the process for the prescribed demultiplexing on the sequence of input encoded bits, outputting a third sequence of encoded bits;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed resolution conversion, creating a sequence of enlarged decoded pictures with a high resolution as a resolution higher than the standard resolution; and

a step of acquiring the third sequence of encoded bits obtained with the high resolution through the process for the prescribed demultiplexing, the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, and the sequence of enlarged decoded pictures created with the high resolution through the process for the prescribed resolution conversion, implementing thereon a combination of

processes for a prescribed prediction and a prescribed third decoding being a decoding with an extension of the high resolution, creating a sequence of super-resolution enlarged pictures as decoded.

19. (Withdrawn) A moving picture reencoding method comprising:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits;

a step of acquiring a first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution;

a step of acquiring a second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution;

a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the prescribed first decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in the process for the prescribed second decoding being a decoding with an extension of the

standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded; and

a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

20. (Withdrawn) A recording medium storing a moving picture decoding program configured to have a computer execute:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits, outputting at least a first and a second sequence of encoded bits;

a step of acquiring the first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution; and

a step of acquiring the second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a

combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution.

21. (Withdrawn) A recording medium storing a moving picture reencoding program configured to have a computer execute:

a step of implementing a process for a prescribed demultiplexing on a sequence of input encoded bits;

a step of acquiring a first sequence of encoded bits obtained with a standard resolution through the process for the prescribed demultiplexing, implementing thereon a process for a prescribed first decoding, creating a sequence of decoded pictures with the standard resolution;

a step of acquiring the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, implementing thereon a process for a prescribed super-resolution enlargement, creating a sequence of super-resolution enlarged decoded pictures;

a step of acquiring the sequence of super-resolution enlarged decoded pictures created through the process for the prescribed super-resolution enlargement, implementing thereon a process for a prescribed resolution conversion, creating a sequence of super-resolution decoded pictures with the standard resolution;

a step of acquiring a second sequence of encoded bits obtained with the standard resolution through the process for the prescribed demultiplexing, the sequence of decoded pictures created with the standard resolution through the process for the prescribed first decoding, and the sequence of super-resolution decoded pictures created with the standard resolution through the process for the prescribed resolution conversion, implementing thereon a process for a prescribed second decoding being a decoding with an extension of the standard resolution, creating a sequence of super-resolution pictures decoded with the standard resolution;

a step of acquiring information on coefficients of orthogonal transform in a course of decoding in the process for the prescribed first decoding, and information on coefficients of orthogonal transform in an extension layer of the standard resolution in a course of decoding in

the process for the prescribed second decoding being a decoding with an extension of the standard resolution, making a synthesis of respective information on coefficients of orthogonal transform, implementing thereon a process for a prescribed entropy encoding, creating a sequence of encoded bits as reencoded; and

a step of acquiring the sequence of encoded bits as reencoded, implementing thereon a process for a multiplexing complying with a prescribed syntax structure, inserting encoding information inclusive of identification information for identification of information on encoding modes and parameters of respective types used, creating a sequence of encoded bits as multiplexed.

22. (Withdrawn) The moving picture encoding system according to claim 3, wherein the first super-resolution enlarger comprises:

a positioner configured to work in a processing for super-resolution enlargement, on a combination of a base picture constituting a base therein and one or more observation pictures to be based on, to make a positioning to pixel positions of a desirable high resolution, for an interval-unequal sampling to create nonhomogeneous high resolution pictures;

an interpolator configured to work on nonhomogeneous high resolution pictures created at the positioner, to implement a process for a prescribed nonhomogeneous interpolation to create interpolated pictures with a desirable high resolution;

an estimated picture creator configured to acquire interpolated pictures created at the interpolator, to implement thereon a process for a prescribed reconstruction to create estimated pictures with a desirable resolution; and

a repetition determiner configured to acquire a nonhomogeneous high resolution picture from the positioner and a nonhomogeneous estimated picture from the estimated picture creator, for employment of the acquired pictures to follow a prescribed determination method to determine whether or not a repetition of the processing for super-resolution enlargement is necessary, and work depending on a result thereof, to operate as the repetition is necessary, to provide the interpolator with information for a control to continue the processing, and operate as the repetition is unnecessary, to provide the estimated picture creator with information for a

control to output a set of estimated pictures with a high resolution after super-resolution enlargement.

23. (Withdrawn) The moving picture encoding system according to claim 3, further comprising a multiplexer configured to operate complying with a prescribed syntax structure to multiplex the first sequence of encoded bits from the first encoder, the second sequence of encoded bits from the second encoder, and information on encoding parameters of respective types used in the encoding at the first encoder and the encoding at the second encoder.

24. (Withdrawn) The moving picture encoding system according to claim 3, further comprising:

a first accumulation buffer configured to work in a course before the first encoder and the first super-resolution enlarger, to accumulate subsequences of the sequence of moving pictures with the standard resolution;

a second accumulation buffer configured to work in a course between the first encoder and the second encoder, to accumulate sets of decoded pictures from the first encoder;

an accumulation controller configured to work for detections of buffer accumulation amounts at the first accumulation buffer, the second accumulation buffer, the first encoder, and the second encoder, to control the buffer accumulation amounts; and

a code rate controller configured to work on bases of the detections of buffer accumulation amounts at the accumulation controller, to control code rates at the first encoder and the second encoder.

25. (Withdrawn) A moving picture encoding method comprising:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution;

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits;

a step of acquiring the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a step of working on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

26. (Withdrawn) A recording medium storing a moving picture encoding program configured to have a computer execute:

a step of implementing a first combination of processes for an encoding and a decoding on a sequence of moving pictures with a standard resolution, creating a first sequence of encoded bits and a set of decoded pictures with the standard resolution;

a step of implementing a process for a first super-resolution enlargement on the sequence of moving pictures with the standard resolution, creating a set of super-resolution enlarged pictures with a resolution higher than the standard resolution;

a step of implementing a process for a first resolution conversion on the set of super-resolution enlarged pictures, creating a set of super-resolution enlarged and converted pictures with the standard resolution;

a step of having the set of super-resolution enlarged and converted pictures as a set of encoding target pictures, implementing thereon a second combination of processes for a prediction and an encoding, creating a second sequence of encoded bits;

a step of acquiring the set of decoded pictures with the standard resolution from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; and

a step of working on the set of super-resolution enlarged decoded pictures to implement a process for a second resolution conversion to create a set of super-resolution enlarged and converted decoded pictures with the standard resolution,

wherein the step of creating the second sequence of encoding bits further comprises a step of having the set of super-resolution enlarged and converted decoded pictures from the second resolution converter as a set of reference pictures to implement the second combination of processes for the prediction and the encoding to create the second sequence of encoded bits.

REMARKS

I. Status of the Claims

Upon entry of the amendments, claims 2-26 will be pending in the present application. Claim 1 is canceled without prejudice to or disclaimer of the subject matter contained therein. Claims 2-6 and 10-26 are withdrawn without prejudice to or disclaimer of the subject matter contained therein. Claims 7-9 have been amended as discussed hereafter. Support for the claim amendments can be found throughout the specification and the claims as originally filed. The claim amendments made are solely for advancing prosecution of the application.

By canceling or amending any claims herein, Applicants make no admission as to the validity of any rejection made by the Examiner against any of these claims. Applicants reserve the right to reassert any of the claims canceled herein or the original claim scope of any claim amended herein, in a continuing application.

Applicants submit that the above amendments introduce no new matter within the meaning of 32 U.S.C. §132, and respectfully request entry of the above amendments and favorable consideration of the application in view of the following.

II. Summary of the Office Action

Claims 7-9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Wan (US 6,580,754 B1) in view of Ong (JP 2007-316161 A), and further in view of Holcomb (US 7,379,496 B2).

III. Response to Rejection under 35 U.S.C. §103

Claims 7-9 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Wan in view of Ong and further in view of Holcomb. Applicants respectfully traverse this rejection.

Applicants traverse the rejections as all of the features of the previously presented claimed subject matter are not disclosed, taught or suggested by the cited prior art of record. To establish a *prima facie* case of obviousness, the Examiner must establish that the prior art references teach or suggest all of the claim features. *Amgen, Inc. v. Chugai Pharm. Co.*, 18, USPQ2d 1016, 1023 (Fed. Cir. 1991); *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 USPQ2d 494, 496 (CCPA 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. *See Dystar Textilfarben GMBH v. C. H. Patrick*, 464 F.3d 1356 (Fed. Cir. 2006). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. *Id.* at 1366.

Applicants respectfully traverse this rejection since the cited prior art does not support a *prima facie* case of obviousness. Obviousness under 35 U.S.C. §103 is a question of law, with underlying factual considerations regarding (1) the scope and content of the prior art, (2) the differences between the prior art and the claimed invention, (3) the level of ordinary skill in the art, and (4) any relevant secondary considerations. *Ball Aerosol & Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 991 (Fed. Cir. 2009) *citing Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966). Title 35 U.S.C. §103 bars patentability unless "the improvement is more than the predictable use of prior art elements according to their

established functions." *In re Kubin*, 561 F.3d 1351, 1360 *citing KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

The Examiner alleges that the use of a process for super-resolution between layers in a hierarchical encoding is well-known in the art. Ong implements super-resolution processing on a predictive picture created by inter-layer intra prediction processor to use the processed picture as a reference picture in an enhancement layer, and there is a general explanation of a super-resolution process, *see* Ong Figure 4a section "Inter-layer prediction encoding …" and section "Super Resolution processor". Based on these descriptions, the Examiner alleges that the super-resolution process is employed for an additional extension of a reference picture for the encoding of an enhancement layer picture and that the super-resolution enlargement of the pictures decoded in a lower layer is a modification of Wan's technique with Ong's technique and is well known in the art.

The Examiner admits that the combination of Wan and Ong does not include the use of a set of super-resolution enlarged pictures with a standard resolution. However, the Examiner alleges that the use of resolution converters for encoding and decoding in multiple resolutions in order to extend the current and reference pictures is obvious from Holcomb. Holcomb has a current frame and a reference frame with different spatial resolutions to implement thereon different resolution conversions into spatial resolutions which another encoder can encode, to implement an encoding process to obtain an encoding output, see Figure 2. The Examiner alleges that like the current frame in the Holcomb configuration, a picture after the super-resolution enlargement may be used, and thus it is well known in the art.

Applicants respectfully submit the amendments to claims 7-9 in response to the

Examiner's arguments. Amendments to claims 7-9 refer to:

(A) a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal; and

(B) the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.

Regarding (A), the combination of cited documents cannot control such that an enlargement ratio of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal.

During an encoding process in an enhancement layer, when resolutions are different between target pictures and reference pictures, it causes a problem where edges and shapes included in the pictures are not located at the same spatial location or at a near spatial location to each other, so that the amount of information of data on differences made from the target pictures and the reference pictures actually becomes large.

The presently claimed subject matter enables the setting of a prescribed enlargement ratio, thereby creating a sequence of target moving pictures and a sequence of reference moving pictures with a desired high resolution, and making use of these moving pictures with the high resolution to implement a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits. Moreover, by controlling the prescribed enlargement

ratio equal among the first super-resolution enlarger, the second super-resolution enlarger, and the third resolution converter, an encoding for a sequence of moving pictures with a high resolution is made easy, *see* written description paragraph [0172].

Regarding (B), the presently claimed subject matter has the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, has the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger as a second set of reference pictures, and has the set of resolution converted enlarged decoded pictures from the third resolution converter as a first set of reference pictures. During a process for the prescribed prediction at the third encoder of the presently claimed subject matter, there is a configuration to employ either the first reference picture or the second reference picture to create a predictive picture and subtract the predictive picture from the target picture to create a data on a difference in between, *see* written description paragraph [0165].

Moreover, for control to make a selection of reference picture, the presently claimed subject matter has a configuration to create a set of data on the selection of reference picture to identify the first reference picture or the second reference picture, whichever is used, *see* written description paragraph [0167].

The combination of cited documents cannot create a set of data on the selection of reference picture for control to make a selection of reference picture. For example, in the configuration of Holcomb, even though the super-resolution enlarged pictures is supplied to the current frame and the second reference picture is supplied to the reference frame, since the first reference picture is not supplied, it is not possible to select a reference picture during the prediction process. Thus, Holcomb cannot create data on the selection of reference picture to

identify the first reference picture or the second reference picture, whichever is used.

Thus, no combination of Wan, Ong, and Holcomb teach each and every feature of the presently amended claims 7-9. Therefore, the Examiner has not proven a *prima facie* case of obviousness. Applicants respectfully request reconsideration and withdrawal of the rejections.

CONCLUSION

Applicant believes that a full and complete response has been made to the pending Office Action and respectfully submits that all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, Applicant respectfully submits that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,
NATH, GOLDBERG & MEYER

Date: September 15, 2014

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Electronic Patent Application Fee Transmittal

Application Number:	12995039
Filing Date:	29-Nov-2010
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
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Attorney Docket Number:	31181U

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	1251	1	200	200

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**200**

Electronic Acknowledgement Receipt

EFS ID:	20132623
Application Number:	12995039
International Application Number:	
Confirmation Number:	7504
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM
First Named Inventor/Applicant Name:	Satoru Sakazume
Customer Number:	20529
Filer:	Stanley Protigal/Annie Kock
Filer Authorized By:	Stanley Protigal
Attorney Docket Number:	31181U
Receipt Date:	15-SEP-2014
Filing Date:	29-NOV-2010
Time Stamp:	16:39:27
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$200
RAM confirmation Number	3308
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Extension of Time	sb0022.pdf	186386 62fe391d89c6445be88a4de8cc6c8da449044ada	no	2
Warnings:					
Information:					
2	Amendment/Req. Reconsideration-After Non-Final Reject	ROA_31181U_09152014.pdf	178076 cc6486386d6ef5255ca5d03246d175c238e32f66	no	28
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30671 18903fbf14dfe690ee89264fd3431034d67b9f94	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	395133	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/22 (03-13)
Approved for use through 3/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): 31181U

Application Number: 12/995,039

Filed: November 29, 2010

For: MOVING PICTURE ENCODING SYSTEM...

Art Unit: 2482

Examiner: PICON-FELICIANO, ANA J

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$ 200
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration number 41,194.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Jerald L. Meyer/ — Signature

September 15, 2014 — Date

Jerald L. Meyer — Typed or printed name

703-548-6284 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/995,039	11/29/2010	

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **09/15/2014**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 16	Minus	***16	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/ANNIE SINGLETON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

20529 7590 01/22/2015
NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

EXAMINER
PICON-FELICIANO, ANA J

ART UNIT	PAPER NUMBER
2482	

DATE MAILED: 01/22/2015

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

TITLE OF INVENTION: MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	04/22/2015

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

20529 7590 01/22/2015
NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

TITLE OF INVENTION: MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	04/22/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
PICON-FELICIANO, ANA J	2482	375-240120

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

20529 7590 01/22/2015

NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

EXAMINER	
PICON-FELICIANO, ANA J	
ART UNIT	PAPER NUMBER
2482	

DATE MAILED: 01/22/2015

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 12/995,039	Applicant(s) SAKAZUME, SATORU	
	Examiner ANA PICON-FELICIANO	Art Unit 2482	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *September 15, 2014*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *7-9*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/ANA PICON-FELICIANO/ Examiner, Art Unit 2482	/CHRISTOPHER S KELLEY/ Supervisory Patent Examiner, Art Unit 2482

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

2. This action is in response to applicant's amendment received on **September 15, 2014**.

3. **Claims 2-26** are still pending in this application.

4. **Claims 2-6 and 10-26** have been withdrawn from consideration.

5. **Claims 7-9** have been amended.

6. **Claim 1** has been canceled.

EXAMINER'S AMENDMENT

7. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Jerald L. Meyer (Reg. No. 41,194) on December 30, 2014.

The application has been amended as follows:

Cancel Claims 2-6 and 10-26.

Allowable Subject Matter

8. Claims 7-9 are allowed.

9. The following is an examiner's statement of reasons for allowance:

Regarding claims 7-9, the closest prior art of record **Wan et al. (US 6,580,754 B1)**, **ONG CHIN PHEK et al.(JP 2007-316161 A)**, and **Holcomb et al.(US 7,379,496 B2)** do not teach nor suggest in detail a moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system comprising: a first encoder configured to work on a sequence of moving pictures with a standard resolution to implement a first combination of processes for an encoding and a decoding to create a first sequence of encoded bits and a set of decoded pictures with the standard resolution; a first super-resolution enlarger configured to work on the sequence of moving pictures with the standard resolution to implement a process for a first super-resolution enlargement to create a set of super-resolution enlarged pictures with a resolution higher than the standard resolution; a second super-resolution enlarger configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a second super-resolution enlargement to create a set of super-resolution enlarged decoded pictures with a resolution higher than the standard resolution; a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion

to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution; and a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super- resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits, wherein a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal; and wherein the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.

Wan et al. (US 6,580,754 B1) discloses an optimal system for determining whether simulcast coding (**400**) or spatial scalability coding (**100**) should be used to encode video for clients with a specific communication link. Operating points (A′, B′, C′) for both simulcast coding and spatial scalability are also determined. Adaptive switching (**3130, 3140**) is provided, with the operating points and decision boundaries being used to guide the switching to optimize the quality of the higher-resolution data based on a bit allocation to the associated lower-resolution data. A system for determining the point (A′, C′) of equal quality in both layers of simulcast and spatial scalability coding is also

provided. The proportion of bits allocated to the base layer to achieve equal quality is essentially independent of the total bit rate for both simulcast and spatial scalability.

ONG CHIN PHEK et al.(JP 2007-316161 A) discloses a method and apparatus of super resolution processing in which the resolution and quality of an image sequence are improved, and a grid artifact is reduced. Interpolation is performed to create a high resolution estimated image, alignment is performed to create an aligned image, the high resolution estimated image is smeared and the smeared image and the aligned image are subtracted to create the residual image, the deficient residue is interpolated by using the residual value of a nondeficient peripheral image, a smoothing image and reverse projection image are combined to create an enhancement coefficient, the enhancement coefficient is updated to the high resolution estimated image to create a fresh enhancement coefficient, and thereby the residual value of the deficient image is interpolated from the residual value of the peripheral image.

Holcomb et al.(US 7,379,496 B2) discloses a video encoder that performs multi-resolution video coding. For example, the encoder adaptively changes frame sizes to reduce blocking artifacts at low bitrates. A video decoder performs corresponding multi-resolution decoding.

Thus prior art of record taking individually or in combination does not teach nor suggest the above-stated limitation taking wholly in combination with all the elements of each independent claim and the structure shown in the specification.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANA PICON-FELICIANO whose telephone number is (571)272-5252. The examiner can normally be reached on Monday-Friday 9am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Kelley can be reached on 571-272-7331. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANA PICON-FELICIANO/
Examiner, Art Unit 2482

/CHRISTOPHER S KELLEY/
Supervisory Patent Examiner, Art Unit 2482

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	**Art Unit**
	ANA PICON-FELICIANO	2482

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/10/2013	05/07/2014	12/30/2014						
	1	-	N	-						
	2	÷	N	-						
	3	÷	N	-						
	4	÷	N	-						
	5	÷	N	-						
	6	÷	N	-						
	7	÷	✓	=						
	8	÷	✓	=						
	9	÷	✓	=						
	10	÷	N	-						
	11	÷	N	-						
	12	÷	N	-						
	13	÷	N	-						
	14	÷	N	-						
	15	÷	N	-						
	16	÷	N	-						
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	19	÷	N	-						
	20	÷	N	-						
	21	÷	N	-						
	22	÷	N	-						
	23	÷	N	-						
	24	÷	N	-						
	25	÷	N	-						
	26	÷	N	-						

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	12/995039.app.	US-PGPUB; USPAT	OR	ON	2014/12/15 14:51
L22	2500	(("20110176604") or ("20140140407") or ("6792045") or ("20010010707") or ("20130163673") or ("20130182776") or ("20130170558") or ("20130163676") or ("20110007823") or ("20070263731") or ("6785464") or ("20110229046") or ("6483945") or ("20070116130") or ("20110002382") or ("20060262861") or ("7715477") or ("7656950") or ("20070230914") or ("20110096226") or ("6271774") or ("20040264566") or ("20110292995") or ("20020181595") or ("5987179") or ("5828421") or ("20110229028") or ("8036268") or ("20140294081") or ("8023561") or ("7386049") or ("20040022318") or ("20020061184") or ("8145006") or ("20040017853") or ("20140044177") or ("5969768") or ("20040017852") or ("20130163661") or ("20090110056") or ("7394851") or ("20090010559") or ("20130170544") or ("7397858") or ("6574274") or ("6310915") or ("6959042") or ("6795499") or ("7925108") or ("20040141653") or ("8213516") or ("7460719") or ("6141059") or ("8660183") or ("20100054338") or ("20080260026") or ("8023754") or ("20130163679") or ("20060126952") or ("20130170564") or ("20120294355") or ("20110216836") or ("20100189418") or ("20060013297") or ("20120013717") or ("20070077023") or ("7139316") or ("20040264580") or ("20070153894") or ("20070153895") or ("20090016437") or ("20070160141") or ("6915018") or ("20070153912") or ("20140177706") or ("20070153893") or ("20070153911") or ("7366240") or ("20070153913") or ("20120195365") or ("6567471") or ("20130170746") or ("7711051") or ("20040080669") or ("7643690") or ("20110157470") or ("8223847") or ("8798143") or ("20070058729") or ("20110142129") or ("20070047662") or ("7957628") or ("20070047661") or ("20070165715") or ("6393059") or ("6687296") or ("8559526") or ("20100086048") or ("20020136295") or ("20010006562") or ("20080095228") or ("6456661") or ("20030067989") or ("20080031328") or ("20110280311") or	US-PGPUB; USPAT	OR	OFF	2014/12/15 14:53

		("6480630") or ("6466624") or ("7212576") or ("20030142872") or ("20020001411") or ("20090168866") or ("20040228409") or ("20060274075") or ("8019169") or ("6549720") or ("7072491") or ("6990244") or ("7555041") or ("20020159755") or ("20110075738") or ("6160844") or ("20080240503") or ("20050276325") or ("6141447") or ("6801574") or ("20040008774") or ("20090141810") or ("20140219338") or ("8811471")).PN. or (("20100290537") or ("7075984") or ("20130271651") or ("20140269912") or ("20010048719") or ("20070154185") or ("20010021260") or ("8340191") or ("20070160153") or ("20110211122") or ("6580755") or ("20120294369") or ("8170097") or ("8872881") or ("20050002458") or ("8135234") or ("6055012") or ("6427027") or ("6459812") or ("6389173") or ("20100061445") or ("20060291570") or ("20130089135") or ("7933494") or ("6097842") or ("20020081094") or ("6414999") or ("20060072672") or ("20030128292") or ("20090202162") or ("20110064321") or ("20020059643") or ("6154495") or ("20110194604") or ("20100150229") or ("20140211844") or ("7272185") or ("20130089154") or ("20130083847") or ("6477202") or ("20060256868") or ("20030142747") or ("20070053444") or ("20040170330") or ("8428116") or ("20020034254") or ("20080152020") or ("20050226325") or ("20010053182") or ("20060072673") or ("8243820") or ("20100220939") or ("20040086189") or ("20030080980") or ("20050084159") or ("20050084160") or ("20050084164") or ("6707778") or ("20060204112") or ("6301428") or ("20120262630") or ("6330284") or ("20070058948") or ("6961471") or ("20040086190") or ("5473380") or ("20050084165") or ("20050084163") or ("20050089230") or ("20110164676") or ("20110280316") or ("20110249738") or ("6339619") or ("20050254577") or ("20070230568") or ("8116576") or ("20020181793") or ("20050084162") or ("7298911") or ("7184600") or ("6950556") or ("8179420") or ("20060023964") or ("6038256") or ("20090103603") or ("20130077674") or ("6339620") or ("6621933") or ("20030053704") or ("20020090135") or ("20140003508") or ("7116827") or ("6934416") or ("6567561") or ("6754268") or ("20060045467") or ("20120002728") or ("20030038982") or ("20080205508") or ("6310962") or ("6621865") or ("6987887") or ("20030002583") or ("7209635") or ("6546138") or ("7031532") or ("20070110163") or ("20060034522") or ("6292585") or ("6353684") or ("6975768")				

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("6954499") or ("20050207620") or ("20100202535") or ("20110216825") or ("20040228404") or ("20050053150") or ("6507615")).PN. or (("20120200663") or ("20070177675") or ("7151799") or ("20090034615") or ("20110293008") or ("20120027082") or ("20080007613") or ("20110090959") or ("6982762") or ("20060072669") or ("20110299600") or ("8855204") or ("20040268222") or ("8041187") or ("20140119441") or ("20100079608") or ("20070121720") or ("20110222599") or ("20020150383") or ("7986732") or ("8520141") or ("20090154816") or ("20140092991") or ("6600785") or ("20020001348") or ("20050053302") or ("20140098892") or ("8184700") or ("5479209") or ("7650061") or ("7697607") or ("8446962") or ("8149917") or ("20060140271") or ("20100150394") or ("8107744") or ("20110216830") or ("5510842") or ("5128754") or ("20090141814") or ("20110142131") or ("20110216824") or ("8208549") or ("20080291997") or ("20100034254") or ("20010026589") or ("20130202044") or ("20070058712") or ("6628714") or ("20120183061") or ("20060062297") or ("8385413") or ("7251368") or ("6532242") or ("8693538") or ("6084909") or ("20050058206") or ("20010026587") or ("20130202031") or ("6301304") or ("7263129") or ("20140119451") or ("20060159168") or ("20140092992") or ("8451895") or ("8503536") or ("20100027621") or ("20050201469") or ("20070273750") or ("8345992") or ("20100034269") or ("20100061446") or ("7308029") or ("20110293017") or ("20050123038") or ("20140085415") or ("8155193") or ("6192188") or ("20100290523") or ("20130188709") or ("4701783") or ("20100290758") or ("20110293016") or ("20020039384") or ("20060233235") or ("8718137") or ("8300688") or ("20070147789") or ("20020118953") or ("7072571") or ("20060018378") or ("20060120463") or ("20130279579") or ("7800690") or ("8374236") or ("8279939") or ("20090034627") or ("20130114715") or ("8098729") or ("20010036230") or ("20100104022") or ("20120069905") or ("20100027897") or ("5767799") or ("20100027971") or ("20060126728") or ("20140010294") or ("6650705") or ("8345749") or ("20130064299") or ("20060034372") or ("20070189377") or ("20090268816") or ("20060203918") or ("7333542") or ("7835440") or ("20100061447") or ("6370192") or ("20060233263") or ("20120219061") or ("20050169377") or ("7333715") or ("20120063517") or ("20070052847") or

("20020136297") or ("6125143") or ("20110255594") or ("7020202") or ("20140233640")).PN. or (("6980732") or ("8532468") or ("8290057") or ("20100195735") or ("20020181597") or ("8233709") or ("7421127") or ("7068847") or ("20130070846") or ("7424203") or ("8270492") or ("20060078056") or ("7035337") or ("20060233256") or ("20040218668") or ("7646812") or ("6944226") or ("7499495") or ("7369709") or ("20060227871") or ("8270493") or ("20080079743") or ("20140010516") or ("6697425") or ("20100080534") or ("20120320977") or ("20050084015") or ("6208745") or ("20060133499") or ("20120236115") or ("20070217297") or ("20020113898") or ("8355619") or ("20080247461") or ("20110199535") or ("20110150080") or ("5122873") or ("20060133477") or ("6870886") or ("8098738") or ("20040252982") or ("20120300843") or ("20080267299") or ("20090180550") or ("7787539") or ("6990146") or ("20060007298") or ("20050249202") or ("20090296808") or ("20020041632") or ("20020196858") or ("6345388") or ("7039108") or ("20080170624") or ("6850571") or ("20120076208") or ("20070160300") or ("6771823") or ("8036267") or ("20140294070") or ("8068541") or ("20020172505") or ("6885707") or ("5510840") or ("20120128070") or ("7970057") or ("20140301436") or ("20060140277") or ("20110150413") or ("20140146887") or ("20060233249") or ("20050074172") or ("8582663") or ("20040105499") or ("7054366") or ("20090074070") or ("8085851") or ("5574504") or ("7865062") or ("20060227872") or ("8406294") or ("7016419") or ("20030021345") or ("20130114741") or ("8442114") or ("20130010866") or ("8223842") or ("20070177812") or ("20060029283") or ("20070230574") or ("20060190625") or ("20070217296") or ("20140133556") or ("6240137") or ("7961786") or ("20020005909") or ("7697036") or ("20020163967") or ("20130156101") or ("8254455") or ("7646967") or ("5854858") or ("7602849") or ("20110228841") or ("20080250470") or ("8233541") or ("7580613") or ("20120207220") or ("6504576") or ("20110150084") or ("RE40415") or ("20030206584") or ("20100166060") or ("8634700") or ("20050025461") or ("20070223909") or ("7899121") or ("7477688") or ("6421144") or ("8369397") or ("20040091159") or ("7492820") or ("20070081814") or ("20080170793") or ("20100020866") or ("20090225869") or ("20070140355") or

		("4703361") or ("20100061464") or ("20100080294") or ("4689673")).PN. or (("20070189398") or ("20090180551") or ("20060029131") or ("20060133677") or ("20090129471") or ("20050058198") or ("20080062306") or ("8428124") or ("20120099648") or ("6456656") or ("20110274171") or ("8396124") or ("5715009") or ("7489342") or ("20140286416") or ("6198767") or ("8520736") or ("8903184") or ("8619854") or ("8774269") or ("20010013951") or ("8553777") or ("5515107") or ("20100322311") or ("RE42589") or ("20110299825") or ("20020154700") or ("8340510") or ("5767986") or ("7756205") or ("20140092964") or ("8184702") or ("20080056380") or ("20080019446") or ("20130034159") or ("7903737") or ("20030099293") or ("20090180553") or ("4743959") or ("20140010304") or ("5612900") or ("20080056379") or ("8422801") or ("20040218671") or ("20080137731") or ("5694173") or ("20080130756") or ("7746933") or ("20030021583") or ("5886794") or ("20050157798") or ("6321026") or ("20060146143") or ("20060029130") or ("6724434") or ("20070286281") or ("20140165125") or ("20100067577") or ("7227895") or ("20080205528") or ("6526178") or ("20140072030") or ("20140334556") or ("20060034371") or ("20100039555") or ("6385248") or ("20130034156") or ("20020060818") or ("6864997") or ("20030118243") or ("20090238264") or ("8165217") or ("20080205517") or ("20040252758") or ("20140294063") or ("20020001344") or ("20080056378") or ("7406124") or ("20010041054") or ("20060083299") or ("20080123972") or ("20070237222") or ("20060029132") or ("8194733") or ("20130101026") or ("8514936") or ("8811493") or ("20140092963") or ("6058362") or ("20020154696") or ("6987805") or ("20070171971") or ("6873368") or ("5596321") or ("20130182775") or ("20140098883") or ("20080137732") or ("7796690") or ("20040264578") or ("20080107401") or ("20120213287") or ("20070009039") or ("20130308711") or ("6690881") or ("6940906") or ("20140092961") or ("8625958") or ("20080187045") or ("7116714") or ("20080130740") or ("8611418") or ("20080123737") or ("6295089") or ("6914939") or ("20040218678") or ("8086087") or ("20110274180") or ("8625959") or ("20080151068") or ("7924919") or ("20080205516") or ("20050157936") or ("20090010331") or ("20050036549") or ("20070076801") or ("20050058197") or				

("20040190610") or ("20090245385") or ("20110075726")).PN. or (("20020080875") or ("20070147502") or ("20130003833") or ("8718132") or ("20100283869") or ("20040086040") or ("20080123736") or ("20050069039") or ("8265144") or ("20140362927") or ("8170111") or ("20030103604") or ("6148032") or ("8194143") or ("20130272430") or ("20130064284") or ("5502493") or ("20020176703") or ("8767822") or ("20050069210") or ("20050141620") or ("8532187") or ("6668018") or ("RE43238") or ("20060146934") or ("20010017974") or ("8711933") or ("RE43021") or ("20050147395") or ("20040202250") or ("20040218677") or ("20140294062") or ("20060039677") or ("20080304562") or ("7586985") or ("7477833") or ("6029126") or ("20050163478") or ("6625320") or ("8428139") or ("20120314776") or ("7391811") or ("7936823") or ("5691775") or ("20080130746") or ("20130279599") or ("8830262") or ("20050100318") or ("20130294522") or ("8660189") or ("20140286397") or ("8320459") or ("8774268") or ("6466623") or ("20130279589") or ("7660487") or ("8270469") or ("5819004") or ("7590294") or ("20050093869") or ("5331414") or ("RE43043") or ("7215871") or ("8179969") or ("20100008415") or ("RE33547") or ("20140161172") or ("20110064142") or ("20070183494") or ("7970058") or ("8195024") or ("20090074053") or ("20020071485") or ("8649434") or ("20020191116") or ("6101313") or ("8571107") or ("20090129470") or ("RE43111") or ("6522694") or ("20080212683") or ("6122321") or ("20020114392") or ("8335252") or ("20020181588") or ("20130070859") or ("7724818") or ("8036272") or ("8243824") or ("20140036033") or ("20110044386") or ("20020181945") or ("20120033730") or ("20090080534") or ("20070053665") or ("6856760") or ("20070064800") or ("20130315306") or ("20140092977") or ("20110274172") or ("20130223541") or ("7215706") or ("7813428") or ("5831688") or ("6141448") or ("8780998") or ("20070177519") or ("20120057635") or ("8009934") or ("7936821") or ("20110103470") or ("20050018915") or ("8340140") or ("5038389") or ("20130163660") or ("7688897") or ("20100266012") or ("5666461") or ("8553764") or ("7986731") or ("8249155") or ("20090116554") or ("7995649") or ("20080144057") or ("8638847") or ("20080002767") or ("20130016769") or ("20110026607") or ("20040146107") or

("7146056") or ("5991503") or ("6115689")).PN. or (("20030156198") or ("20140092976") or ("20070280350") or ("20140098881") or ("20030169933") or ("8526492") or ("20030108103") or ("20030086622") or ("20110268175") or ("20080219393") or ("8554061") or ("8755445") or ("20020001346") or ("20140105286") or ("20140133572") or ("20050078756") or ("20130089152") or ("20140003539") or ("5282049") or ("20140133578") or ("20140086333") or ("20020009141") or ("20070253486") or ("20140341278") or ("20110103471") or ("20130114680") or ("20080117988") or ("7804899") or ("20010005447") or ("20080095234") or ("20120093227") or ("20140133561") or ("8045622") or ("20070247549") or ("6957350") or ("5343250") or ("20040012510") or ("20050195899") or ("20040264937") or ("20080080621") or ("20140161181") or ("20090097551") or ("20080144711") or ("20100189181") or ("7263126") or ("20080131079") or ("4652935") or ("7706445") or ("20050100092") or ("8189680") or ("20110216826") or ("20080118218") or ("20060233246") or ("7400684") or ("20080144719") or ("20080118224") or ("7016337") or ("20070291841") or ("6539166") or ("20060192698") or ("20140133577") or ("8340190") or ("8446945") or ("20130266068") or ("20080123970") or ("8279928") or ("20140111614") or ("8160135") or ("8902976") or ("20070248163") or ("6940911") or ("8682089") or ("20090097555") or ("6826308") or ("8831107") or ("20060222069") or ("8644672") or ("20050147174") or ("20110081046") or ("5689307") or ("20100208827") or ("7864849") or ("7453938") or ("7860170") or ("6788227") or ("20120224635") or ("20140341275") or ("7995658") or ("20140301479") or ("6097439") or ("20110122943") or ("8804845") or ("20020044603") or ("20130114718") or ("20010022891") or ("5862140") or ("8615038") or ("8428143") or ("20080152007") or ("20130188743") or ("7936822") or ("8199832") or ("20130287110") or ("8073053") or ("20140269920") or ("7970056") or ("5526131") or ("20130202162") or ("20080063073") or ("6175592") or ("7864863") or ("20080317125") or ("7352877") or ("7593467") or ("20080144718") or ("4989089") or ("7224842") or ("20140198842") or ("20020154698") or ("5838874") or ("5940130") or ("8718139") or ("8229274") or ("6754440") or ("20140177711") or ("20120243603") or ("8760495") or

("7725008") or ("20050083218") or ("7142601")).PN. or (("20060146138") or ("6128340") or ("20110176562") or ("20130315299") or ("20120189054") or ("8085842") or ("20020031184") or ("RE40079") or ("8559505") or ("7593433") or ("20130235152") or ("20120243604") or ("20060083303") or ("7728878") or ("20040218816") or ("20050152458") or ("6421749") or ("20100310155") or ("4369464") or ("8155460") or ("8731374") or ("8442119") or ("8571108") or ("7206347") or ("6665345") or ("7728877") or ("20120224628") or ("8189658") or ("20090010337") or ("20130182774") or ("20140185681") or ("20040146108") or ("8325816") or ("20090116558") or ("20040125204") or ("20070286577") or ("8655087") or ("8428118") or ("8144765") or ("7760803") or ("5913031") or ("20110058793") or ("20090051808") or ("8837594") or ("20130329956") or ("20030194140") or ("6356667") or ("20090034633") or ("5793425") or ("5703646") or ("20020051493") or ("7961791") or ("20080166059") or ("8369400") or ("8331434") or ("20080089410") or ("20100086059") or ("20130336384") or ("8270819") or ("20060029365") or ("7953282") or ("6424795") or ("20130089265") or ("20020110197") or ("20080232473") or ("7197072") or ("6917310") or ("20060133479") or ("8355439") or ("20100080293") or ("20110286513") or ("20080192830") or ("20040027452") or ("20060222068") or ("7852353") or ("6014171") or ("20100046635") or ("7961785") or ("5737023") or ("20090279608") or ("8073313") or ("7995896") or ("20120229670") or ("20120263225") or ("20020141503") or ("20080285644") or ("6498814") or ("7801411") or ("20140086342") or ("20020157102") or ("5861905") or ("8290062") or ("20070104270") or ("20020037111") or ("6256346") or ("20070189382") or ("20050180505") or ("6339617") or ("6944224") or ("5691767") or ("20030007556") or ("20140362921") or ("20060074692") or ("20080069209") or ("20090244392") or ("20110249749") or ("20080069226") or ("20100220789") or ("20070121722") or ("20100208799") or ("20100080472") or ("6404814") or ("20100091845") or ("20140079117") or ("6201927") or ("7933335") or ("20100135395") or ("20060120610") or ("20060133484") or ("6608935") or ("6021199") or ("20040008766") or ("5815604") or ("6192154") or ("20090190655") or ("20130163674") or ("20090060034") or ("20070198931") or

		("20060013311") or ("6028634")).PN. or (("20100091843") or ("5974185") or ("20130188738") or ("20120189219") or ("8619852") or ("5825927") or ("20060098215") or ("7787540") or ("20130182769") or ("20090129467") or ("20040119842") or ("5532752") or ("20080151991") or ("20020118760") or ("20120044322") or ("8165392") or ("6339659") or ("8306119") or ("8170108") or ("20040184531") or ("6600783") or ("8526489") or ("7864841") or ("7660356") or ("5452006") or ("8275033") or ("8331438") or ("20100172593") or ("6941020") or ("20130336399") or ("6922442") or ("20140192886") or ("20110249743") or ("20140119450") or ("20130343459") or ("20050207501") or ("20130279564") or ("8073059") or ("8611427") or ("20070274384") or ("7079580") or ("7483488") or ("6519285") or ("20060256860") or ("20130235927") or ("20130272398") or ("6775326") or ("20040047417") or ("20140079115") or ("20130315311") or ("5686965") or ("7039112") or ("20070183755") or ("20020061143") or ("20070116126") or ("20140140414") or ("5727091") or ("6549671") or ("8155206") or ("8520729") or ("20090310680") or ("20050063471") or ("8467454") or ("20100080292") or ("20100158116") or ("8542746") or ("20090116555") or ("8526491") or ("8401076") or ("6996282") or ("6845129") or ("20120300850") or ("8369409") or ("20080043831") or ("20060285592") or ("6263150") or ("6091855") or ("20030012276") or ("6674802") or ("8417088") or ("20090190844") or ("20080101473") or ("7817899") or ("6236760") or ("20140362922") or ("20090046092") or ("20060146141") or ("20090296811") or ("8300700") or ("8194734") or ("8054885") or ("7742523") or ("7333515") or ("8150182") or ("20020046308") or ("7782950") or ("7986847") or ("5818531") or ("20080196061") or ("7680182") or ("20130077821") or ("7782948") or ("6614935") or ("20110280303") or ("6549668") or ("6529550") or ("20050008240") or ("20020006273") or ("20140119671") or ("4743965") or ("20070177677") or ("20060133503") or ("20060082474") or ("6057884") or ("7782947") or ("8681872") or ("8259800") or ("20100111169") or ("20070098301") or ("20060088094") or ("20080253447") or ("7782943") or ("6931064") or ("20050089102") or ("20130279575") or ("7974340") or ("20050047506") or ("20130182766") or ("20090168880") or ("20100303151") or ("20100074334") or ("7627034") or ("6456663")).PN. or				

		((("7065141") or ("6182034") or ("20090010332") or ("5533138") or ("6560283") or ("6148140") or ("5974224") or ("20050147375") or ("20110019084") or ("20100220781") or ("8090025") or ("20110019747") or ("20050041742") or ("8559523") or ("20070030911") or ("20060115001") or ("8897376") or ("20130287090") or ("7944966") or ("8699569") or ("20140098891") or ("20050123056") or ("20040252981") or ("20140321530") or ("20070296826") or ("20050201471") or ("20090147847") or ("7782949") or ("8644386") or ("6535557") or ("8798162") or ("20030007559") or ("RE44091") or ("5703966") or ("8477838") or ("20060222070") or ("20060210184") or ("5477397") or ("5821986") or ("6584273") or ("7515631") or ("20120230394") or ("8199834") or ("20030184453") or ("20120287987") or ("8306112") or ("6628712") or ("20050254649") or ("20100103297") or ("5929914") or ("8041194") or ("20070291840") or ("7782946") or ("8432972") or ("4827339") or ("20080008453") or ("20080152241") or ("20060165182") or ("8184690") or ("20040047423") or ("6829373") or ("20140092966") or ("RE43686") or ("6219381") or ("20130272407") or ("8780973") or ("8014448") or ("6366615") or ("20090175355") or ("8170100") or ("7474841") or ("5798796") or ("6904094") or ("6999673") or ("20130182760") or ("20130114702") or ("RE40679") or ("6078617") or ("5754698") or ("5828788") or ("8542933") or ("7978766") or ("20070041444") or ("20070019925") or ("20080205852") or ("20090010553") or ("20100091885") or ("20070109409") or ("8358702") or ("20120294362") or ("8320462") or ("8854486") or ("20080123751") or ("8811483") or ("5668598") or ("20140328414") or ("8457207") or ("6385243") or ("20090219994") or ("8315475") or ("7092576") or ("5523793") or ("20090316782") or ("20080069246") or ("7671894") or ("20100091883") or ("20070110154") or ("20120320986") or ("20140362911") or ("20090022412") or ("20110150082") or ("7542510") or ("7710462") or ("6650708") or ("20130243103") or ("8300694") or ("20060268982") or ("20060239636") or ("20110261888") or ("20040263361") or ("20100027659") or ("20100027682") or ("20130188686") or ("20080240250") or ("20130148731") or ("20050041734") or ("20080123738") or ("20020101928") or ("20020154886") or ("8644628") or ("20070217513") or ("20030058946")).PN. or (("20140098858") or ("20110150083")				

or ("20010001614") or ("20140098860") or ("6810154") or ("7495704") or ("8326064") or ("20140105302") or ("20100026883") or ("20100027660") or ("20100027653") or ("7295767") or ("6314188") or ("20100026882") or ("20100272188") or ("20080175491") or ("20060114993") or ("7136415") or ("20040202372") or ("20040066851") or ("20100027654") or ("8345745") or ("8823821") or ("20060262651") or ("6067320") or ("20100026884") or ("20080285938") or ("7280708") or ("20100316360") or ("20100316362") or ("20100316135") or ("8165212") or ("6501862") or ("8160153") or ("20140085418") or ("20100316136") or ("20070297505") or ("5986707") or ("6408030") or ("7970053") or ("6553072") or ("20050013372") or ("20120039386") or ("20090304292") or ("8218623") or ("20120063695") or ("20070030356") or ("20100164995") or ("7822279") or ("20140247883") or ("8576920") or ("20050185719") or ("20130128959") or ("7873224") or ("8229004") or ("6256608") or ("20090010338") or ("20050185715") or ("8031768") or ("8295348") or ("8817887") or ("20020101921") or ("8155461") or ("20020110195") or ("5847763") or ("20030156640") or ("8396116") or ("7782944") or ("20040223549") or ("6393197") or ("20120195376") or ("20030231863") or ("20070171986") or ("8565319") or ("6025886") or ("20110150331") or ("20110019744") or ("20040008893") or ("20140079119") or ("20070268971") or ("20140092978") or ("8374248") or ("8467446") or ("20130322535") or ("20100316361") or ("20040120403") or ("20130039415") or ("8014619") or ("8472518") or ("20080159636") or ("8428144") or ("20030215012") or ("6665340") or ("6415055") or ("8085850") or ("7532670") or ("20040105501") or ("7558319") or ("20040008788") or ("20120026288") or ("8902975") or ("20130215291") or ("20100329337") or ("8750390") or ("8139637") or ("6850567") or ("20110026606") or ("8300690") or ("20090168894") or ("20080219347") or ("6332003") or ("20100020870") or ("8477837") or ("20070291849") or ("20130156104") or ("20100128787") or ("20080199147") or ("6839386") or ("5751888") or ("20040013202") or ("7792190") or ("20110194619") or ("20020186769") or ("20070189385") or ("20050008079") or ("5737019") or ("20100296585") or ("20060271990") or ("6658057") or ("7782945")).PN. or (("7970054") or ("20060048193") or ("20140233653") or ("20120269266") or ("20140294088") or ("20080152313") or

("8611688") or ("6621979") or ("20090232199") or ("20110032856") or ("20100013948") or ("8483273") or ("5946040") or ("7006576") or ("20080260034") or ("7263125") or ("6052384") or ("20070269182") or ("20070206917") or ("20060098952") or ("8494044") or ("8571113") or ("8184694") or ("20090180532") or ("8670626") or ("5838678") or ("20120147968") or ("20100128778") or ("20060133498") or ("20070076794") or ("7933327") or ("20140056356") or ("20070081731") or ("20140269919") or ("20080240590") or ("7469011") or ("20120183060") or ("20110051809") or ("8331440") or ("6741651") or ("8364019") or ("8218640") or ("20080075168") or ("20120224641") or ("20110142138") or ("20080175326") or ("7760802") or ("20070223575") or ("8488891") or ("20100215100") or ("5832120") or ("20050201461") or ("8340173") or ("20080310739") or ("5414527") or ("20040240560") or ("8494043") or ("8548261") or ("5774206") or ("7551835") or ("20070014346") or ("20090262803") or ("20030174770") or ("20140192903") or ("20140092959") or ("20130003862") or ("20140153640") or ("20140016697") or ("20030190059") or ("20080212682") or ("20140241439") or ("5847771") or ("20050105618") or ("20050190845") or ("8554002") or ("20100027664") or ("7302001") or ("20140098853") or ("20050094728") or ("20130077880") or ("20120201304") or ("20100091884") or ("5003377") or ("20130135431") or ("6665344") or ("8817872") or ("8391622") or ("20070092145") or ("20060159176") or ("20070147494") or ("20080069528") or ("20060239359") or ("20010046263") or ("8462844") or ("6633676") or ("20030169931") or ("20100246684") or ("20090214178") or ("20060055798") or ("20130201279") or ("7127110") or ("20090060040") or ("6240380") or ("4727421") or ("6539120") or ("20040218672") or ("8611419") or ("20050111544") or ("20030206588") or ("20050195897") or ("20140218473") or ("20040066854") or ("6020934") or ("20130235936") or ("8184698") or ("5668599") or ("20120099649") or ("5543847") or ("20120050475") or ("20070086518") or ("8494045") or ("6377748") or ("20110142130") or ("6229849") or ("20130322544") or ("6011869") or ("20140185673") or ("8150163") or ("20080037637")).PN. or (("20120201308") or ("5878166") or ("20080019398") or ("20040213551") or ("8532412") or ("20060159174") or ("8270482") or ("8401085") or

		("20090141808") or ("20130142256") or ("20110216837") or ("20060259536") or ("7881387") or ("6373905") or ("8411744") or ("20140126640") or ("20110002397") or ("20080232470") or ("7020284") or ("20140010469") or ("8699583") or ("6438139") or ("6608867") or ("8401077")).PN.				
L23	18	(("20110176604") or ("20140140407") or ("6792045") or ("20010010707") or ("20130163673") or ("20130182776") or ("20130170558") or ("20130163676") or ("20110007823") or ("20070263731") or ("6785464") or ("20110229046") or ("6483945") or ("20070116130") or ("20110002382") or ("20060262861") or ("7715477") or ("7656950")).PN.	US-PGPUB; USPAT	OR	OFF	2014/12/15 15:07
L24	13	l23 and resolution	US-PGPUB; USPAT	OR	ON	2014/12/15 15:07
L25	13	l24 and resolution	US-PGPUB; USPAT	OR	ON	2014/12/15 15:11
L26	321	l22 and ((encod$4 or cod$4) with ((low or standard) near2 resolution))	US-PGPUB; USPAT	OR	ON	2014/12/15 15:12
L27	224	l22 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 15:13
L30	468	l22 and (control$4 with reference) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:18
L31	180	l22 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:18
L32	1865	(H04N19/00436 OR H04N19/00472 OR H04N19/00521 OR H04N19/00757 OR H04N19/00781 OR H04N19/00884 OR H04N19/0089).CPC.	US-PGPUB; USPAT; USOCR	OR	ON	2014/12/15 16:46
L34	9750	375/240.12,240.18,E7.243,E7.226.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/15 16:46
L36	35	l32 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:46
L37	8	l32 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:46
L38	267	l34 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:46
L39	378	l34 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:46
L40	8054	(H04N19/00436 OR H04N19/00472 OR H04N19/00521 OR H04N19/00757 OR H04N19/00781 OR H04N19/00884 OR H04N19/0089).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/12/15 16:47
L41	8	l40 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:47
L42	35	l40 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT	OR	ON	2014/12/15 16:47

12/15/2014 4:48:31 PM
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Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
12995039	SAKAZUME, SATORU
Examiner	**Art Unit**
ANA PICON-FELICIANO	2482

CPC						
Symbol					**Type**	**Version**
H04N		19	/	59	F	2014-11-01
H04N		19	/	70	I	2014-11-01
H04N		19	/	61	I	2014-11-01
H04N		19	/	80	I	2014-11-01
H04N		19	/	33	I	2014-11-01
H04N		19	/	436	I	2014-11-01
H04N		19	/	40	I	2014-11-01
			/			
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			/			
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			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

/ANA PICON-FELICIANO/ Examiner.Art Unit 2482	12/30/2014	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	3	
/CHRISTOPHER S KELLEY/ Supervisory Patent Examiner.Art Unit 2482	01/05/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	7	13

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	**Art Unit**
	ANA PICON-FELICIANO	2482

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
375	240.120	H	0	4	N	7 / 12 (2006.0)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
375	240.18	E07.243	E07.226		

/ANA PICON-FELICIANO/ Examiner.Art Unit 2482	12/30/2014	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	3	
/CHRISTOPHER S KELLEY/ Supervisory Patent Examiner.Art Unit 2482	01/05/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	7	13

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	**Art Unit**
	ANA PICON-FELICIANO	2482

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17												
	2		18												
	3		19												
	4		20												
	5		21												
	6		22												
1	7		23												
2	8		24												
3	9		25												
	10		26												
	11														
	12														
	13														
	14														
	15														
	16														

/ANA PICON-FELICIANO/ Examiner.Art Unit 2482 (Assistant Examiner)	12/30/2014 (Date)	**Total Claims Allowed:** 3	
/CHRISTOPHER S KELLEY/ Supervisory Patent Examiner.Art Unit 2482 (Primary Examiner)	01/05/2015 (Date)	O.G. Print Claim(s) 7	O.G. Print Figure 13

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1892	(H04N19/00436 OR H04N19/00472 OR H04N19/00521 OR H04N19/00757 OR H04N19/00781 OR H04N19/00884 OR H04N19/0089).CPC.	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:35
L2	9786	375/240.12,240.18,E7.243,E7.226.ccls.	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:36
L3	35	l1 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:36
L4	8	l1 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:36
L5	267	l2 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:37
L7	378	l2 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:38
L8	1892	(H04N19/00436 OR H04N19/00472 OR H04N19/00521 OR H04N19/00757 OR H04N19/00781 OR H04N19/00884 OR H04N19/0089).CPC.	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:38
L9	8	l8 and ((encod$4 or cod$4) with ((low or standard) near2 resolution)) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:38
L11	35	l8 and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:39
L12	44	((encod$4 or cod$4) with ((low or standard) near2 resolution)) and ((control$4 with reference) same predict$4) and @ad<"20080530"	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:39
L13	97	video and (superresolution or super-resolution) and (scalable or scalability) and enhancement and base	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:40
L14	1	(super$1resolution near2 (enlarger and converter)) and encoder and (first near2 resolution) and (second near2 resolution)	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:40

L15	60	super$1resolution and encoder and (first near2 resolution) and (second near2 resolution)	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:40
L16	97	video and (superresolution or super-resolution) and (scalable or scalability) and enhancement and base	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:40
L17	1	(pixel near2 insert$4) and filter$4 and (pixel near2 thin$4) and resolution and position$$ and interpolat$4 and enlarg$6 and repetition	US-PGPUB; USPAT; UPAD	OR	ON	2014/12/30 18:41

12/30/2014 6:41:56 PM
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12995039	SAKAZUME, SATORU
	Examiner	Art Unit
	ANA PICON-FELICIANO	2482

CPC- SEARCHED		
Symbol	Date	Examiner
H04N	1/16/2014	AP
H04N(Update)	5/1/2014	AP
H04N(Search Update)	12/15/2014	AP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
H04N 7/50,7/26244,7/26271,7/26015,7/26031,19/00436,19/00472,19/00521,19/00757,19/00781,19/00884,19/0089	1/16/2014	AP
H04N 19/00436,19/00472,19/00521,19/00757,19/00781,19/00884,19/0089(Update)	5/1/2014	AP
H04N 19/00436,19/00472,19/00521,19/00757,19/00781,19/00884,19/0089(Update)	12/15/2014	AP

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	240.12,240.18,E7.243,E7.226	7/23/2013	AP
375	240.12,240.18,E7.243,E7.226(Update)	5/1/2014	AP
375	240.12,240.18,E7.243,E7.226(Update)	12/15/2014	AP

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search on USPC class/subclass	7/23/2013	AP
EAST Search on Assignee	8/28/2013	AP
EAST Search on Inventor	8/29/2013	AP
EAST Search on CPC class/subclass	1/16/2014	AP
EAST Search on keywords	1/24/2014	AP
Consulted Christopher Kelley (SPE Art Unit 2482)	9/10/2013	AP
Consulted Christopher Kelley (SPE Art Unit 2482)	4/29/2014	AP
EAST Search Update on classifications	5/1/2014	AP

SEARCH NOTES		
Search Notes	**Date**	**Examiner**
Consulted Christopher Kelley(SPE Art Unit 2482)	5/7/2014	AP
EAST Search on classifications and keywords	12/15/2014	AP
EAST Search on classifications and keywords	12/30/2014	AP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
375	240.12,240.18,E7.243,E7.226	12/30/2014	AP
H04N	19/00436,19/00472,19/00521,19/00757,19/00781,19/00884,19/0089	12/30/2014	AP

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

20529 7590 01/22/2015
NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

TITLE OF INVENTION: MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	04/22/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
PICON-FELICIANO, ANA J	2482	375-240120

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Nath, Goldberg & Meyer
2 Jerald L. Meyer
3 Stanley N. Protigal

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: JVC KENWOOD CORPORATION

(B) RESIDENCE: (CITY and STATE OR COUNTRY): YOKOHAMA-SHI, KANAGAWA, JAPAN

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☒ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Jerald L. Meyer/ Date April 21, 2015

Typed or printed name Jerald L. Meyer Registration No. 41,194

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	12995039
Filing Date:	29-Nov-2010
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND
First Named Inventor/Applicant Name:	Satoru Sakazume
Filer:	Stanley Protigal/Amanda Suazo
Attorney Docket Number:	31181U

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	22112843
Application Number:	12995039
International Application Number:	
Confirmation Number:	7504
Title of Invention:	MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYTEM, MOVING PICTURE REENCODING METHOD, AND
First Named Inventor/Applicant Name:	Satoru Sakazume
Customer Number:	20529
Filer:	Stanley Protigal/Amanda Suazo
Filer Authorized By:	Stanley Protigal
Attorney Docket Number:	31181U
Receipt Date:	21-APR-2015
Filing Date:	29-NOV-2010
Time Stamp:	15:32:17
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$960
RAM confirmation Number	2065
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		312Amendment.pdf	29598 155c8aa380335ba3aa98759238de02422b068eea	yes	4

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment after Notice of Allowance (Rule 312)	1	1
Specification	2	2
Applicant Arguments/Remarks Made in an Amendment	3	4

Warnings:

Information:

2	Issue Fee Payment (PTO-85B)	IFPayment.pdf	121203 4aab2274d1afdc95bb2174dc9b26d09e396c2fa3	no	1

Warnings:

Information:

3	Fee Worksheet (SB06)	fee-info.pdf	30725 a3fcceb6a1032a0c232b945e45c7b8e65ca23c2e	no	2

Warnings:

Information:

Total Files Size (in bytes):	181526

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Mail Stop ISSUE FEE
Attorney Docket No.: 31181U

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Satoru SAKAZUME		Conf. No.:	7504
Appl. No.:	12/995,039	Examiner:	Ana J. PICON-FELICIANO
Filing Date:	November 29, 2010	Art Unit:	2482

Title: **MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM**

AMENDMENT AFTER ALLOWANCE UNDER 37 C.F.R. § 1.312

Commissioner for Patents
Attn: Examiner Aronovich
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Examiner Aronovich:

In response to the Notice of Allowance, mailed on January 22, 2015, applicant respectfully requests this amendment be considered to correct a typographical error in the specification. Prior to payment of the Issue Fee, please enter the following changes:

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

A **Conclusion** appears at page 4 of this paper.

AMENDMENTS TO THE SPECIFICATION:

Please amend paragraph [0122] as follows:

In Fig. 10, there is a first encoder 102 including a first predictor 402, a first encoder element 403, a first decoder element 404, an intra-predictor 405, a first predictive picture buffer 406, a first reference picture buffer 407, a motion estimator 408, a motion compensator 409, an adder 410, and a deblocker 411. This configuration affords to implement an equivalent function to MPEG-4 AVC specified to standardize under the ISO/IEC SC29 WG11 as a typical motion picture encoding. However, this specific configuration of the first encoder 102 is an example, so there may well be any example else subject to functions of the first encoder 102 to be implemented. For instance, there may be an example compliant with MPEG-2 employed in digital broadcasting or the like, or an example compliant with MPEG-4 SVC being a scalable extension of MPEG-4 AVC. There may be use of a pre-super-resolution encoder element based on a wavelet transform, as typified by ~~JPRG2000~~ JPEG2000.

Mail Stop ISSUE FEE
Attorney Docket No.: 31181U

REMARKS

The above amendment to the specification has been made to correct a typographical error .

No new matter has been added.

Accordingly, the Examiner is respectfully requested to enter the above amendment before the payment of the Issue Fee.

Favorable consideration is respectfully requested.

CONCLUSION

The Examiner is welcomed to telephone the undersigned attorney if any questions or comments should arise.

Respectfully submitted,

NATH, GOLDBERG & MEYER

Date: April 21, 2015

/Jerald L. Meyer/

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Customer No. 20529

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	11/29/2010	Satoru Sakazume	31181U	7504

20529 7590 04/30/2015

NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

EXAMINER	
PICON-FELICIANO, ANA J	

ART UNIT	PAPER NUMBER
2482	

NOTIFICATION DATE	DELIVERY MODE
04/30/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@nathlaw.com

Response to Rule 312 Communication	Application No.	Applicant(s)
	12/995,039	SAKAZUME, SATORU
	Examiner	Art Unit
	ANA PICON-FELICIANO	2482

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

1. ☒ The amendment filed on *21 April 2015* under 37 CFR 1.312 has been considered, and has been:

   a) ☒ entered.

   b) ☐ entered as directed to matters of form not affecting the scope of the invention.

   c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
   Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

   d) ☐ disapproved. See explanation below.

   e) ☐ entered in part. See explanation below.

/CHRISTOPHER S KELLEY/ Supervisory Patent Examiner, Art Unit 2482	/ANA PICON-FELICIANO/ Examiner, Art Unit 2482

OK TO ENTER: /A.F./

04/23/2015

Mail Stop ISSUE FEE
Attorney Docket No.: 31181U

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Satoru SAKAZUME		Conf. No.:	7504
Appl. No.:	12/995,039	Examiner:	Ana J. PICON-FELICIANO
Filing Date:	November 29, 2010	Art Unit:	2482

Title: **MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM, MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD, AND MOVING PICTURE REENCODING PROGRAM**

AMENDMENT AFTER ALLOWANCE UNDER 37 C.F.R. § 1.312

Commissioner for Patents
Attn: Examiner Aronovich
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Examiner Aronovich:

In response to the Notice of Allowance, mailed on January 22, 2015, applicant respectfully requests this amendment be considered to correct a typographical error in the specification. Prior to payment of the Issue Fee, please enter the following changes:

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/995,039	05/26/2015	9042448	31181U	7504

20529 7590 05/06/2015

NATH, GOLDBERG & MEYER
Joshua Goldberg
112 South West Street
Alexandria, VA 22314

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 1099 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Satoru Sakazume, Kanagawa-ken, JAPAN;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.