

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Iourcha et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	ATI-060057-US-CNT	

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	1	5051840		1991-09-24	Watanabe et al.	
	2	5384643	A	1995-01-24	Inga et al.	
	3	5420639	A	1995-05-30	Perkins, Michael G.	
	4	5455680	A	1995-10-03	Shin, Jae-Sub	
	5	5535290	A	1996-07-09	Allen, James D.	
	6	5692012	A	1997-11-25	Virtamo et al.	
	7	5768434	A	1998-06-16	Ran, Xiaonong	
	8	5956431	A	1999-09-21	Iourcha et al.	

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9	5946417	A	1999-08-31	Bonneau et al.	
10	6031939	A	2000-02-29	Gilbert et al.	
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16	6975773	B1	2005-12-13	Govindaswamy et al.	
17	7039244	B2	2006-05-02	Hong et al.	
18	7388993	B2	2008-06-17	Govindaswamy et al.	

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	1	20030053706	A1	2003-03-20	Hong, Zhou et al.	
	2	20040081357	A1	2004-04-29	Oldcorn, David et al.	
	3	20040126031	A1	2004-07-01	Dwyer et al.	
	4	20040228527	A1	2004-11-18	Iourcha et al.	
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	7	20060074935	A1	2006-04-06	Zimmerer, Peter K.	
	8	20030035477	A1	2003-02-20	Sekiguchi Shunichi et al.	

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1	2 274 754	GB		1994-08-03	Samsung Electronics Co. Ltd.		
2	99 018537	WO		1999-04-15	S3 Incorporated		
3	1672177	CN	A	2005-09-21	Govindaswamy et al.		

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NON-PATENT LITERATURE DOCUMENTS

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	Search Report and Written Opinion for International Application No. PCT/US2007/018965 mailed April 10, 2008 (12 pages)	
	2	Examination Report, dated October 14, 2009, for European Patent Appln. No. 07811591.2 (4 pages)	
	3	Notification of the First Office Action, dated June 28, 2010, for Chinese Patent Appln. No. 200780030887.7 (7 pages)	
	4	Notification of the Second Office Action, dated November 14, 2011, for Chinese Patent Appln. No. 200780030887.7 (9 pages)	
	5	Masayuki Tanimoto, Hiroshi Ohyama, Tadahiko Kimoto, Sakae Katsuyama and Toshiaki Fuji; "A New Fractal Image Coding Scheme Employing Blocks of Variable Shapes"; September 1996; in Proceedings ICIP-96 (IEEE International Conference on Image Processing; 137-140).	
	6	Kauff et al., "Functional Coding of Video Using a Shape-Adaptive DCT Algorithm and an Object-Based Motion Prediction Toolbox", IEEE Transactions on Circuits and Systems for Video Technology, Vol. 7, No. 1, February 1997; 181-196	

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7	Leonid Levkovich, Maslyuk et al., "Texture Compression with Adaptive Block Partitions", pp. 401-403. Proceedings of the 8th ACM International Conference on Multimedia (2000)
8	Ying, Tang et al.; "Importance-Driven Texture Encoding Based on Samples", IEEE, June 22, 2005, pp. 169-176
9	Kirenko, Ihor, "Reduction of Coding Artifacts Using Chrominance and Luminance Spatial Analysis", IEEE, 2006; 209-210
10	"Intra coding Core Experiment proposal for MPEG-4 Video"; 34, Puri et al.; MPEG Meeting; 25-03-1996; Florence; Firenze; (MOTION PICTURE EXPERT GROUP OR ISO/IEC JTC1/SC29/WG11); no. M077, 21 March 1996 (1996-03-21), XP030030171, ISSN: 0000-0332
11	Eckert et al., "Perceptual quality metrics applied to still image compression", December 1998, Signal Processing 70, 177-200
12	Cosman et al., Evaluating Quality of Compressed Medical Images: SNR, Subjective Rating, and Diagnostic Accuracy, PROCEEDINGS OF THE IEEE, VOL. 82, NO. 6, JUNE 1994, pgs. 919-932
13	Stasidski et al., A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression, Dec. 1999; pgs. 16-34
14	Belloulata et al., REGION-BASED IMAGE COMPRESSION USING FRACTALS AND SHAPE-ADAPTIVE DCT, Dec. 1999, pgs. 815-819

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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.

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Signature	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2019-01-25
Name/Print	Joseph P. Gushue	Registration Number	59819

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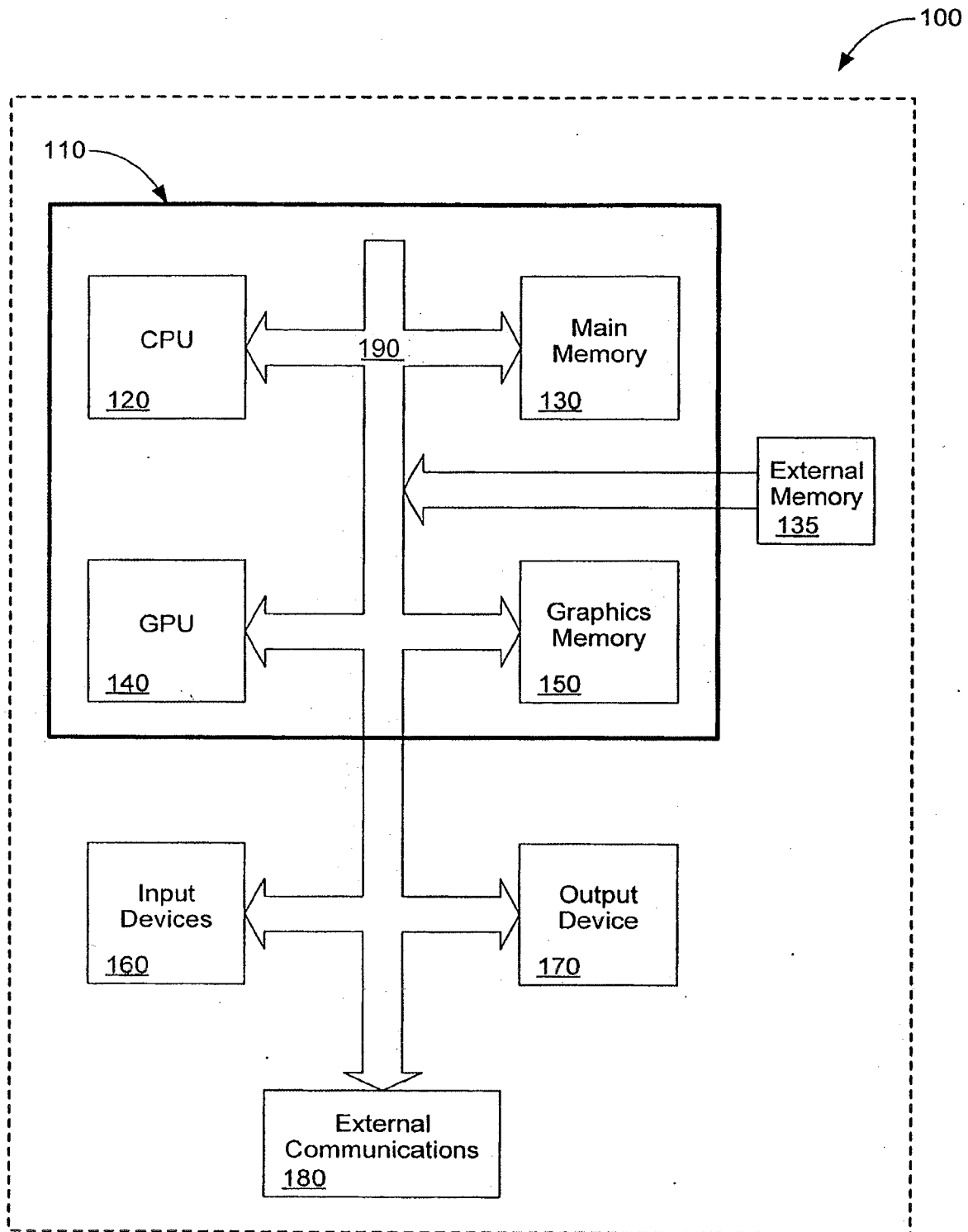
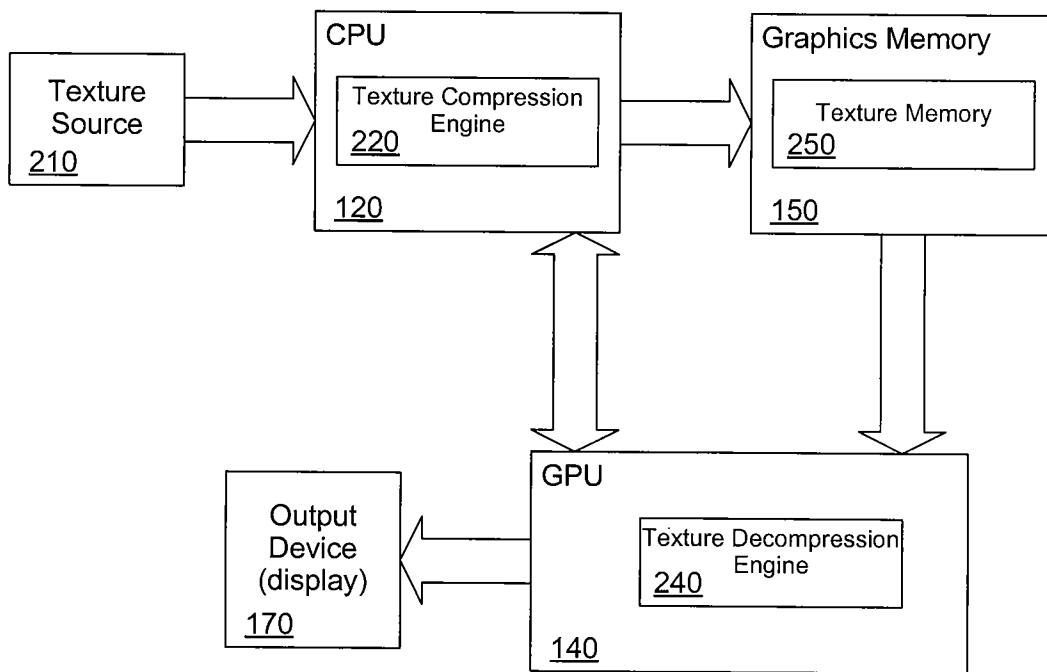
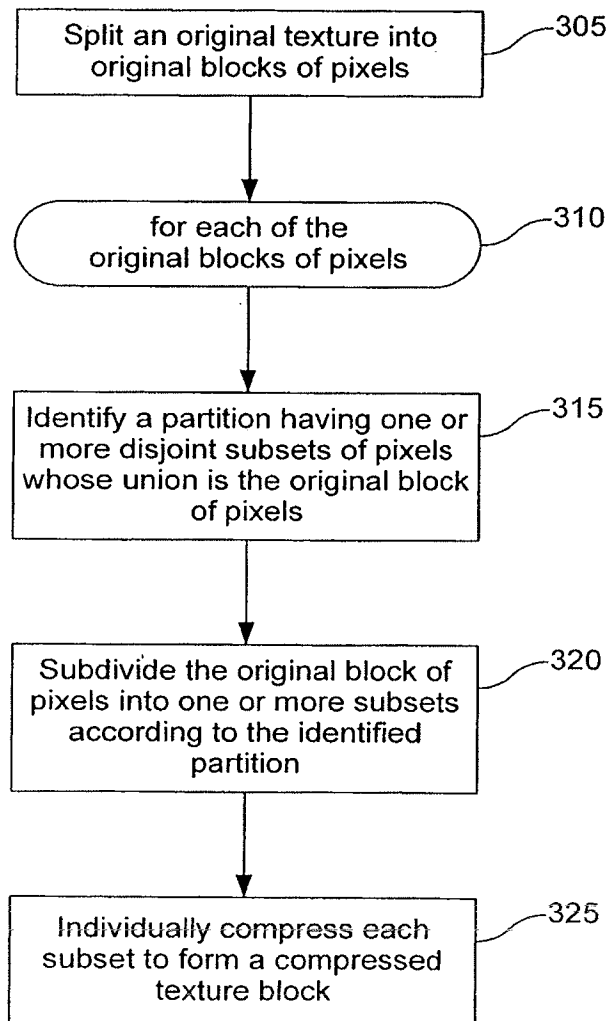


FIG. 1

**FIG. 2**

**FIG. 3A**

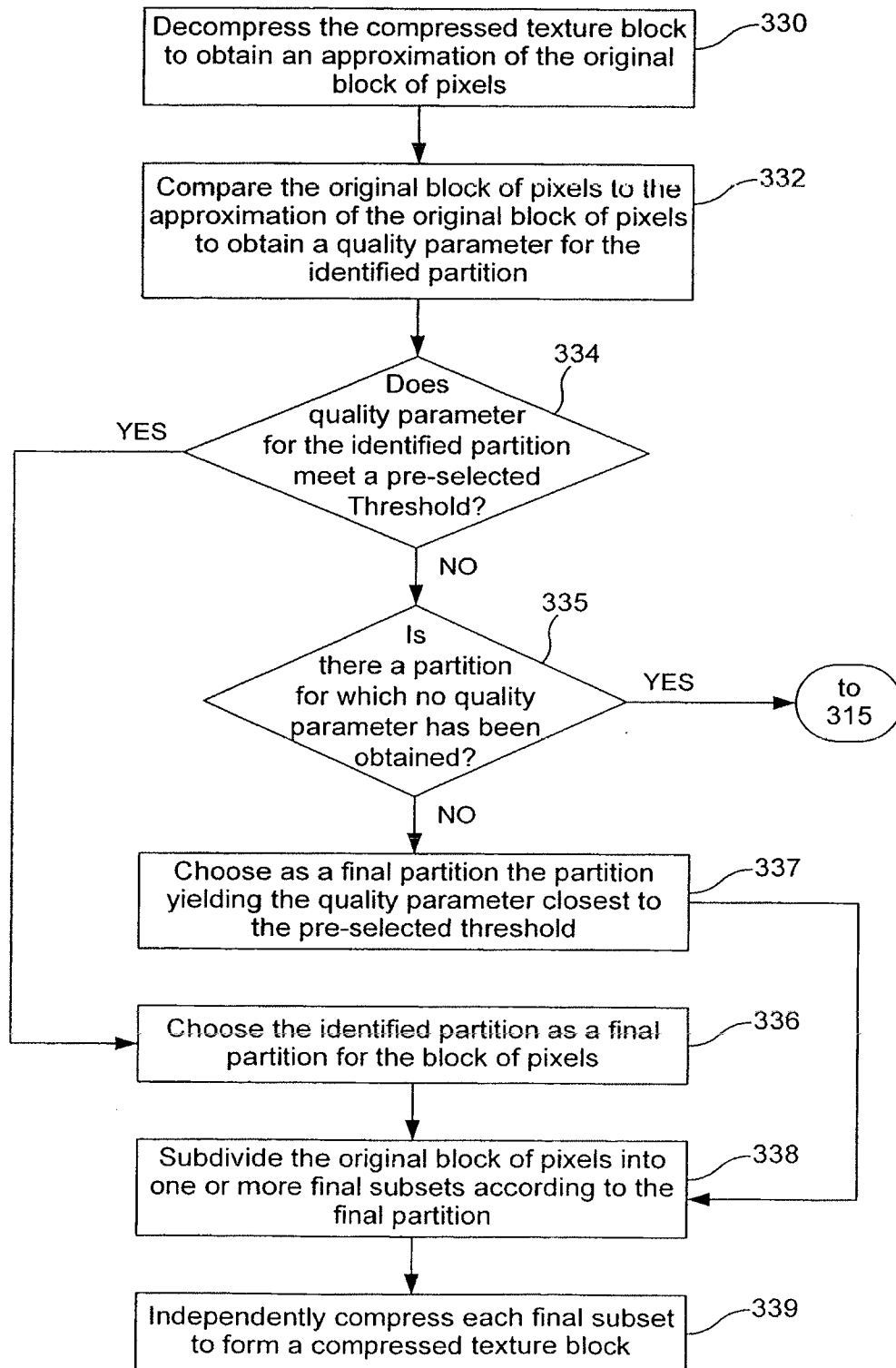


FIG. 3B

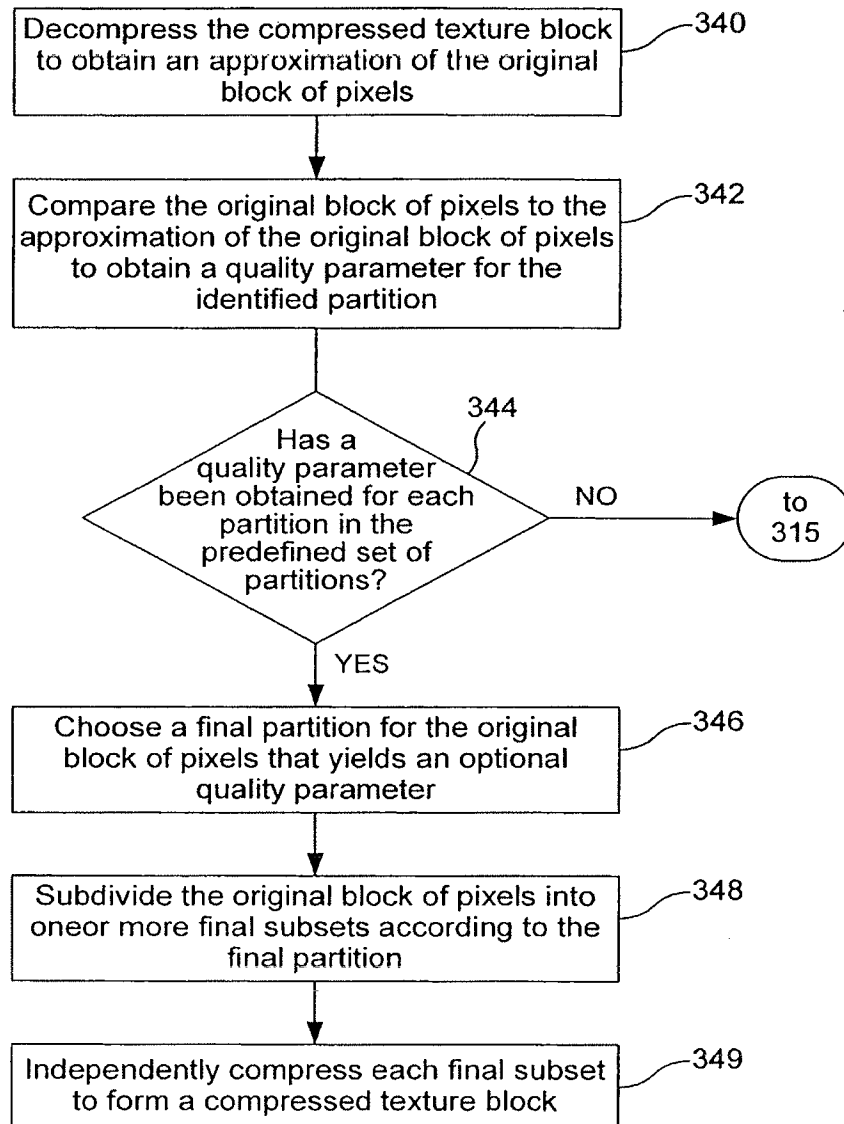


FIG. 3C

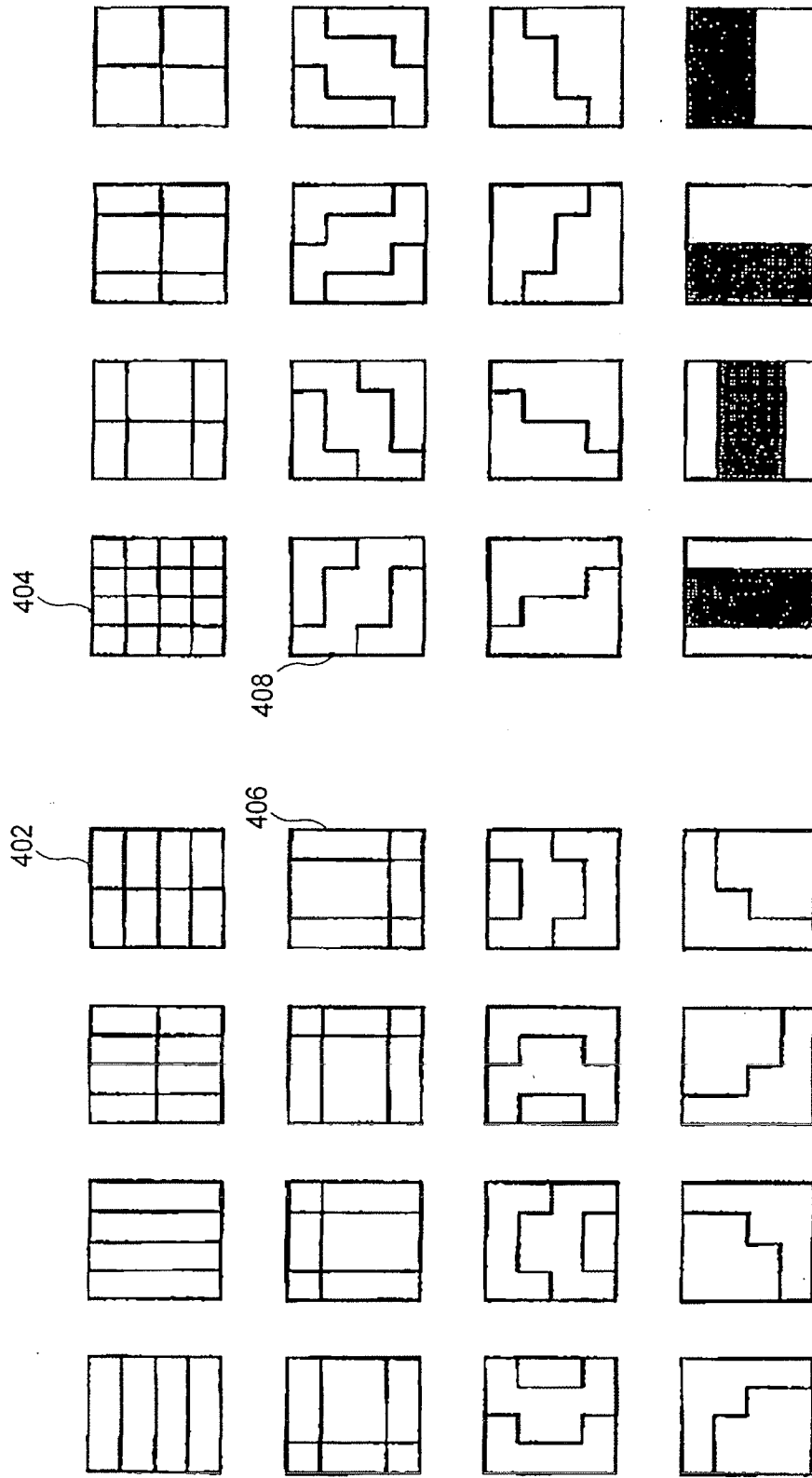
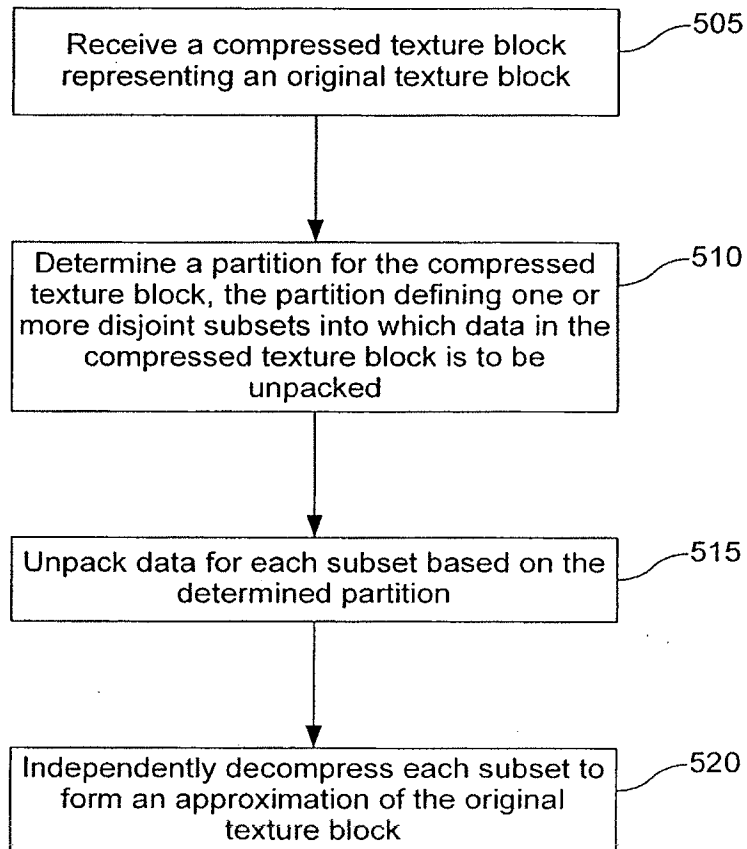


FIG.4

**FIG. 5**

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FIG. 6A

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2, 1, 1, 1, 0, 0, 0, 0,	2, 2, 1, 1, 1, 0, 0, 0,	3, 2, 2, 1, 1, 1, 0, 0,	3, 2, 2, 2, 1, 1, 1, 0,	3, 2, 2, 2, 1, 1, 1, 0,
2, 2, 1, 1, 0, 0, 0, 0,	2, 2, 3, 1, 1, 1, 0, 0,	3, 2, 2, 2, 1, 1, 1, 0,	3, 3, 2, 2, 2, 1, 1, 1,	3, 3, 2, 2, 2, 1, 1, 1,
2, 2, 2, 1, 1, 0, 0, 0,	3, 2, 2, 2, 1, 1, 1, 0,	3, 3, 2, 2, 2, 1, 1, 1,	4, 3, 3, 2, 2, 2, 1, 1,	4, 3, 3, 2, 2, 2, 1, 1,
3, 2, 2, 2, 1, 1, 1, 0,	3, 3, 2, 2, 2, 1, 1, 1,	4, 3, 3, 2, 2, 2, 1, 1,	4, 4, 3, 3, 2, 2, 2, 1,	4, 4, 3, 3, 2, 2, 2, 1,
3, 3, 2, 2, 2, 1, 1, 1,	4, 3, 3, 2, 2, 2, 1, 1,	4, 4, 3, 3, 2, 2, 2, 1,	4, 4, 4, 3, 3, 2, 2, 2,	4, 4, 4, 3, 3, 2, 2, 2,
4, 3, 3, 2, 2, 2, 1, 1,	4, 4, 3, 3, 2, 2, 2, 1,	4, 4, 4, 3, 3, 2, 2, 2,	4, 4, 4, 4, 3, 3, 2, 2,	4, 4, 4, 4, 3, 3, 2, 2,
4, 4, 3, 3, 2, 2, 2, 1,	4, 4, 4, 3, 3, 2, 2, 2,	4, 4, 4, 4, 3, 3, 2, 2,	4, 4, 4, 4, 4, 3, 3,	4, 4, 4, 4, 4, 3, 3,
3, 2, 2, 2, 1, 1, 0, 0,	3, 3, 2, 2, 2, 1, 0, 0,	4, 4, 4, 4, 4, 3, 3,	2, 3, 3, 4, 4, 4, 4,	2, 3, 3, 4, 4, 4, 4,
3, 3, 2, 2, 2, 1, 1, 0,	4, 3, 3, 2, 2, 2, 1, 0,	4, 4, 4, 4, 4, 3, 3,	2, 2, 3, 3, 4, 4, 4,	2, 2, 3, 3, 4, 4, 4,
4, 3, 3, 2, 2, 2, 1, 1,	4, 4, 3, 3, 2, 2, 2, 1,	4, 4, 4, 4, 4, 3, 3,	2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 3, 3, 4, 4,
4, 4, 3, 3, 2, 2, 2, 1,	4, 4, 4, 3, 3, 2, 2, 2,	4, 4, 4, 4, 4, 3, 3,	1, 2, 2, 2, 3, 3, 4,	1, 2, 2, 2, 3, 3, 4,
3, 2, 2, 2, 1, 1, 0, 0,	3, 3, 2, 2, 2, 1, 0, 0,	4, 4, 4, 4, 4, 3, 3,	1, 1, 2, 2, 2, 3, 3, 4,	1, 1, 2, 2, 2, 3, 3, 4,
3, 3, 2, 2, 2, 1, 1, 0,	4, 3, 3, 2, 2, 2, 1, 0,	4, 4, 4, 4, 4, 3, 3,	1, 1, 2, 2, 2, 3, 3, 4,	1, 1, 2, 2, 2, 3, 3, 4,
4, 4, 4, 4, 4, 3, 3,	4, 4, 4, 4, 4, 3, 3,	3, 3, 3, 2, 2, 1, 0, 0,	0, 1, 1, 2, 2, 2, 3, 3,	0, 1, 1, 2, 2, 2, 3, 3,
4, 4, 4, 4, 4, 3, 3,	4, 4, 4, 4, 4, 3, 3,	3, 3, 3, 2, 2, 1, 0, 0,	0, 0, 1, 2, 2, 2, 3, 3,	0, 0, 1, 2, 2, 2, 3, 3,

FIG. 6B

0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,
0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,
0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,	0, 0, 0, 0, 0, 1, 1, 1,
2, 0, 0, 0, 1, 1, 1, 1,	2, 2, 0, 0, 1, 1, 1, 1,	2, 2, 0, 0, 1, 1, 1, 1,	2, 2, 0, 0, 1, 1, 1, 1,
2, 2, 2, 2, 3, 3, 4, 1,	2, 2, 2, 2, 3, 3, 1, 1,	2, 2, 2, 2, 3, 3, 1, 1,	2, 2, 2, 2, 3, 3, 1, 1,
2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,
2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,
2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,
0, 0, 0, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,
0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,
0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 1, 1, 1, 1,
0, 0, 0, 0, 1, 1, 1, 4,	0, 0, 0, 0, 1, 1, 4, 4,	0, 0, 0, 0, 1, 1, 4, 4,	0, 0, 0, 0, 1, 1, 4, 4,
0, 2, 2, 2, 3, 3, 4, 4,	0, 0, 2, 2, 3, 3, 4, 4,	0, 0, 2, 2, 3, 3, 4, 4,	0, 2, 2, 2, 3, 3, 0, 0,
2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4, 4,	4, 4, 3, 3, 0, 0, 0,
2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4,	2, 2, 2, 2, 3, 3, 4,	4, 4, 3, 3, 0, 0, 0,
2, 2, 2, 2, 3, 3, 4, 4,	2, 2, 2, 2, 3, 3, 4,	2, 2, 2, 2, 3, 3, 4,	4, 4, 3, 3, 0, 0, 0,
0, 0, 0, 0, 2, 2, 2,	0, 0, 1, 1, 1, 1, 1, 1,	0, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,
0, 0, 0, 0, 2, 2, 2,	0, 0, 1, 1, 1, 1, 1, 1,	0, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 1, 1, 1, 1, 1,
0, 0, 0, 0, 0, 2, 2,	0, 0, 0, 1, 1, 1, 1, 4,	0, 0, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 1, 1, 1, 1,
0, 0, 0, 0, 0, 1, 1,	0, 0, 0, 1, 1, 4, 4,	0, 0, 1, 1, 1, 1, 1, 1,	0, 0, 4, 1, 1, 1, 2, 2,
0, 0, 4, 3, 3, 3, 1, 1,	0, 0, 2, 3, 3, 3, 4, 4,	2, 2, 3, 3, 3, 4, 4, 4,	4, 4, 4, 4, 2, 2, 2, 2,
4, 4, 4, 3, 3, 3, 1, 1,	2, 2, 2, 3, 3, 3, 4, 4,	2, 2, 3, 3, 3, 4, 4, 4,	4, 4, 4, 4, 2, 2, 2, 2,
4, 4, 4, 4, 3, 3, 1, 1,	2, 2, 2, 2, 3, 3, 3, 4,	2, 2, 2, 3, 3, 3, 4, 4,	3, 3, 3, 3, 3, 2, 2, 2,
4, 4, 4, 4, 3, 3, 1, 1,	2, 2, 2, 2, 3, 3, 3, 4,	2, 2, 2, 3, 3, 3, 4, 4,	3, 3, 3, 3, 3, 2, 2, 2,
0, 0, 0, 0, 1, 1, 1, 1,	2, 2, 2, 3, 3, 3, 3, 3,	2, 2, 3, 3, 3, 3, 3, 3,	0, 0, 0, 0, 0, 0, 0, 1,
0, 0, 0, 0, 1, 1, 1, 1,	2, 2, 2, 3, 3, 3, 4, 4,	2, 2, 3, 3, 3, 3, 4, 4,	0, 0, 0, 0, 0, 0, 0, 1,
2, 2, 0, 0, 1, 1, 3, 3,	2, 2, 2, 2, 4, 4, 4, 4,	2, 2, 2, 3, 4, 4, 4, 4,	3, 3, 0, 0, 0, 0, 1, 1,
2, 2, 2, 2, 3, 3, 3, 3,	2, 2, 2, 2, 4, 4, 4, 4,	2, 2, 2, 3, 4, 4, 4, 4,	3, 3, 3, 4, 0, 0, 1, 1,
2, 2, 2, 2, 3, 3, 3, 3,	2, 2, 2, 2, 4, 4, 1, 1,	2, 2, 2, 2, 4, 4, 4, 4,	3, 3, 3, 4, 4, 4, 2, 2,
2, 2, 2, 2, 4, 4, 3, 3,	2, 2, 0, 0, 1, 1, 1, 1,	2, 2, 2, 2, 4, 4, 1, 1,	3, 3, 3, 4, 4, 4, 2, 2,
2, 2, 2, 4, 4, 4, 4, 4,	0, 0, 0, 0, 1, 1, 1, 1,	2, 2, 0, 0, 1, 1, 1, 1,	3, 3, 4, 4, 4, 4, 2, 2,
2, 2, 2, 4, 4, 4, 4, 4,	0, 0, 0, 0, 1, 1, 1, 1,	0, 0, 0, 0, 1, 1, 1, 1,	3, 3, 4, 4, 4, 4, 2, 2,

FIG. 6C

FIG. 6D

0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1,	0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1,	0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1,	0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 1, 1, 0, 1, 1, 1,
0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 1,	0, 0, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 1, 0, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0, 1, 1, 1,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1,	0, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 1,
0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1,
0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1,	1, 0, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 0,	1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1,
1, 1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1,	0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 0,	0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0,	0, 0, 0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 1, 0,
1, 1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 1,	0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0,	0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 0,	0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 0,
0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 0, 0, 0,	0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0,	1, 0, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, 0, 0, 0, 1,	1, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1,

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FIG. 7

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700

0, 0, 1, 1, 0, 0, 1, 1, 0, 2, 2, 1, 2, 2, 2, 2,	0, 0, 0, 1, 0, 0, 1, 1, 2, 2, 1, 1, 2, 2, 2, 1	0, 0, 0, 0, 2, 0, 0, 1, 2, 2, 1, 1, 2, 2, 1, 1,	2, 0, 0, 0, 2, 2, 0, 0, 2, 2, 1, 1, 2, 1, 1, 1,
0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 2, 2, 1, 1, 2, 2,	0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 2, 2, 0, 0, 2, 2,	1, 1, 2, 2, 1, 1, 2, 2, 0, 0, 0, 0, 0, 0, 0, 0,	1, 1, 0, 0, 1, 1, 0, 0, 2, 2, 0, 0, 2, 2, 1, 0,
0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 2, 1, 2, 2,	0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2,	0, 0, 0, 0, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2,	0, 0, 1, 2, 0, 0, 1, 2, 0, 0, 1, 2, 0, 0, 0, 2,
0, 1, 1, 2, 0, 1, 1, 2, 0, 1, 1, 2, 0, 1, 1, 2,	0, 1, 2, 2, 0, 1, 2, 2, 0, 1, 2, 2, 0, 1, 2, 2,	0, 0, 1, 1, 0, 1, 1, 2, 1, 1, 2, 2, 1, 2, 2, 2,	0, 0, 1, 1, 2, 0, 0, 1, 2, 2, 0, 0, 2, 2, 2, 0,

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FIG. 8

TEXTURE DECOMPRESSION TECHNIQUES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application Serial No. 15/237,134 filed August 15, 2016, which is a continuation of U.S. Patent Application Serial No. 11/513,190, filed August 31, 2006, which issued as U.S. Patent No. 9,418,450 on August 16, 2016, which are incorporated by reference as if fully set forth.

FIELD OF INVENTION

[0002] The invention relates generally to field of texture compression and decompression in computer graphics.

BACKGROUND

[0003] A texture is a one-, two- or multi-dimensional array of data items used in the calculation of the color or appearance of fragments produced by rasterization of a computer graphics scene. A texture could be image data (either photographic or computer generated), color or transparency data, roughness/smoothness data, reflectivity data, etc. Providing realistic computer graphics typically requires many high quality, detailed textures. Providing such textures can tax available computer memory and bandwidth. Texture compression can therefore significantly reduce memory and bandwidth requirements.

[0004] Texture compression has thus become a widely accepted feature of graphics hardware in general and 3D graphics hardware in particular. Indeed, forms of texture compression date back to the earliest pieces of graphics hardware. The goal of texture compression is to reduce storage and bandwidth costs on the graphics system while retaining as much of the quality of the original texture as possible. Attaining this goal,

however, has proved to be complex and has generated several different approaches, some of which are described briefly below.

[0005] Palletization is amongst the oldest forms of texture compression. Its roots date back to the earliest days of color computer graphics. Typically, palletized formats are represented by 8 bits of data per pixel, permitting a maximum of 256 colors chosen from the complete colorspace (usually quantized to 16 or 32 bits). Some images can be well represented by this approach, but it is not uncommon for the palletizing process to generate significant visual artifacts. Palletization is clearly limited when dealing with real-world images such as photographs, where the limited set of available colors is quickly exhausted. Image space techniques such as dithering are used for improving the quality of palletized images, but are difficult to use with textures because if the texture is magnified, the desired effect of the dithering may be lost, and the dithering itself may introduce undesirable artifacts. Palletized methods have some additional attributes that can make them less attractive for implementation in graphics hardware - for instance, they introduce an indirection when looking up color values. Palletization might also require storage for multiple palettes simultaneously for multi-texturing support. Generally, the quality achieved per-bit is quite low with palletization, and it has largely been superseded by more advanced methods.

[0006] Vector Quantization ("VQ"), developed by PowerVR, is another specific texture compression technique. It works by storing a limited "codebook" of representative entries to define a texture. The codebook entries are blocks of pixels of some size (typically 2x2 or larger). For each block of pixels in the original texture, an index is stored to the codebook entry that most closely approximates the block. VQ can achieve very high compression rates (down to about 2 bits per pixel) while still retaining fair quality. Nonetheless, it shares some of the undesirable qualities of

palletization with respect to texture compression. For instance, the type of artifacts introduced by VQ compression can be quite noticeable on texture images, and it frequently shows visible artifacts on some common texture contents such as smooth gradients.

[0007] The Joint Photographic Experts Group (JPEG) algorithms are another image compression technique. JPEG achieves a very high quality of compression at a low bit rate, but the compression is of a variable rate. Variable rate compression makes addressing the texture map very difficult compared to fixed-rate schemes. As a result, there has been no adoption of JPEG compression in consumer 3D graphics systems except for the limited purpose of reducing a system memory imprint. For example, JPEG compression is used on Sony's Playstation 2 to reduce the system memory footprint, but the system does not texture directly from the compressed JPEG representation.

[0008] DXTC (sometimes referred to as DXTn) is a block-based texture compression scheme has been adopted by all major hardware vendors and is the most widely used today. An extension of Block Truncation Coding (BTC), it explicitly stores two 16-bit colors per 4x4 pixel block and two other colors that are implicitly represented as being interpolants between these endpoints, with an index of 2 bits per pixel to choose the colors for the pixel block. As a result it achieves overall color compression to 4 bits per pixel. DXTC represents the original texture data quite well in the majority of cases. However, DXTC has problems with textures having many different color hues within each block. Additionally, the low precision of the endpoints and small number of interpolants can produce some noise on gradients, particularly ones that are oriented diagonally to the pixel blocks. DXTC also has problems with textures containing blocks that have multiple separate color gradients at different orientations, as accurate compression of one gradient must typically be

sacrificed when mapping the points to a line through the colorspace. This happens frequently in images such as normal maps. A DXTC extension allows 4 component images (with alpha) to be represented at 8 bits per pixel.

[0009] FXT 1 is a competing compression scheme with DXTC. It essentially extends DXTC with some additional block types that can be mixed within any given image, and also provides a 4 bits per pixel compression mode for textures with alpha. The gains in image quality over DXTC were never conclusive and FXT 1 received limited industry support.

[0010] PVR-TC is a recently developed compression scheme that scales an image down to a fraction of its original size and then scales it back up to obtain a good first-approximation of the original image. Texture compression is thus achieved by storing the downscaled version and then adding some modulation to create a fairly accurate reconstruction of the original data. This texture compression scheme works well for some types of data (particularly smooth gradients), and scales reasonably even to low bit rates. However, PVR-TC has a tendency to blur images somewhat and lose high frequency details. Occasionally the PVR-TC compression also seems to introduce other artifacts such as high frequency modulation noise and ringing.

[0011] A review of current texture compression techniques and their limitations reveals a need for improvements. An ideal solution would allow compression of various types of data and would have the flexibility to make the best use of available memory and bandwidth. Additionally, traditional texture compression schemes target a specific type of texture content (e.g., JPEG for photographic images) and perform well within that set, but perform poorly as soon as presented with a type of image outside

of the designated set. Another challenge is thus to broaden the scope of texture compression to adequately cover a wider base of image types.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings, which are incorporated herein and form a part of the specification, illustrate the present invention and, together with the description, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

[0013] FIG. 1 illustrates an exemplary system in which the described embodiments may operate.

[0014] FIG. 2 illustrates the flow of texture data through an exemplary system.

[0015] FIGS. 3A-3C are flow charts illustrating a compression method.

[0016] FIG. 4 illustrates various partitions.

[0017] FIG. 5 is a flow chart illustrating a decompression method.

[0018] FIGS. 6A-6D illustrate an exemplary set of 64 partitions, each having five disjoint subsets.

[0019] FIG. 7 illustrates an exemplary set of 32 partitions, each having two disjoint subsets.

[0020] FIG. 8 illustrates an exemplary set of 12 partitions, each having three disjoint subsets.

[0021] The present invention will now be described with reference to the accompanying drawings. In the drawings, like reference numbers indicate identical or functionally similar elements. Additionally, the left-most digit(s) of a reference number identifies the drawing in which the reference number first appears.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Introduction

[0022] Textures are one-, two-, or multi-dimensional data arrays. Textures are sometimes used to enhance or change the appearance of surfaces in graphics. A “texel” is a texture element in the same way a “pixel” is a picture element. The terms “pixel” and “texel” may be used synonymously herein and simply refer a discrete unit of data—e.g., data at an (x, y) location in a frame buffer, texture buffer or other type of memory or array. The compression and decompression methods described herein may be used to compress various types of texture information including image data, picture data, transparency (alpha) information, smoothness or roughness data, or any other similarly structured data. As such, the term texture is used broadly herein to refer to the data being compressed or decompressed using the described methods.

[0023] Texture mapping is the process of applying a texture to a fragment, pixel or primitive representing a surface to be displayed. Texture mapping is often used to add realism to a scene. For example, one can apply a picture of a building façade to a polygon representing a wall. During texture mapping, a compressed texture element—e.g., a block of texels—is obtained from texture memory and represents the color or other surface characteristic of a corresponding fragment or pixel on the surface to be displayed.

[0024] As hardware and software graphics platforms support increasingly sophisticated texture mapping techniques, the scenes that developers would like to render have grown much more complex. Complex scenes thus often make greater use of textures. One of the costs of texture mapping is that the texture images often require a large amount of memory. Memory for textures can be limited, especially in hardware rendering systems where textures are placed in a dedicated memory in the graphics subsystem. Texture compression, which reduces the amount of data needed to store texture map images, allows a user to fit more texture data into

available memory. The result is an ability to use more textures for higher accuracy and increased rendering quality.

[0025] There exist both “lossy” and “lossless” texture compression schemes. A lossy texture compression scheme refers to a compression technique where it is impossible to exactly recreate the texture during decompression—i.e., the original texture data is changed irretrievably. A lossless texture compression scheme, on the other hand, refers to those techniques that permit the exact recreation of the original texture—i.e., the original texture data can be identically recovered by decompressing the texture compressed by a lossless compression technique. The present invention typically implements lossy texture compression techniques.

[0026] Lossy texture compression techniques seek a balance between texture compression ratio (i.e., the amount of compression) and image quality. A high texture compression ratio provides benefits with respect to memory use and speed, but typically sacrifices image quality. On the other hand, textures may be stored at a high level of quality, but typically at the cost of reduced compression ratios. It will be appreciated by those skilled in computer graphics that certain applications may value image quality, while others may value a high texture compression ratio (i.e., a low bit-per-pixel number). The overall goal, therefore, is to make the most efficient use of available resources while meeting the needs and limitations of the application, the user, and the user's graphics system.

[0027] As the expectations for higher levels of image quality in computer graphics increase, the limitations of DXTC and other lossy texture compression methods described above are becoming more apparent. Given that the amount of available memory and bandwidth is constantly increasing the present invention permits increased image quality with a lower compression ratio as well higher quality compression than existing methods at the same compression ratio. When going to a higher number of bits-per-pixel, one challenge is trying to achieve the same quality per bit as the schemes with higher compression ratios. To address this challenge, the present invention further refines block-based image compression

techniques such as DXTC with a flexible method for pre-compression partitioning of texture blocks. The pre-compression partitioning enhances image quality by flexibly selecting partitions suitable to the characteristics of the texture block being compressed, rather than adopting the one-size-fits-all approach suggested in other methods.

Sample Environment

[0028] Before describing embodiments of the present invention in detail, it is helpful to describe an example environment in which the data compression device may be implemented. FIG. 1 illustrates a graphics system 100. The system may include, but is not limited to, a computer 110, various input devices 160 such as a keyboard or a mouse (not shown), and various output devices 170 such as a liquid crystal display (LCD) monitor or a cathode ray tube (CRT) monitor (not shown). The computer 110 may include, but is not limited to a central processing unit (CPU) 120, a graphics processing unit (GPU) 140, a main memory 130, and a graphics memory 150. As will be understood by those having ordinary skill in the art, the components may be combined in various ways. For example, the CPU and the GPU may be combined into a single device. Similarly, exemplary embodiments of the invention may combine main memory and graphics memory into a single memory. Other combinations are similarly possible.

[0029] The computer 110 may be a portable computer, a laptop computer, a desktop computer, server, mainframe, handheld device (e.g., mobile phone, camera, portable media player), digital television or the like. The main memory 130 may be random access memory (RAM) or some other storage device. For static data, the main memory may also contain read only memory (ROM). Main memory 130 may be used for storing information during execution of instructions by the CPU 120 such as processor instructions, temporary variables, or cached information. Graphics memory 150 may also consist of RAM, ROM or other storage and is primarily used for storing graphics information such as scene information and

texture data. Also illustrated is an external memory or storage device 135, such as a hard disk or other storage device, that can be used to store texture data. It should be noted that textures may be stored in uncompressed or compressed format. Pre-compressed data would pass through the CPU unmodified.

[0030] The graphics system 100 may also include an external communication device 180 such as a modem, a wired or wireless network interface card, or other well-known interface devices. External communication device 180 allows a communication link to a local area network (LAN), wide area network (WAN), the Internet or any other well-known type of external network. All the elements of the graphics system 100 are typically coupled to a communications bus 190 through which information and instructions are routed.

[0031] The GPU 140 contains the graphics hardware, which typically includes a rendering pipeline for transforming scene and texture data into information ready for display. Some graphics hardware systems may include a separate pipeline that is dedicated to texture information. The GPU 140 also typically has its own local storage that holds the information to be output to a visual display device.

[0032] FIG. 2 further illustrates the path texture data may take through an exemplary graphics system. An uncompressed texture source 210 (e.g., texture database or library) is coupled to CPU 120. Within CPU 120 is a texture compression engine 220. The texture compression engine 220 is primarily responsible for implementing the texture compression methods of the present invention using hardware, software or a combination of both.

[0033] A compressed texture may then be stored in graphics memory 150 or external memory 135, which are coupled to CPU 120. Texture data for use by the GPU 140 is stored in the graphics memory 150. In some implementations this may be a dedicated region of memory—i.e., texture memory 250. The graphics memory 150 and CPU 120 are both coupled to GPU 140. Within GPU 140 is a texture decompression engine 240. Texture decompression engine 240 is primarily responsible for decompression or decoding compressed texture data such that it can

be used by GPU 140. The GPU may use this texture data to produce data used by the output device 170 or in further processing.

Compression Principles

[0034] As noted above, the present invention represents a further refinement of block-based texture compression schemes such as DXTC. Like DXTC, the basic compression algorithm implemented in a preferred embodiment divides or splits the image up into discrete blocks of pixels (e.g., 4×4 pixel or 8×8 pixel blocks) and compresses them.

[0035] However, rather than mechanistically compressing the regular texture blocks, the present invention introduces the idea of further subdividing or partitioning the block internally into “subsets” of different shape and size before compression. Each subset is then compressed in a manner similar to DXTC. Precompression subdivision addresses several image quality problems with existing DXTC compression, and results in a significant overall increase in perceived and measured quality. Furthermore, it provides improvement in the ability to compress less common types of texture data (such as non-photorealistic textures, cartoons, etc.).

[0036] FIGS. 3A-C are flowcharts more specifically illustrating one embodiment of the present invention. Initially, an original texture to be compressed is received in a texture compression engine. As with other block-based texture compression schemes, the original texture is then split or divided into original blocks of pixels according to step 305. Typically, the original block of pixels is a square or rectangular block—e.g., 4×4 or 8×8 pixel. The size of the original block of pixels is variable, and may be selected according to user needs, application demands and/or system capabilities.

[0037] As indicated in 310, each original block of pixels is then subjected to steps 315 through 325. According to step 315 a partition is identified that describes the manner in which the original block of pixels is to be further split. Each of the

partitions define a plurality of disjoint subsets of pixels whose union is the original block of pixels. A partition can consist of a single subset, in this case the subset is identical to the single block of pixels. FIG. 4 illustrates some basic examples of the types of partitions and the subsets they contain. The size and arrangement of the subsets within a partition is completely variable—i.e., there is no restriction considering the number or configuration of the subsets except for the number of bits dedicated to defining them. For example, a partition may have 8 or 16 subsets as in partitions 402 and 404, respectively. Alternatively, a partition may have 3 or 6 subsets as in partitions 408 and 406, respectively.

[0038] Typically, the partition is selected from a pre-defined set of partitions. The number of available partitions in the pre-defined set may vary, but is limited by the number of bits in the data structure dedicated to relaying that information. For example, if there are 6 “partitionBits” dedicated to describing the partition, then the pre-defined partition set could contain up to 64 different partitions. Some embodiments could have several sets of partitions, the partitions in each set divide the block into the same number of subsets, with the set of partitions to be used (and hence the number of subsets for the block) being identified by a selector. For example, if the selector has two bits, and there are 6 partition bits, then there could be one set of 64 two-subset partitions, another set of 64 three-subset partitions, a third set of 64 four-subset partitions, and a fourth set of 64 five-subset partitions. The specific data structure for this embodiment is described in more detail below.

[0039] An exemplary set of 64 partitions, each having 5 subsets, is illustrated in FIGS. 6A-6D. For clarity, the complete set of partitions is illustrated over 4 pages of figures, with 16 such partitions illustrated by partition 600A in FIG. 6A. An exemplary partition 602 is shown in FIG. 6A. Therein, an 8×8 pixel block has been subdivided into 5 disjoint subsets with a first subset containing those pixels labeled 0, a second subset containing those pixels labeled 1, a third subset containing those pixels labeled 2, a fourth subset containing those pixels labeled 3, and a fifth subset containing those pixels labeled 4.

[0040] Similarly, FIG. 7 illustrates 32 partitions, each having two disjoint subsets. An exemplary partition 702 is illustrated in FIG. 7. Therein, a 4×4 pixel block 702 has been subdivided into two disjoint subsets with a first subset containing those pixels labeled 0 and a second subset containing those pixels labeled 1. FIG. 8 illustrates a set of 16 partitions, each of which has been subdivided into three disjoint subsets. An exemplary partition 802 is illustrated in FIG. 8. Therein, a 4×4 pixel block 802 has been subdivided into 3 disjoint subsets with a first subset containing those pixels labeled 0, a second subset containing those pixels labeled 1, and a third subset containing those pixels labeled 2.

[0041] The partition set could be of arbitrary size up to the combinatorial limit of the number of ways to partition a block. In embodiments designed for efficient encoding a more limited set of partitions will be defined in order to fit within the desired code size. An embodiment could allow a unique partition set for each texture, or it could require all textures to share the same fixed partition set. It is possible to evaluate a quality function for each original block of pixels to aid in selecting an appropriate partition. Once a partition has been identified, the original block of pixels is subdivided into one or more subsets according to the identified partition, as illustrated in step 320.

[0042] Next, according to step 325, each subset is then independently compressed to form a compressed texture block. In an embodiment, each of the subsets may be compressed using two explicit endpoint parameters that define a line in the colour space, and a plurality of implicit points on the line selected according to a predefined quantization. However, the described methods are not limited to this particular compression scheme. For example, palletization or other vector quantization compression algorithms could be implemented as well.

[0043] After the subsets of pixels have been compressed, the compressed texture block may be evaluated to further refine partition selection. Two such evaluation embodiments are illustrated in FIGS. 3B and 3C. Evaluation typically requires (i) decompression of the compressed texture block to obtain an

approximation of the original block of pixels, and (ii) comparison of the original block of pixels and the approximation of the original block of pixels to obtain a quality parameter. These steps are reflected in steps 330 and 332 of FIG. 3B, and steps 340 and 342 of FIG. 3C.

[0044] The quality parameter is derived from a predefined function used to quantify a certain aspect of the decompressed texture block as it compares to the original block of pixels. For instance, the predefined function could evaluate the pixel colors in the original block of pixels as compared to the pixel colors in the approximation of the original block of pixels to derive an overall error approximation. An error approximation may be a root-mean-square (RMS) error composed of, for example, the squared sum of individual pixel color error contributions over all the pixels in the block. Alternatively, other functions may be devised, depending on the users needs. For example, the function could evaluate luminance, or transparency, or any other texture parameter deemed important by a user. As detailed below, the quality parameter is used to measure the relative success of the compression for the selected partition against other partitions, or against a pre-selected quality parameter threshold.

[0045] In the embodiment of FIG. 3B, a decision is made in step 334 as to whether the quality parameter for the identified partition meets a pre-selected threshold. If it does, then the identified partition becomes the final partition for the current block of pixels according to step 336. If the quality parameter does not meet the pre-selected threshold, then a determination is made according to step 335 as to whether partitions remain for which no quality parameter has been obtained. If such an untested partition remains, then the method returns to step 315. In this embodiment, a user can select a minimum standard of quality for the texture block compression based on a variety of parameters. In this embodiment, the quality parameter values are also tracked so that, if the threshold quality value is not achieved, then the partition yielding the best quality value can be chosen, as illustrated in step 337.

[0046] Next, in step 338, the original block of pixels is subdivided into one or more final subsets according to the final partition. The subsets from this final subdivision are then independently compressed to form a compressed texture block, as illustrated in step 339.

[0047] In an alternative embodiment, represented by FIG. 3C, the partition is identified from a predefined set of partitions. Then, a quality parameter is obtained for each partition in the set of partitions. According to step 344 of FIG. 3C, if a quality parameter has not been obtained for each partition in the predefined set of partitions, the method returns to step 315, where another partition is selected. In this embodiment, the system then selects the partition yielding an optimal quality parameter, as described in step 346. Next, in step 348, the original block of pixels is subdivided into one or more final subsets according to the final partition. The subsets from this final subdivision are then independently compressed to form a compressed texture block, as illustrated in step 349.

[0048] One of skill in the art could devise various other means for identifying and selecting an appropriate partition. Such embodiments could be tailored for the specific needs of the programmer, and depend on the particular implementation for which data compression is desired.

Decompression Principles

[0049] Decompression of texture blocks that have been compressed according to the present methods involves essentially working backwards. FIG. 5 is a flowchart illustrating such a decompression scheme. According to step 505, a compressed texture block is received that represents an original texture block.

[0050] The next decompression step 510 involves determining the partition that was used for the compressed texture, the partition defining one or more disjoint subsets into which the compressed texture block is to be unpacked. As noted above in the compression discussion, the partition defines the manner in which the uncompressed texture blocks were further subdivided into disjoint

subsets prior to compression. Thus, the size and shape of the subsets must be determined before decompressing the subsets.

[0051] According to step 515, the data for each subset is then unpacked based on the determined partition. “Unpacking” refers to extracting the information from the block that is required to decompress the data stored in the subset. Finally, according to step 520, the subsets are independently decompressed to generate an approximation of the original texture block. Typically, the approximation would then be used by the GPU's texture mapping algorithm and applied to a rendered surface for display, but in some cases it could instead be used in further stages of processing.

Exemplary Embodiments

[0052] Described below are several exemplary embodiments of the above described compression methods. They include exemplary data structures and pseudo code for accomplishing the compression principles described above. The invention is not limited to these embodiments, but only by the scope of the appended claims. The skilled artisan could envision and implement variations on these embodiments without departing from the spirit and scope of the invention.

[0053] A first embodiment is a direct, higher quality replacement for DXTC compression. It compresses 24-bit RGB data to 4 bits per pixel. Punch-through alpha encoding from DXTC is also supported, where one of the indices in the data structure supports a fully transparent “black-pixel” for so-called “punch-through” textures. As illustrated below, the texture is divided into blocks of 8×8 pixels for compression. Each compressed block has a notional format described below. However, the exact details of the packing and storage will be implementation dependent, and could be reordered to make the hardware decompression as simple as possible. In this first embodiment, a texture block is subdivided into two, three, four or five subsets. The particular data structures are described more fully below.

[0054] Partition data structure with two subsets:

```

typedef union
{
    struct
    {
        unsigned int    blockType : 2;
        unsigned int    colour0:14, colour1:14, colour2:14, colour3:14;
        unsigned int    partitionBits : 6;
        unsigned int    t00:3, t01:3, t02:3, t03:3, t04:3;
        unsigned int    t05:3, t06:3, t07:3, t08:3, t09:3;
        unsigned int    t0a:3, t0b:3, t0c:3, t0d:3, t0e:3;
        unsigned int    t0f:3, t10:3, t11:3, t12:3, t13:3;
        unsigned int    t14:3, t15:3, t16:3, t17:3, t18:3;
        unsigned int    t19:3, t1a:3, t1b:3, t1c:3, t1d:3;
        unsigned int    t1e:3, t1f:3, t20:3, t21:3, t22:3;
        unsigned int    t23:3, t24:3, t25:3, t26:3, t27:3;
        unsigned int    t28:3, t29:3, t2a:3, t2b:3, t2c:3;
        unsigned int    t2d:3, t2e:3, t2f:3, t30:3, t31:3;
        unsigned int    t32:3, t33:3, t34:3, t35:3, t36:3;
        unsigned int    t37:3, t38:3, t39:3, t3a:3, t3b:3;
        unsigned int    t3c:3, t3d:3, t3e:3, t3f:3;
    } two PartitionMode;

```

[0055] Partition data structure with three subsets:

```

struct
{
    unsigned int    blockType : 2;
    unsigned int    colour0:20, colour1:20, colour2:20;
    unsigned int    colour3:20, colour4:20, colour5:20;
    unsigned int    partitionBits : 6;

```

```

unsigned int  t00:2, t01:2, t02:2, t03:2, t04:2;
unsigned int  t05:2, t06:2, t07:2, t08:2, t09:2;
unsigned int  t0a:2, t0b:2, t0c:2, t0d:2, t0e:2;
unsigned int  t0f:2, t10:2, t11:2, t12:2, t13:2;
unsigned int  t14:2, t15:2, t16:2, t17:2, t18:2, t19:2;
unsigned int  t1a:2, t1b:2, t1c:2, t1d:2, t1e:2, t1f:2;
unsigned int  t20:2, t21:2, t22:2, t23:2, t24:2, t25:2, t26:2, t27:2;
unsigned int  t28:2, t29:2, t2a:2, t2b:2, t2c:2, t2d:2, t2e:2, t2f:2;
unsigned int  t30:2, t31:2, t32:2, t33:2, t34:2, t35:2, t36:2, t37:2;
unsigned int  t38:2, t39:2, t3a:2, t3b:2, t3c:2, t3d:2, t3e:2, t3f:2;
} threePartitionMode;

```

[0056] Partition data structure with four subsets:

```

struct
{
    unsigned int  blockType : 2;
    unsigned int  colour0:15, colour1:15, colour2:15, colour3:15;
    unsigned int  colour4:15, colour5:15, colour6:15, colour7:15;
    unsigned int  partitionBits : 6;
    unsigned int  t00:2, t01:2, t02:2, t03:2, t04:2, t05:2, t06:2, t07:2;
    unsigned int  t08:2, t09:2, t0a:2, t0b:2, t0c:2, t0d:2, t0e:2, t0f:2;
    unsigned int  t10:2, t11:2, t12:2, t13:2, t14:2, t15:2, t16:2, t17:2;
    unsigned int  t18:2, t19:2, t1a:2, t1b:2, t1c:2, t1d:2, t1e:2, t1f:2;
    unsigned int  t20:2, t21:2, t22:2, t23:2, t24:2, t25:2, t26:2, t27:2;
    unsigned int  t28:2, t29:2, t2a:2, t2b:2, t2c:2, t2d:2, t2e:2, t2f:2;
    unsigned int  t30:2, t31:2, t32:2, t33:2, t34:2, t35:2, t36:2, t37:2;
    unsigned int  t38:2, t39:2, t3a:2, t3b:2, t3c:2, t3d:2, t3e:2, t3f:2;
} fourPartitionMode;

```

[0057] Partition with five subsets:

```

struct
{
    unsigned int blockType : 2;
    unsigned int colour0:12, colour1:12, colour2:12, colour3:12;
    unsigned int colour4:12, colour5:12, colour6:12, colour7:12;
    unsigned int colour8:12, colour9:12;
    unsigned int partitionBits : 6;
    unsigned int t00:2, t01:2, t02:2, t03:2, t04:2, t05:2, t06:2, t07:2;
    unsigned int t08:2, t09:2, t0a:2, t0b:2, t0c:2, t0d:2, t0e:2, t0f:2;
    unsigned int t10:2, t11:2, t12:2, t13:2, t14:2, t15:2, t16:2, t17:2;
    unsigned int t18:2, t19:2, t1a:2, t1b:2, t1c:2, t1d:2, t1e:2, t1f:2;
    unsigned int t20:2, t21:2, t22:2, t23:2, t24:2, t25:2, t26:2, t27:2;
    unsigned int t28:2, t29:2, t2a:2, t2b:2, t2c:2, t2d:2, t2e:2, t2f:2;
    unsigned int t30:2, t31:2, t32:2, t33:2, t34:2, t35:2, t36:2, t37:2;
    unsigned int t38:2, t39:2, t3a:2, t3b:2, t3c:2, t3d:2, t3e:2, t3f:2;
} fivePartitionMode;
}

```

[0058] With respect to the above described exemplary data structures, the <blockType> field has 2 fixed bits that indicate how many subsets are in the partition. The next field indicates the color endpoints for the subsets. In each case there are 2 colors stored explicitly per subset, so a partition having 2 subsets stores 4 colors, and a partition having five subsets stores 10 colors. Each data structure has 6 “partitionBits” that are used to choose a partition from a pre-defined set of 64 possible partition modes. Each <blockType> has its own set of 64 possible pre-defined partitions.

[0059] In practical terms, in order to simplify the decompression and make it cheaper, this first embodiment uses only one base set of 64 explicitly pre-defined

partitions, defined for the 5-subset case, as illustrated in FIGS. 6A-D. One can then, for example, create tables for the partitions with fewer subsets by merging regions within this table—i.e., performing unions on the subsets within a partition. For example 4 subsets could be derived by merging subsets 4+3 together, while 3 subsets could be derived by merging subsets 4+3 together, and 0+1 together. Other combinations are, of course, possible. By deriving the partitions for all modes from the above table we can reduce the storage requirements for the tables in hardware.

[0060] Preferably, the colors for the partition subsets are reconstructed as follows: Each subset uses two of the explicitly defined colors that are directly mapped to the subset. In this embodiment the explicit colors are promoted from their base representation up to 8 bits-per-component by shifting and replication of the high bits to the low bits. That is, 8 bits each for Red, Green and Blue (“RGB 8.8.8”) in what is referred to as “RGB” color space.

[0061] Colors are then generated for the subset by using the two explicit colors as the endpoints of a line in RGB color space. The remaining (implicit) colors are evenly distributed along that line. For higher quality in this embodiment it is desirable for the implicit colors to be derived at higher precision than the endpoints—ie. more than 8 bits-per-component. Each pixel or texel in the subset has an index that looks up which color to use from the line. Each subset can use one of two different distributions of the implicit colors relative to the endpoints along the line. We will, in future, refer to these different distributions as colour ramps—the ramp consists of the endpoints and the distributed colours. Which ramp to use is decided by treating the endpoints as unsigned numbers and performing the following simple comparison: IF(colour0<colour1) use ramp 0 ELSE use ramp 1. Finally, exact color derivations are defined in the sections on each data structure below.

[0062] For example, in the partition with two subsets, four colors are stored at 14 bits of precision (RGB 5.5.4). Each texel or pixel index is 3 bits, so the ramps have 8 positions. The ramp derivation is as follows:

```

unsigned BYTE c[8][4];
if(colour0 > colour1)
{
    c[0] = colour0;
    c[7] = colour1;
    // Set alpha to 1.0
    c[0][0] = 0xff;
    c[7][0] = 0xff;
    for(i=0;i<4;i++)
    {
        c[1][i] = (6*c[0][i] + 1*c[7][i] + 3) / 7;
        c[2][i] = (5*c[0][i] + 2*c[7][i] + 3) / 7;
        c[3][i] = (4*c[0][i] + 3*c[7][i] + 3) / 7;
        c[4][i] = (3*c[0][i] + 4*c[7][i] + 3) / 7;
        c[5][i] = (2*c[0][i] + 5*c[7][i] + 3) / 7;
        c[6][i] = (1*c[0][i] + 6*c[7][i] + 3) / 7;
    }
}
else
{
    c[0] = colour0;
    c[7] = colour1;
    // Set alpha to 1.0
    c[0][0] = 0xff;
    c[7][0] = 0xff;
    for(i=0;i<4;i++)
    {
        c[1][i] = (5*c[0][i] + 1*c[7][i] + 2) / 6;
        c[2][i] = (4*c[0][i] + 2*c[7][i] + 2) / 6;

```

```

    c[3][i] = (3*c[0][i] + 3*c[7][i] + 2) / 6;
    c[4][i] = (2*c[0][i] + 4*c[7][i] + 2) / 6;
    c[5][i] = (1*c[0][i] + 5*c[7][i] + 2) / 6;
}

// Colour 6 is treated as transparent
c[6] = transparent; c[6][0] = 0;
}

```

[0063] In the above example, each pixel in a subset is represented by a 3-bit index into the color set.

[0064] In the partition with three subsets, alternatively, six colors may be stored at 20 bits of precision (RGB 7.7.6). Each texel index is 2 bits, so the ramps have 4 positions. The ramp derivation is as follows:

```

unsigned BYTE c[4][4];
if(colour0 > colour1)
{
    c[0] = colour0;
    c[4] = colour1;
    // Set alpha to 1.0
    c[0][0] = 0xff;
    c[4][0] = 0xff;
    for(i=0;i<4;i++)
    {
        c[1][i] = (2*c[0][i] + 1*c[4][i] + 1) / 3;
        c[2][i] = (1*c[0][i] + 2*c[4][i] + 1) / 3;
    }
}
else

```

```

{
    c[0] = colour0;
    c[4] = colour1;
    // Set alpha to 1.0
    c[0][0] = 0xff;
    c[4][0] = 0xff;
    for(i=0;i<4;i++)
    {
        c[1][i] = (c[0][i] + c[4][i] + 1) / 2;
    }
    // Colour 3 is treated as transparent
    c[3] = transparent; c[3][0] = 0;
}

```

[0065] In the above example, each pixel in the subset is represented by a 2-bit index into the color set.

[0066] In the partition with four subsets, eight colors are stored at 15 bits of precision (RGB 5.5.5). Each pixel is represented by a 2 bit index into the color set. The color derivation is the same as for the 3 partition mode. Similarly, in the partition with five subsets, ten colors are stored at 12 bits of precision (RGB 4.4.4) and the texel representations work as in the four subset mode.

[0067] It should be noted that the optimal set of partitions for the format will be determined by the user and the nature of the application. One skilled in the art will recognize that it is impossible for one set of partitions to be totally optimal across all images.

Image quality versus DXT1

[0068] The above described first embodiment was tested against S3 Graphics' DXT1 (sometimes also called DXTn or DXTC) using the 64 partition set described in FIG. 6. The tests revealed that this embodiment gives a higher quality compression

than DXT1 on all images tested, both in terms of measured RMS error and perceived image quality. Taking the Root Mean Square (RMS) error as the basic quality parameter, the gains achieved range from a typical low-bar of 10-15% reduction of total RMS error to a high range of 50% reduction or more.

[0069] The low-range RMS improvements are typically found on more photo-realistic textures, but even in cases where there is a relatively small improvement in overall RMS, the above described embodiment can give significantly better perceived quality as it improves on some of DXT1s most noticeable quality problems, noticeably its tendencies towards introducing low-frequency noise (or ‘blocking’) and bleeding colors from one region to another. The largest improvements in RMS tend to occur on non-photorealistic textures such as cartoons, or items like “heads-up displays,” where the above described embodiment usually gives a very significant improvement in visual quality.

[0070] The variable partition scheme described above is superior in terms of RMS error. Additionally, it also provides noticeable improvement in perceived quality and eliminates some image artifacts almost completely. The table below illustrates some test results for various types of images.

Image Name	Image Description	Weighted RMS Error R=0.3086; G=0.6094; B=0.082	
		DXT1	4bpp partition
4.2.03	Photographic; noisy	5.97	2.86
17	Computer display	7.28	5.6
Dialog 1	Cartoon	5.55	3.28
Lena	Photographic portrait	3.74	2.82
Ring	Artificial, concentric gradients with varying frequency	12.71	6.29

Smart	Photographic, complex Color regions	7.8	5.57
-------	--	-----	------

Image quality versus other compression methods

[0071] In testing, the above described embodiment consistently produces higher quality images than the other compression methods discussed in the introduction to this document, such as palletisation and vector quantization. Comparing schemes at the same compression rate has shown the above embodiment to be of higher quality in terms of RMS error and subjective quality than other fixed-rate compression formats. It also adapts very well to a wide variety of input image types, and largely doesn't depend on one particular type of input data (e.g., photographic) to produce high quality compression—some of other compression methods discussed perform reasonably well on a subset of images, but break down when given a wider range of data.

Alternative Embodiments

[0072] A second embodiment is intended as a direct replacement for DXT5. Its data structure is similar to the first embodiment described above and DXT1. It uses the same color encoding as the first embodiment, but each 8×8 color block is accompanied by an 8×8 alpha block with the following format:

```
struct
{
    unsigned int  alpha0:8;
    unsigned int  alpha1:8;
    unsigned int  alpha2:8;
    unsigned int  alpha3:8;
    unsigned int  alpha4:8;
    unsigned int  alpha5:8;
```

```

    unsigned int  alpha6:8;
    unsigned int  alpha7:8;
    unsigned int  t00:3, t01:3, t02:3, t03:3, t04:3, t05:3, t06:3, t07:3;
    unsigned int  t08:3, t09:3, t0a:3, t0b:3, t0c:3, t0d:3, t0e:3, t0f:3;
    unsigned int  t10:3, t11:3, t12:3, t13:3, t14:3, t15:3, t16:3, t17:3;
    unsigned int  t18:3, t19:3, t1a:3, t1b:3, t1c:3, t1d:3, t1e:3, t1f:3;
    unsigned int  t20:3, t21:3, t22:3, t23:3, t24:3, t25:3, t26:3, t27:3;
    unsigned int  t28:3, t29:3, t2a:3, t2b:3, t2c:3, t2d:3, t2e:3, t2f:3;
    unsigned int  t30:3, t31:3, t32:3, t33:3, t34:3, t35:3, t36:3, t37:3;
    unsigned int  t38:3, t39:3, t3a:3, t3b:3, t3c:3, t3d:3, t3e:3, t3f:3;
} APC2_ALPHA_BLOCK;

```

[0073] The alpha block is subdivided into subsets as with the color block, but there are no explicit partitioning bits used in the format. Instead, the endpoints are ordered for each subset in the partition to derive the 4 bits chosen from a table of 16 possible partitions.

[0074] For alpha encoding, a lower number of subsets per partitions are acceptable because the quality gains from additional subsets rapidly reaches diminishing returns due to the generally high quality of the basic compression scheme. Avoiding explicit partition bits allows the precision of the endpoints to be kept as high as in DXT5. The 6-interpolant encoding with explicit 0 and 1 is no longer used, but this loss is generally more than offset by the addition of pre-compression partitioning. Alpha derivation should typically have at least 12 bits of fractional precision retained. Although the old DXT5 only required 8-bits of precision for the derivation, it is more flexible to allow the format to use the full potential precision of the interpolated values.

[0075] For the color block, decoding in the above described formats typically means that transparent punch-through alpha encoding is no longer required. However, the ability to decode to either 3 or 4 colors for each subset in the partition

could make a quality difference. As detailed below, there are a number of possible extensions to this second embodiment format.

[0076] One example is an alpha extension. As noted above, the number of partitions for the color block for the first embodiment was limited to only 64 possibilities, leaving only two “spare” bits. In the format of this second embodiment, one additional possibility is to make use of these two bits to decide on a per-block basis which channel is represented in the alpha block. Given the two bits we have four possibilities –

- 0 – Colour block contains RGB, Alpha block contains A
- 1 – Colour Block contains AGB, Alpha block contains R
- 2 – Colour block contains RAB, Alpha block contains G
- 3 – Colour block contains RGA, Alpha block contains B

[0077] After decoding the channels would be swizzled back into the normal order. By selecting different swizzles for each block, significant improvements in compression quality are possible.

[0078] Third through sixth embodiments differ from the above described first embodiment in that they compress a different number of components—i.e., instead of compressing three color components in RGB space, they compress a single component or other texture variable. A third embodiment, for example, is a 1-component compressed format for single channel data. It uses the same compression as the alpha block in the second embodiment and allows compression of original data with around 12-bits of precision to 4-bits.

[0079] A fourth embodiment is a 2-component compressed format. It is the substantially similar to ATI2N/3DC compression (developed by ATI Technologies), and uses the same block format for each component as the above described third embodiment.

[0080] A fifth embodiment is a 4-component compressed format using the same block format for each component as the third embodiment.

[0081] A sixth embodiment format is designed for developers who require higher quality compression than that provided by the above described first embodiment. It compresses to 8-bits per pixel (compared to the first embodiment at 4-bits per pixel), but the compressed texture quality is much higher, and the format can handle images with 3 or 4 channels. Textures compressed with this sixth embodiment are generally nearly indistinguishable from the uncompressed source texture. The principles of the sixth embodiment are very similar to the first embodiment, but works by compressing 4×4 pixel blocks.

[0082] In the sixth embodiment, each block contains either two or three subsets per partition.

```

        typedef union
        {
            struct
            {
                unsigned int blockType : 1;

                unsigned int colour0:19;
                unsigned int t0:3;
                unsigned int t1:3;
                unsigned int t2:3;
                unsigned int t3:3;

                unsigned int partitionBit0:1;
                unsigned int colour1:19;
                unsigned int t4:3;
                unsigned int t5:3;
                unsigned int t6:3;
                unsigned int t7:3;
            }
        }

```

```

unsigned int partitionBit1:1;
unsigned int colour2:19;
unsigned int t8:3;
unsigned int t9:3;
unsigned int tA:3;
unsigned int tB:3;

```

```

unsigned int partitionBit2:1;
unsigned int colour3:19;
unsigned int tC:3;
unsigned int tD:3;
unsigned int tE:3;
unsigned int tF:3;
} twoPartitionMode;

```

```

struct
{
    unsigned int blockType : 1;
    unsigned int colour0:13;
    unsigned int t0:3;
    unsigned int t1:3;
    unsigned int t2:3;
    unsigned int t3:3;
    unsigned int t4:3;
    unsigned int t5:3;

    unsigned int colour1:13;
    unsigned int colour2:13;
    unsigned int t6:3;

```

```

        unsigned int t7:3;
        unsigned int colour3:13;
        unsigned int colour4:13;
        unsigned int t8:3;
        unsigned int t9:3;

        unsigned int colour5:13;
        unsigned int tA:3;
        unsigned int tB:3;
        unsigned int tC:3;
        unsigned int tD:3;
        unsigned int tE:3;
        unsigned int tF:3;
        unsigned int partitionBit:1;
    } threePartitionMode;

    DWORD rawData[4];

} OPC8_BLOCK;

```

[0083] The <blockType> specifies if the data structure contains two or three subsets per partition. There is no transparency encoding, and the color ramps always have 8 points. As illustrated, the sixth embodiment has a number of different partitions.

[0084] For a two subset partition, the data structure contains four endpoints, specified at 19 bits (RGB 6.7.6) precision. The index size is three bits and there are 32 possible partitions, selected in some fashion similar to the following:

$$\text{partition} = (\text{block->colour0} > \text{block->colour1}) ? 0x1 : 0;$$

```

partition |= (block->colour2 > block->colour3) ? 0x2 : 0;
partition |= (block->partitionBit0) ? 0x4 : 0;
partition |= (block->partitionBit1) ? 0x8 : 0;
partition |= (block->partitionBit2) ? 0x10 : 0;

```

[0085] For a three subset partition, the data structure contains six endpoints, specified at 13 bits (RGB 4.5.4) precision. The index size is three bits. There are 16 possible block partitions, selected in some fashion similar to the following:

```

partition = (block->partitionBit) ? 0x1 : 0;
partition = (block->colour0 > block->colour1) ? 0x2 : 0;
partition |= (block->colour2 > block->colour3) ? 0x4 : 0;
partition |= (block->colour4 > block->colour5) ? 0x8 : 0;

```

[0086] An implementation of the sixth embodiment has been tested and shown to give quality levels that on most 3-channel (RGB) textures can be considered ‘perceptually lossless.’ In other words, if the compressed and uncompressed representations are compared side-by-side, it can be difficult for an observer to determine which is which, even when magnified and subjected to close scrutiny. Preservation of detail and color is extremely good, and noticeable artifacts are very rare. The compression quality is high on both real-world and artificial images, when comparing the sixth embodiment to DXT1, RMS error on the 3-channel textures is typically reduced by at least 50%, and more commonly by 70% or more. While normal map—i.e., a map of surface normals—compression can also potentially be achieved with this format, the quality is not as high as other alternatives (3DC/BC5).

Conclusion

[0087] While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example only, and not limitation. Note that numerous features described above can be implemented in data compression schemes outside the field of texture compression. It will be apparent to persons skilled in the relevant art that various changes in form and detail can be made therein without departing from the spirit and scope of the invention. Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

CLAIMS

What is claimed is:

1. A method for performing texture decompression comprising:
receiving a compressed texture block;
determining a partition of pixels used for the compressed texture block,
wherein the partition includes one or more disjoint subsets into which data in the
compressed texture block is to be unpacked;
unpacking data for each subset based on the determined partition; and
decompressing each of the one or more disjoint subsets to form an
approximation of an original texture block.
2. The method of claim 1, wherein the compressed texture block
represents the original texture block.
3. The method of claim 1, wherein the partition provides an indication
regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to
compression.
4. The method of claim 1 further comprising determining a size and
shape of the one or more disjoint subsets before decompressing each of the one or
more disjoint subsets.
5. The method of claim 1, wherein a size, shape, and arrangement of the
one or more disjoint subsets within the partition is variable.
6. The method of claim 1, wherein the one or more disjoint subsets within
the partition have different sizes.

7. The method of claim 1, wherein the unpacking includes extracting information from the block that is required to decompress the data stored in the one or more subsets within the partition of pixels.

8. The method of claim 1, wherein the decompressing each of the one or more disjoint subsets is performed independently.

9. The method of claim 1 further comprising applying the approximation to a rendered surface for display.

10. The method of claim 1, wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold.

11. A computer processing system comprising:
a processor and a memory, wherein the processor is configured to:
receive a compressed texture block;
determine a partition of pixels used for the compressed texture block,
wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked;
unpack data for each subset based on the determined partition; and
decompress each of the one or more disjoint subsets to form an approximation of an original texture block.

12. The computer processing system of claim 11, wherein the compressed texture block represents the original texture block.

13. The computer processing system of claim 11, wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression.

14. The computer processing system of claim 11, wherein the processor is further configured to:

determine a size and shape of the one or more disjoint subsets before decompressing each of the one or more disjoint subsets.

15. The computer processing system of claim 11, wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable.

16. The computer processing system of claim 11, wherein the one or more disjoint subsets within the partition have different sizes.

17. The computer processing system of claim 11, wherein the processor is further configured to extract information from the block that is required to decompress the data stored in the one or more subsets within the partition of pixels when unpacking data for each subset based on the determined partition.

18. The computer processing system of claim 11, wherein the processor is further configured to independently decompress each of the one or more disjoint subsets.

19. The computer processing system of claim 11, wherein the processor is further configured to apply the approximation to a rendered surface for display.

20. The computer processing system of claim 11, wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold.

ABSTRACT

A texture decompression method is described. The method comprises receiving a compressed texture block, determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked, unpacking data for each subset based on the determined partition, and decompressing each of the one or more disjoint subsets to form an approximation of an original texture block.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES			
First Named Inventor/Applicant Name:	Konstantine Iourcha			
Filer:	Joseph P. Gushue/Peggy Ferello			
Attorney Docket Number:	ATI-060057-US-CNT[2]			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1720

Electronic Acknowledgement Receipt

EFS ID:	34957341
Application Number:	16257500
International Application Number:	
Confirmation Number:	9063
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES
First Named Inventor/Applicant Name:	Konstantine Iourcha
Customer Number:	25310
Filer:	Joseph P. Gushue/Peggy Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	ATI-060057-US-CNT[2]
Receipt Date:	25-JAN-2019
Filing Date:	
Time Stamp:	13:33:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1720
RAM confirmation Number	012519INTEFSW13341801
Deposit Account	220493
Authorized User	Margaret Ferello

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37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

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Case No. IPR2023-00688

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	ATI_060057_US_CNT_2_declarations.PDF	168337	no	2
			e3a7e78ed8b5553e5fb1c43edae46ba593527a1f		
Warnings:					
Information:					
2	Application Data Sheet	ATI_0600057_US_CNT_2_ADS.PDF	1822911	no	8
			9176fc0daeb6444a952fe922900a03f3967e59ef		
Warnings:					
Information:					
3	Transmittal Letter	ATI_060057_US_CNT_2_IDS_Transmittal_Letter.PDF	55696	no	2
			4423d2ebc9a015e7161b665adffde4e957d0e16a		
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	ATI_060057_US_CNT_2_IDS_Form_SB_08a.PDF	1037553	no	7
			38707b9c12978770444e1c416b9703f22c72a1ab		
Warnings:					
Information:					
5	Drawings-only black and white line drawings	ATI_060057_US_CNT_2_Drawings_efs.PDF	362376	no	13
			2b7da51967b2dab13b818687df267dd57348f60e		
Warnings:					
Information:					
6		ATI_060057_US_CNT_2_Continuation_Application.PDF	129222	yes	36
			85f3ea90743f8e086292ad3351aba0e002507fea		
	Multipart Description/PDF files in .zip description				
	Document Description	Start Realtek Ex. 1002 Case No. IPR2023-00688			

	Specification	1	31
	Claims	32	35
	Abstract	36	36

Warnings:

Information:

7	Fee Worksheet (SB06)	fee-info.pdf	34949	no	2
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Warnings:

Information:

Total Files Size (in bytes):	3611044
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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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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)**Title of
Invention****TEXTURE COMPRESSION TECHNIQUES**

As the below named inventor, I hereby declare that:

This declaration
is directed to:

The attached application, or

United States application or PCT international application number 15/237,134filed on August 15, 2016

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

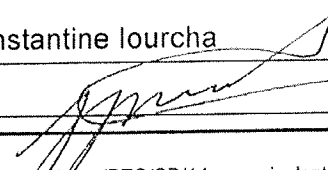
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTORInventor: Konstantine Iourcha

Date (Optional):

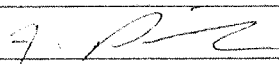
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This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute 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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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	TEXTURE COMPRESSION TECHNIQUES
As the below named inventor, I hereby declare that: This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>15/237,134</u> filed on <u>August 15, 2016</u> The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>Andrew S.C. Pomianowski</u> Date (Optional): <u>8/10/17</u> Signature: <u></u>	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ATI-060057-US-CNT[2]
		Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES		
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.)
--------------------------	---

Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Konstantine		fourcha		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
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Postal Code	95054	Country	US		

Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Andrew	S.C.	Pomianowski		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Sunnyvale	State/Province	CA	Country of Residence	US

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City	Sunnyvale	State/Province	CA		
Postal Code	94087	Country	US		

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

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For further information see 37 CFR 1.33(a).

Realtek Ex. 1002

Case No. IPR2023-00688

Page 64 of 215

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ATI-060057-US-CNT[2]
		Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES		

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

Customer Number	25310		
Email Address	eooffice@vklaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	TEXTURE DECOMPRESSION TECHNIQUES		
Attorney Docket Number	ATI-060057-US-CNT[2]	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	13	Suggested Figure for Publication (if any)	3A

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

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). Either enter 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	25310		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ATI-060057-US-CNT[2]
		Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	15237134	2016-08-15		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15237134	Continuation of	11513190	2006-08-31	9418450	2016-08-16
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. 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. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

- ☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
- NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Realtek Ex. 1002

Case No. IPR2023-00688

Application Data Sheet 37 CFR 1.76	Attorney Docket Number ATI-060057-US-CNT[2]	
	Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ATI-060057-US-CNT[2]
		Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES		

Applicant Information:

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

Applicant	1	Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear		
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor:		
If the Applicant is an Organization check here. ☒		
Organization Name	ATI Technologies ULC	
Mailing Address Information For Applicant:		
Address 1	1 Commerce Valley Drive East	
Address 2		
City	Markham	State/Province ON
Country	CA	Postal Code L3T 7X6
Phone Number		Fax Number
Email Address		
Additional Applicant Data may be generated within this form by selecting the Add button. Add		

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ATI-060057-US-CNT[2]
		Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES		

Assignee	1		
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
Remove			
If the Assignee or Non-Applicant Assignee is an Organization check here. ☒			
Organization Name	ATI Technologies ULC		
Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1	1 Commerce Valley Drive East		
Address 2			
City	Markham	State/Province	ON
Country i	CA	Postal Code	L3T 7X6
Phone Number		Fax Number	
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add			

Signature:[Remove](#)

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Joseph P. Gushue/		Date (YYYY-MM-DD)	2019-01-25	
First Name	Joseph P.	Last Name	Gushue	Registration Number	59819
Additional Signature may be generated within this form by selecting the Add button. Add					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ATI-060057-US-CNT[2]
		Application Number	
Title of Invention	TEXTURE DECOMPRESSION TECHNIQUES		

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Iourcha et al.

Application No.: Not Yet Known

Confirmation No.: Not Yet Known

Filed: Herewith

For: TEXTURE DECOMPRESSION
TECHNIQUES

Group: Not Yet Known

Examiner: Not Yet Known

Our File: ATI-060057-US-CNT[2]

Date: January 25, 2019

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents (via EFS)
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed Information Disclosure Statement Form.

This Application is a continuation of U.S. Patent Application No. 15/237,134 filed August 15, 2016, which is a continuation of U.S. Patent Application No. 11/513,190, filed August 31, 2006, which issued as U.S. Patent No. 9,418,450 on August 16, 2016.

Pursuant to 37 C.F.R. §1.98(d), copies of documents cited in the parent application are not enclosed, but copies will be provided upon request.

Applicant: ATI Technologies ULC
Application No.: Not Yet Known

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Information Disclosure Statement Form indicating consideration of the cited materials.

Respectfully submitted,

ATI Technologies ULC

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819

Volpe and Koenig, P.C.
30 South 17th Street, Suite 1800
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

JPG/pf
Enclosure

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/257,500
Filing Date	January 25, 2019
First Named Inventor	Iourcha et al.
Title	TEXTURE DECOMPRESSION TECHNIQUES
Art Unit	Not Yet Known
Examiner Name	Not Yet Known
Attorney Docket Number	ATI-060057-US-CNT[2]

SIGNATURE of Applicant or Patent Practitioner

Signature	/Joseph P. Gushue/	Date (Optional)	January 29, 2019
Name	Joseph P. Gushue	Registration Number	59,819
Title (if Applicant is a juristic entity)	ATI Technologies ULC		
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐

*Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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.

Realtek Ex. 1002
Case No. IPR2023-00688

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

16/257,500

January 25, 2019

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

25310

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR



Firm or Individual Name

Volpe and Koenig, P.C.

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

ATI Technologies ULC



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

28 Jan/2019

Name

Sorel Susan

Title

Senior Patent Attorney, Legal

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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.

Realtek Ex. 1002

Case No. IPR2023-00688

Page 75 of 215

Electronic Acknowledgement Receipt

EFS ID:	34987704
Application Number:	16257500
International Application Number:	
Confirmation Number:	9063
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES
First Named Inventor/Applicant Name:	Konstantine Iourcha
Customer Number:	25310
Filer:	Joseph P. Gushue/Peggy Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	ATI-060057-US-CNT[2]
Receipt Date:	29-JAN-2019
Filing Date:	
Time Stamp:	16:41:25
Application Type:	Utility under 35 USC 111(a)

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	Power of Attorney	ATI_060057_US_CNT_2__Power_of_Attorney_efs.PDF	315377 887669061e8d5c141fa9b0199cd713352ee14590	no	2

Warnings:

Realtex Ex. 1002
Case No. IPR2023-00688

Information:	
Total Files Size (in bytes):	315377
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.	

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/257,500			
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	300		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	660		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760		
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *			OR	x 100 =	0.00		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *				x 460 =	0.00		
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).						0.00		
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	1720		
APPLICATION AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT A	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))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
AMENDMENT B	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))					OR			
	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.									



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 NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
16/257,500	01/25/2019	2611	1720	ATI-060057-US-CNT[2]	20	2

CONFIRMATION NO. 9063

FILING RECEIPT



0000000106131412

25310
VOLPE AND KOENIG, P.C.
DEPT. AMD
30 SOUTH 17TH STREET -18TH FLOOR
PHILADELPHIA, PA 19103

Date Mailed: 02/27/2019

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**

Inventor(s)

Konstantine Iourcha, Santa Clara, CA;
Andrew S. C. Pomianowski, Sunnyvale, CA;

Applicant(s)

ATI Technologies ULC, Markham, CANADA;

Assignment For Published Patent Application

ATI Technologies ULC, Markham, CANADA

Power of Attorney: The patent practitioners associated with Customer Number 25310

Domestic Priority data as claimed by applicant

This application is a CON of 15/237,134 08/15/2016 PAT 10205956
which is a CON of 11/513,190 08/31/2006 PAT 9418450

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/257,500**

Projected Publication Date: 06/06/2019

Non-Publication Request: No

Early Publication Request: No

Title

TEXTURE DECOMPRESSION TECHNIQUES

Preliminary Class

345

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]

CONFIRMATION NO. 9063

25310
VOLPE AND KOENIG, P.C.
DEPT. AMD
30 SOUTH 17TH STREET -18TH FLOOR
PHILADELPHIA, PA 19103

PUBLICATION NOTICE



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Title:TEXTURE DECOMPRESSION TECHNIQUES

Publication No.US-2019-0174140-A1

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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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]	9063
25310	7590	06/11/2020	EXAMINER	
VOLPE AND KOENIG, P.C.			CRADDOCK, ROBERT J	
DEPT. AMD			ART UNIT	PAPER NUMBER
30 SOUTH 17TH STREET -18TH FLOOR			2618	
PHILADELPHIA, PA 19103			NOTIFICATION DATE	DELIVERY MODE
			06/11/2020	ELECTRONIC

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Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

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 though the invention is not identically disclosed or described as set forth in section 102, 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 negated 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.

Claims 1, 2, 6, 7, 11, 12, 16 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) as cited in an IDS in view of Dwyer et al. (US 20040126031 A1).

Regarding claim 1, Govindaswamy teaches a method for performing texture decompression comprising (See title of Govindaswamy. The examiner notes an image is considered to be a texture. Also the applicant's specification clarifies that a texture can also be a texture in ¶3 of the specification.) :

receiving a compressed texture block (See Govindaswamy col. 3 line 37 – 49, “The image decompressing means is configured to decompress compressed image information into the decompressed image information based on block size assignment information and address of data within a data block.”);

determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked (Indicates and identifies that subdivision structure of the original block is decided upon based upon block size assignment information see column 3 lines 57 - 67, column 7 lines 1 – 36, and see Figures 4A-5D. Col. 10 line 15 – 27);

unpacking data for each subset based on the determined partition (See col. 9 line 12-23. Col. 3 line 39 - 49); and

decompressing each of the one or more disjoint subsets [...] (column 3 lines 57 - 67).

but doesn't explicitly disclose to form an approximation of an original texture block.

Dwyer teaches to form an approximation of an original texture block (See Dwyer ¶¶26-27).

Therefore it would have been obvious to a person of ordinary skill at the time of the filing of the instant application filing to combine Govindaswamy in view of Dwyer as a lossy decompression allows the ability achieve a better compression ratio and have a smaller file than a lossless file, thus reducing the space required.

Regarding claim 2, Govindaswamy in view of Dwyer teaches the method of claim 1, wherein the compressed texture block represents the original texture block (See col. 3 line 11 – 25).

Regarding claim 6, Govindaswamy in view of Dwyer teaches the method of claim 1, wherein the one or more disjoint subsets within the partition have different sizes (Indicates and identifies that subdivision structure of the original block is decided upon based upon block size assignment information see column 3 lines 57 - 67, column 7 lines 1 – 36, and see Figures 4A-5D. Examiner notes as shown in the different Figures as cited, the different values for PRQ provide a different shape, aka a variable shape. Examiner additionally notes, that in Figure 5C, the bottom right hand corner block and the upper left hand corner are disjoint from each other.).

Regarding claim 7, Govindaswamy in view of Dwyer teaches the method of claim 1, wherein the unpacking includes extracting information from the block that is required to decompress the data stored in the one or more subsets within the partition of pixels (See col. 3 lines 36 – 49 of Govindaswamy).

Claim 11 recites similar limitations to that of claim 1 and thus is rejected under similar rationale but differs with the limitations of:

a processor and a memory, wherein the processor is configured to:

Which are taught by Govindaswamy:

a processor and a memory, wherein the processor is configured to: (See col. 6 line 35 – 45)

Claim 12 recites similar limitations to claim 2 and thus is rejected under similar rationale as detailed above.

Claim 16 recites similar limitations to claim 6 and thus is rejected under similar rationale as detailed above.

Claim 17 recites similar limitations to claim 7 and thus is rejected under similar rationale as detailed above.

Claims 3 and 13 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) in view of Dwyer et al. (US 20040126031 A1) in further view of Reshetov et al. (US 6,891,793)

Regarding claim 3, Govindaswamy in view of Dwyer teaches the method of claim 1, wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression.

Claim 13 recites similar limitations to claim 3 and thus is rejected under similar rationale as detailed above.

Reshetov teaches wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression (See Fig. 9, col. 10 line 59 – col. 11 line 2, col. 11 line 12 – 20, col. 11 line 34 – 57).

Therefore it would have been obvious to a person of ordinary skill at the time of the instant application filing to combine Govindaswamy in view of Dwyer in further view of Reshetov as some areas of blocks either don't require compression or compression wouldn't be optimal system wise, therefore not compressing them would increase the flexibility offered.

Claims 4, 5, 14 and 15 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) in view of Dwyer et al. (US 20040126031 A1) in further view of Stasiński et al. “A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression” as cited in an IDS.

Regarding claim 4, Govindaswamy in view of Dwyer teaches the method of claim 1 further comprising but doesn't explicitly disclose determining a size and shape of the one or more disjoint subsets before decompressing each of the one or more disjoint subsets.

Stasiński teaches determining a size and shape of the one or more disjoint subsets before decompressing each of the one or more disjoint subsets (See abstract, See page 16, col. 1, “One such approach is based on image partitioning into irregularly shaped regions [15], [23]. Although several variants of this approach have been proposed, most assume that a segmentation of an image into regions is performed first, followed by independent compression of each region (segment). An immediate benefit of such an approach, as opposed to rectangular image partitioning, is that all pixels associated with an object are treated as one entity.” [...] “The introduction of such planes permits a division of each block into arbitrarily shaped parts for the purpose of independent texture coding and motion compensation of each part. Clearly, object boundaries can be handled more efficiently in this approach than in standard block-based coding. However, any region is still divided into (perhaps partial) blocks, and therefore an

independent coding of these blocks is likely to result in a distortion inside the region (block visibility) if the bit rate is severely limited.” The examiner notes this disclosed arbitrary shapes. The examiner notes an arbitrary shape is considered to contain different size than another shape in the context that a different is doing to have different dimensional sizes.)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Stasiński as a variable shape to take advantage of the different compression needs of each image/texture rather than a “one size fits all” approach which may not take into account different patterns within image/textures.

Claim 14 recites similar limitations to claim 4 and thus is rejected under similar rationale as detailed above.

Regarding claim 5, Govindaswamy in view of Dwyer teaches the method of claim 1, but doesn’t explicitly disclose wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable.

Stasiński teaches wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable (See abstract, See page 16, col. 1, “One such approach is based on image partitioning into irregularly shaped regions [15], [23]. Although several variants of this approach have been proposed, most assume that a segmentation of an image into regions is performed first, followed by independent

compression of each region (segment). An immediate benefit of such an approach, as opposed to rectangular image partitioning, is that all pixels associated with an object are treated as one entity." [...] "The introduction of such planes permits a division of each block into arbitrarily shaped parts for the purpose of independent texture coding and motion compensation of each part. Clearly, object boundaries can be handled more efficiently in this approach than in standard block-based coding. However, any region is still divided into (perhaps partial) blocks, and therefore an independent coding of these blocks is likely to result in a distortion inside the region (block visibility) if the bit rate is severely limited." The examiner notes this disclosed arbitrary shapes. The examiner notes an arbitrary shape is considered to contain different size than another shape in the context that a different is doing to have different dimensional sizes.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Stasiński as a variable shape to take advantage of the different compression needs of each image/texture rather than a "one size fits all" approach which may not take into account different patterns within image/textures.

Claim 15 recites similar limitations to claim 5 and thus is rejected under similar rationale as detailed above.

Claim 8 and 18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) in view of Dwyer et al. (US 20040126031 A1) in further view of Seroussi et al. (US 5488365 A)

Regarding claim 8, Govindaswamy in view of Dwyer teaches the method of claim 1, but doesn't explicitly disclose wherein the decompressing each of the one or more disjoint subsets is performed independently.

Seroussi teaches wherein the decompressing each of the one or more disjoint subsets is performed independently (See col. 2 line 21 – 23, Claim 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Seroussi as in as blocks may be randomly accessible and therefore it is possible to decompress each block independently.

Claim 18 recites similar limitations to claim 8 and thus is rejected under similar rationale as detailed above.

Claim 9 and 19 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) in view of Dwyer et al. (US 20040126031 A1) in further view of Dye et al. (US 6,208,273)

Regarding claim 9, Govindaswamy in view of Dwyer teaches the method of claim 1 but doesn't explicitly disclose further comprising applying the approximation to a rendered surface for display.

Dye teaches further comprising applying the approximation to a rendered surface for display (col. 39 line 19 – 51: the examiner notes a texture mapping is a mapping that is applied towards a surface thus a rendered surface and can be lossy.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Dye as compressing a rendered surface at a size advantage without a time delay so to increase the flexibility offered.

Claim 19 recites similar limitations to claim 9 and thus is rejected under similar rationale as detailed above.

Claim 10 and 20 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) in view of Dwyer et al. (US 20040126031 A1) in further view of Eckert et al., Perceptual quality metrics applied to still image compression, Dec. 1998, Signal Processing 70, 177-200 as cited in an IDS.

Regarding claim 10. The method of claim 1, but doesn't explicitly disclose wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold.

Eckert teaches wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold (See page 189 col. 1 4.3 Metrics which incorporate observer preferences for suprathreshold artefacts. "There are a number of quality metrics which incorporate threshold perceptual factors, somewhat ad hoc mathematical measures, and penalties for specific suprathreshold artefacts. Mathematical measures include ^acorrelation quality^a or ^alocal image activity^a. **Suprathreshold compression artefacts** which invoke **penalties include blocking artefacts** of JPEG compression or ringing artefacts around edges [11,39]. As an **example** of such a **metric**, we can consider the **picture quality scale (PQS)** developed by Miyahara et al. [51]. They incorporate luminance adaptation, the CSF, **block artefacts**, edge artefacts, and **local summation of errors in a 5x5 pixel window.**" The examiner has made a best attempt to clean up the quoted language (in British spelling/grammar), but the inline quotation should help get the gist of important portions of the reference to apply towards the reference. The examiner notes other thresholds/qualities from Eckert may be used.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Eckert as the quality metric should be able to predict the visually lossless compression point as well as provide a perceptually meaningful scale when distortions are

significantly above the visual threshold (See page 179 col. 1 2. The utility of image quality metrics).

Claim 20 recites similar limitations to claim 10 and thus is rejected under similar rationale as detailed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT J CRADDOCK whose telephone number is (571)270-7502. The examiner can normally be reached on Monday - Friday 11:00 AM - 7 PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

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/ROBERT J CRADDOCK/
Primary Examiner, Art Unit 2618

Notice of References Cited	Application/Control No. 16/257,500		Applicant(s)/Patent Under Reexamination Iourcha et al.	
	Examiner ROBERT J CRADDOCK		Art Unit 2618	Page 1 of 1

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*	B	US-6208273-B1	03-2001	Dye, Thomas A.	H03M7/30	341/51
*	C	US-5488365-A	01-1996	Seroussi, Gadiel	G06T9/005	341/106
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Search Notes</i> 	Application/Control No. 16/257,500	Applicant(s)/Patent Under Reexamination Iourcha et al.
	Examiner ROBERT J CRADDOCK	Art Unit 2618

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
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US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
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Interference Search			
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	Realtek Ex. 1002
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Doc code: IDS

PTO/SB/08a (03-15)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2016. OMB 0651-0031

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Application Number

Filing Date

First Named Inventor

Iourcha et al.

Art Unit

Examiner Name

Attorney Docket Number

ATI-060057-US-CNT

U.S. PATENTS

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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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Iourcha et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	ATI-060057-US-CNT	

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Attorney Docket Number	ATI-060057-US-CNT	

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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	2	20040081357	A1	2004-04-29	Oldcorn, David et al.	
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Iourcha et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	ATI-060057-US-CNT	

1	2 274 754	GB		1994-08-03	Samsung Electronics Co. Ltd.		
2	99 018537	WO		1999-04-15	S3 Incorporated		
3	1672177	CN	A	2005-09-21	Govindaswamy et al.		

If you wish to add additional Foreign Patent Document citation information please click the Add button

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NON-PATENT LITERATURE DOCUMENTS

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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
	1	Search Report and Written Opinion for International Application No. PCT/US2007/018965 mailed April 10, 2008 (12 pages)	
	2	Examination Report, dated October 14, 2009, for European Patent Appln. No. 07811591.2 (4 pages)	
	3	Notification of the First Office Action, dated June 28, 2010, for Chinese Patent Appln. No. 200780030887.7 (7 pages)	
	4	Notification of the Second Office Action, dated November 14, 2011, for Chinese Patent Appln. No. 200780030887.7 (9 pages)	
	5	Masayuki Tanimoto, Hiroshi Ohyama, Tadahiko Kimoto, Sakae Katsuyama and Toshiaki Fuji; "A New Fractal Image Coding Scheme Employing Blocks of Variable Shapes"; September 1996; in Proceedings ICIP-96 (IEEE International Conference on Image Processing; 137-140).	
	6	Kauff et al., "Functional Coding of Video Using a Shape-Adaptive DCT Algorithm and an Object-Based Motion Prediction Toolbox", IEEE Transactions on Circuits and Systems for Video Technology, Vol. 7, No. 1, February 1997; 181-196	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Iourcha et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	ATI-060057-US-CNT	

7	Leonid Levkovich, Maslyuk et al., "Texture Compression with Adaptive Block Partitions", pp. 401-403. Proceedings of the 8th ACM International Conference on Multimedia (2000)
8	Ying, Tang et al., "Importance-Driven Texture Encoding Based on Samples", IEEE, June 22, 2005, pp. 169-176
9	Kirenko, Ihor, "Reduction of Coding Artifacts Using Chrominance and Luminance Spatial Analysis", IEEE, 2006; 209-210
10	"Intra coding Core Experiment proposal for MPEG-4 Video"; 34, Puri et al.; MPEG Meeting; 25-03-1996; Florence; Firenze; (MOTION PICTURE EXPERT GROUP OR ISO/IEC JTC1/SC29/WG11); no. M077, 21 March 1996 (1996-03-21), XP030030171, ISSN: 0000-0332
11	Eckert et al., "Perceptual quality metrics applied to still image compression", December 1998, Signal Processing 70, 177-200
12	Cosman et al., Evaluating Quality of Compressed Medical Images: SNR, Subjective Rating, and Diagnostic Accuracy, PROCEEDINGS OF THE IEEE, VOL. 82, NO. 6, JUNE 1994, pgs. 919-932
13	Stasidski et al., A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression, Dec. 1999; pgs. 16-34
14	Belloulata et al., REGION-BASED IMAGE COMPRESSION USING FRACTALS AND SHAPE-ADAPTIVE DCT, Dec. 1999, pgs. 815-819

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EXAMINER SIGNATURE

Examiner Signature	/ROBERT J CRADDOCK/	Date Considered	03/20/2019
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*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		
First Named Inventor	Iourcha et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	ATI-060057-US-CNT	

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2019-01-25
Name/Print	Joseph P. Gushue	Registration Number	59819

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.

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

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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.

Realtek Ex. 1002

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R J C/

Case No. IPR2023-00688

Page 106 of 215

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	37,881,506	disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 13:48
S2	2,476,889	(pixel or texture or texel or bitmap or pixmap)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 13:55
S3	119,812	S1 same S2 same (groups or sets or subsets)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 14:02
S4	5,284	S1 same S2 same (groups or sets or subsets) same (unpack or decompress\$3 or decod\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 14:03
S5	37,881,506	disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 23:13
S6	2,476,889	(pixel or texture or texel or bitmap or pixmap)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 23:13

S7	1,748	S5 same S6 same (groups or sets or subsets) same (unpack or decompress\$3 or decod\$3) same (calculating or determin\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 23:13
S8	622	S5 same S6 same (groups or sets or subsets) same (unpack or decompress\$3 or decod\$3) with (calculating or determin\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 23:16
S9	622	S5 same S6 same (groups or sets or subsets) same (unpack or decompress\$3 or decod\$3) with (calculating or determin\$3) same S5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/02 23:27
S10	96	((("IOURCHA") near3 ("Konstantine"))) OR ((("POMIANOWSKI") near3 ("Andrew"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2020/06/03 12:36
S11	82	("20030035477" "20030053706" "20040081357" "20040126031" "20040228527" "20040252894" "20040258322" "20060074935" "5051840" "5384643" "5420639" "5455680" "5535290" "5692012" "5768434" "5946417" "5956431" "6031939" "6545705" "6658146" "6683978" "6775417" "6819793" "6975773" "7039244" "7388993").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 12:36
S12	82	("20030035477" "20030053706" "20040081357" "20040126031" "20040228527" "20040252894" "20040258322" "20060074935" "5051840" "5384643" "5420639" "5455680" "5535290" "5692012" "5768434" "5946417" "5956431" "6031939" "6545705" "6658146" "6683978" "6775417" "6819793" "6975773" "7039244" "7388993").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 22:24

S13	21	S12 and (approximat\$3 or lossy)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 22:24
S14	15	S12 and (approximat\$3 or lossy) same (set or subset or block or sub ajd block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 22:24
S15	15	S12 and (approximat\$3 or lossy) same (set or subset or block or sub ajd block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 22:26
S16	12	S12 and (approximat\$3 or lossy) same (block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 22:55
S17	10	S12 and (approximat\$3 or lossy) same (block) same (decompress\$3 or decod\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 22:59
S18	18	S12 and (original) with block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 23:31
S19	18	S12 and (original) with block same (compress\$3 or encod\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/03 23:31

S22	82	("20030035477" "20030053706" "20040081357" "20040126031" "20040228527" "20040252894" "20040258322" "20060074935" "5051840" "5384643" "5420639" "5455680" "5535290" "5692012" "5768434" "5946417" "5956431" "6031939" "6545705" "6658146" "6683978" "6775417" "6819793" "6975773" "7039244" "7388993").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/04 21:39
S23	2	S22 and (uncompress\$3) with block same (compress\$3 or encod\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/04 21:39
S24	10	(uncompress\$3) with block same (compress\$3 or encod\$3) same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/04 21:45
S25	12	(uncompress\$3) same block same (compress\$3 or encod\$3) same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/04 21:48
S26	13	(uncompress\$3) same block same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/04 21:48
S27	5	S22 and (uncompress\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/04 21:49
S28	16	S22 and (uncompress\$3) or "not" adj (encod\$3 or compress\$3)	US-PGPUB; USPAT; USOCR;	OR	ON	2020/06/04 22:10

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S29	23	S22 and (independent)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 00:18
S30	1,393	(independent) with (compression or encode) with block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 12:37
S31	316	(independent) near10 (decompression or decode) near10 block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 12:37
S32	2	"7,388,993".pn. and (uncompress\$3 or decompress\$3 or decode) with (information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 14:03
S33	4	"5488365".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 14:29
S34	82	("20030035477" "20030053706" "20040081357" "20040126031" "20040228527" "20040252894" "20040258322" "20060074935" "5051840" "5384643" "5420639" "5455680" "5535290" "5692012" "5768434" "5946417" "5956431" "6031939" "6545705" "6658146" "6683978" "6775417" "6819793"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:16

		"6975773" "7039244" "7388993").PN.				
S35	0	S34 and (approximat\$3 same surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:16
S36	0	S34 and (approximat\$3 or approximation) same (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:17
S37	932	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:19
S38	101	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:19
S39	101	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:20
S40	3	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:20
S41	45	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2020/06/05 22:22

			DERWENT; IBM_TDB			
S42	11	S41 and 345/\$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:23
S43	18	(decode or decompression or decompress) same (approximat\$3 or approximation) same (texture same map\$5) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:26
S44	29	(decode or decompression or decompress) same (approximat\$3 or approximation or lossy) same (texture same map\$5) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/06/05 22:29

6/6/2020 2:11:51 AM

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/257,500	Filing Date 01/25/2019	☐ To be Mailed
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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 \$100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x \$460 =	
☐ 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

	(Column 1)		(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	11/11/2020		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	x \$100 = 0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	x \$480 = 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			CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =
	☐ 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.						SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/KAREN L VESTAL/
*** 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.						

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.**

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Iourcha et al.

Application No.: 16/257,500

Confirmation No.: 9063

Filed: January 25, 2019

For: TEXTURE
DECOMPRESSION TECHNIQUES

Group: 2618

Examiner: Robert J. Craddock

Our File: ATI-060057-US-CNT[2]

Date: November 11, 2020

RESPONSE PURSUANT TO 37 C.F.R. §1.111

Mail Stop Amendment (via EFS)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Response is being filed in response to the Non-Final Office Action dated June 11, 2020 and is submitted in conjunction with an appropriate petition for extension of time.

Please amend the application without prejudice or disclaimer as follows:

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) ATI-060057-US-CNT[2]
Application Number 16/257,500	Filed January 25, 2019	
For TEXTURE DECOMPRESSION TECHNIQUES		
Art Unit 2618	Examiner Robert J. Craddock	

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):

	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>	
☐ One month (37 CFR 1.17(a)(1))	\$220	\$110	\$55	\$ _____
☒ Two months (37 CFR 1.17(a)(2))	\$640	\$320	\$160	\$ <u>640.00</u>
☐ Three months (37 CFR 1.17(a)(3))	\$1,480	\$740	\$370	\$ _____
☐ Four months (37 CFR 1.17(a)(4))	\$2,320	\$1,160	\$580	\$ _____
☐ Five months (37 CFR 1.17(a)(5))	\$3,160	\$1,580	\$790	\$ _____

☐ 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 22-0493.☒ 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.☒ attorney or agent of record. Registration number 59,819.☐ attorney or agent acting under 37 CFR 1.34. Registration number _____./Joseph P. Gushue/
SignatureNovember 11, 2020
DateJoseph P. Gushue
Typed or printed name(215) 568-6400
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: Mail Stop PCT, 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.
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).
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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 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.

Electronic Patent Application Fee Transmittal

Application Number:	16257500			
Filing Date:	25-Jan-2019			
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES			
First Named Inventor/Applicant Name:	Konstantine Iourcha			
Filer:	Joseph P. Gushue/Margaret Ferello			
Attorney Docket Number:	ATI-060057-US-CNT[2]			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
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:				

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Page 118 of 215

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 2 months with \$0 paid	1252	1	640	640
Miscellaneous:				
Total in USD (\$)				640

Electronic Acknowledgement Receipt

EFS ID:	41093488
Application Number:	16257500
International Application Number:	
Confirmation Number:	9063
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES
First Named Inventor/Applicant Name:	Konstantine Iourcha
Customer Number:	25310
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	ATI-060057-US-CNT[2]
Receipt Date:	11-NOV-2020
Filing Date:	25-JAN-2019
Time Stamp:	16:48:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$640
RAM confirmation Number	E2020AAG49118515
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

Realtek Ex. 1002

Case No. IPR2023-00688

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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ATI_060057_US_CNT_2_Response_Non_Final_efs.pdf	535956	yes	15
			a2da4b910bf955adb294d2eacbf6a7f05948130		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Applicant Arguments/Remarks Made in an Amendment		7	15	
	Claims		2	6	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
Warnings:					
Information:					
2	Extension of Time	ATI_060057_US_CNT_2_Extension_of_Time_efs.pdf	175797	no	2
			afb410a45271aa8455f8d96aedaf0a36dbdb0		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30971	no	2
			949040a6c649e058ad9befb96b5ab3ad2f287d75		
Warnings:					
Information:					
Total Files Size (in bytes):			742724		

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.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-3, 6-13, and 16-22 are currently pending in this application. Claims 4-5 and 14-15 are canceled. Claims 1 and 11 are amended. New claims 21 and 22 are added.

Request for an Interview

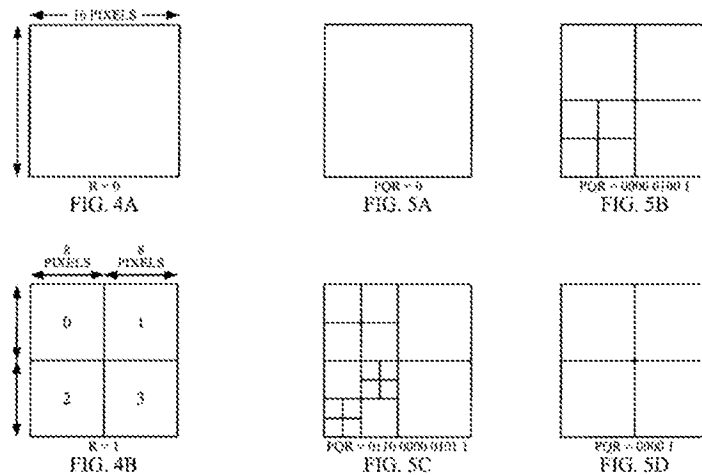
If any of the claims submitted herewith will be rejected by the Examiner, the Applicant respectfully requests a telephonic interview.

Claim Rejections - 35 U.S.C. §103

Claims 1, 2, 6, 7, 11, 12, 16 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,388,993 to Govindaswamy et al. (hereinafter “Govindaswamy”), as cited in an IDS, in view of U.S. Publication No. 2004/0126031 to Dwyer et al. (hereinafter “Dwyer”). The Applicant respectfully disagrees.

Govindaswamy teaches a technique for decoding compressed information that includes an image decompressing means configured to decompress compressed image information based on block size assignment information and address of data within a data block (see column 3, lines 37-49).

Govindawamy also teaches a technique for decoding an address of a data block into Y and X indices based on a Y and X index system that includes selecting an appropriate quantization parameter based on the block size assignment information that represent the block size assignment within an nxn block and the Y and X indices (see column 3, lines 50-65 and column 7, lines 1-6). For example, Govindaswamy teaches that a compressor generates PQR information that represents to what extent a 16x16 block is subdivided (see column 3, lines 57-67, column 7, lines 6-37, and Figures 4A-5D).



As shown above, Govindaswamy teaches that the PRQ information may be used to subdivide a 16x16 block into four 8x8 blocks where each 8x8 block may be further subdivided into four 4x4 blocks where each 4x4 block may be further subdivided into four 2x2 blocks (see column 7, lines 6-37). In Figure 5C of Govindaswamy, each of

the blocks are sub-divisions of a 16x16 block and the blocks must be either 8x8 blocks, 4x4 blocks, or 2x2 blocks.

Govindasway further discloses the use of a variable length decoding (VLD) module that decodes a compressed image and inverse quantization is performed based on the block assignment information (see column 3, lines 39-49, column 9, lines 12-23, and column 10, lines 15-27).

Govindaswamy merely teaches a technique for decoding that includes the use of block assignment information that indicates how a 16x16 block is sub-divided into square sub-blocks where all of the sub-blocks are the same size.

Govindaswamy is silent regarding the use of subsets that define a plurality of disjoint subsets of pixels having variable sizes, shapes, and arrangements as recited in the amended independent claims.

Because Govindaswamy is silent regarding the use of disjoint subsets as recited in the amended independent claims, Govindaswamy fails to teach or suggest “determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable” as recited in the amended independent claims.

Govindaswamy is also silent regarding decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block as recited in the pending independent claims. The Examiner agrees (see page 3 of the Non-Final Office Action).

It is noted that the independent claims are amended to recite individually decompressing each of the one or more disjoint subsets within each partition of pixels. Govindaswamy is silent regarding this feature as well. Accordingly, Govindaswamy fails to teach or suggest “individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block” as recited in the amended independent claims.

Dwyer fails to cure the deficiencies of Govindaswamy. Dwyer teaches techniques for compressing and decompressing a digital image (see paragraph [0008]). More particularly, Dwyer teaches a decompression technique where [[the codec]] determines whether to perform lossy or lossless decompression

Like Govindaswamy, Dwyer is also silent regarding the determining a partition of pixels used for a compressed texture block where the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked, where a size, shape, and arrangement of the one or more

disjoint subsets within the partition is variable as recited in the amended independent claims.

The combination of Govindaswamy and Dwyer also fails to teach or suggest “individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block” as recited in the amended independent claims.

Claims 3 and 13 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, and in further view of U.S. Patent No. 6,891,793 to Reshetov et al. (hereinafter “Reshetov”).

Claims 3 and 13 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Claims 4, 5, 14 and 15 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, and in further view of “A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression”, as cited in an IDS, to Stasidski et al. (hereinafter “Stasidski”). The Applicant disagrees.

Independent claims are amended to include the limitations found in dependent claims 4-5 and 14-15. It is respectfully submitted that amended independent claim are allowable over the combination of Govindaswamy, Dwyer, and Stasidski.

Stasidski fails to cure the deficiencies of Govindaswamy and Dwyer. Stasidski is related to region-based approaches to image and video compression. In contrast to the pending independent claims, Stasidski is totally silent regarding any teachings for decompression techniques.

Accordingly, Stasidski, in combination with Govindaswamy and Dwyer, fails to teach or suggest “determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable” as recited in the amended independent claims.

Stasidski, Govindaswamy, and Dwyer, also fail to each or suggest “individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block” as recited in the amended independent claims (emphasis added).

Claims 8 and 18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, and in further view of U.S. Patent No. 5,488,365 to Seroussi et al. (hereinafter “Seroussi”).

Claims 8 and 18 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Claims 9 and 19 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, and in further view of U.S. Patent No. 6,208,273 to Dye et al. (hereinafter “Dye”).

Claims 9 and 19 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Claims 10 and 20 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, and in further view of “Perceptual quality metrics applied to still image compression”, as cited in and IDS, to Eckert et al. (hereinafter “Eckert”).

Claims 10 and 20 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Based on the arguments presented above, withdrawal of the 35 U.S.C. 103 rejection of claims 1-3 and 6-13, and 16-20 is respectfully requested.

New dependent claims 21-22 are added to the pending claims and recite that each of the one or more disjoint subsets is associated with a quality parameter that met a pre-selected threshold. The cited references of record are totally silent regarding a quality parameter being associated with each of the one or more disjoint subsets within each partition of pixels as recited in the new dependent claims.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Iourcha et al.

By /Joseph P. Gushue/
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JPG/pf
Enclosure

Amendments to the Claims:

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

1. (Currently Amended) A method for performing texture decompression comprising:

receiving a compressed texture block;

determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable;

unpacking data for each subset based on the determined partition; and

individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block.

2. (Original) The method of claim 1, wherein the compressed texture block represents the original texture block.

3. (Original) The method of claim 1, wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression.

4. Canceled.

5. Canceled.

6. (Original) The method of claim 1, wherein the one or more disjoint subsets within the partition have different sizes.

7. (Original) The method of claim 1, wherein the unpacking includes extracting information from the block that is required to decompress the data stored in the one or more subsets within the partition of pixels.

8. (Original) The method of claim 1, wherein the decompressing each of the one or more disjoint subsets is performed independently.

9. (Original) The method of claim 1 further comprising applying the approximation to a rendered surface for display.

10. (Original) The method of claim 1, wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold.

11. (Currently Amended) A computer processing system comprising:
a processor and a memory, wherein the processor is configured to:
receive a compressed texture block;
determine a partition of pixels used for the compressed texture block,
wherein the partition includes one or more disjoint subsets into which data in
the compressed texture block is to be unpacked, wherein a size, shape, and
arrangement of the one or more disjoint subsets within the partition is
variable;
unpack data for each subset based on the determined partition; and
individually decompress each of the one or more disjoint subsets within
each partition of pixels to form an approximation of an original texture block.

12. (Original) The computer processing system of claim 11, wherein the compressed texture block represents the original texture block.

13. (Original) The computer processing system of claim 11, wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression.

14. Canceled.

15. Canceled.

16. (Original) The computer processing system of claim 11, wherein the one or more disjoint subsets within the partition have different sizes.

17. (Original) The computer processing system of claim 11, wherein the processor is further configured to extract information from the block that is required to decompress the data stored in the one or more subsets within the partition of pixels when unpacking data for each subset based on the determined partition.

18. (Original) The computer processing system of claim 11, wherein the processor is further configured to independently decompress each of the one or more disjoint subsets.

19. (Original) The computer processing system of claim 11, wherein the processor is further configured to apply the approximation to a rendered surface for display.

20. (Original) The computer processing system of claim 11, wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold.

21. (New) The method of claim 1, wherein each of the one or more disjoint subsets is associated with a quality parameter that met a pre-selected threshold.

22. (New) The computer processing system of claim 11, wherein each of the one or more disjoint subsets is associated with a quality parameter that met a pre-selected threshold.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]	9063
25310	7590	01/12/2021	EXAMINER	
Volpe Koenig DEPT. AMD 30 SOUTH 17TH STREET -18TH FLOOR PHILADELPHIA, PA 19103			CRADDOCK, ROBERT J	
			ART UNIT	PAPER NUMBER
			2618	
			NOTIFICATION DATE	DELIVERY MODE
			01/12/2021	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):

eoffice@volpe-koenig.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

Applicant's arguments filed 11/11/2020 have been fully considered but they are not persuasive.

The applicant argues on page 11, "The combination of Govindaswamy and Dwyer also fails to teach or suggest "individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block" as recited in the amended independent claims." To which the examiner respectfully disagrees.

- The rejection states individually decompressing each of the one or more disjoint subsets within each partition of pixels [...] (column 3 lines 57 – 67. See col. 8 lines 5 – 20, the quantization levels for each block size can be different, which necessarily means that the decompression is different for different block sizes which suggests that the decompression happens separate for each block. Col. 3 lines 3 – 6, col. 13 lines 49 - 62), but doesn't explicitly disclose to form an

approximation of an original texture block; wherein a size, shape and arrange of one or more disjoint subject within the partition is variable.

- Dwyer teaches to form an approximation of an original texture block (See Dwyer ¶26-27).
- Therefore it would have been obvious to a person of ordinary skill at the time of the filing of the instant application filing to combine Govindaswamy in view of Dwyer as a lossy decompression allows the ability achieve a better compression ratio and have a smaller file than a lossless file, thus reducing the space required.

As such the applicant's arguments aren't considered to be persuasive.

The applicant's argues on page 12, "In contrast to the pending independent claims, Stasidski is totally silent regarding any teachings for decompression techniques." The examiner respectfully disagrees.

- The examiner notes, the rejection has been further clarified to note: The examiner additionally notes, "decomposed", "decomposition" , "inverse algorithm" and "decode" used throughout the document are synonyms with decompression. For this reasons the applicant's argument isn't considered to be persuasive.

On page 12 the applicant argues, "Accordingly, Stasidski, in combination with Govindaswamy and Dwyer, fails to teach or suggest "determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable" as recited in the amended independent claims.

Stasidski, Govindaswamy, and Dwyer, also fail to each or suggest "individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block" as recited in the amended independent claims (emphasis added). " To which the examiner respectfully disagrees.

- Govindaswamy is cited for teaching, "determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked". From Govindaswamy, column 3 lines 57 - 67, column 7 lines 1 – 36, and see Figures 4A-5D. Col. 10 line 15 – 27, Govindaswamy indicates and identifies subdivision structure of the original block based upon block size assignment information.
- Stasiński is cited for teaching, "wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is variable". From Stasiński, abstract, See page 16, col. 1, "One such approach is based on

image partitioning into irregularly shaped regions [15], [23]. Although several variants of this approach have been proposed, most assume that a segmentation of an image into regions is performed first, followed by independent compression of each region (segment). An immediate benefit of such an approach, as opposed to rectangular image partitioning, is that all pixels associated with an object are treated as one entity." [...] "The introduction of such planes permits a division of each block into arbitrarily shaped parts for the purpose of independent texture coding and motion compensation of each part. Clearly, object boundaries can be handled more efficiently in this approach than in standard block-based coding. However, any region is still divided into (perhaps partial) blocks, and therefore an independent coding of these blocks is likely to result in a distortion inside the region (block visibility) if the bit rate is severely limited." The examiner notes this disclosed arbitrary shapes. The examiner notes an arbitrary shape is considered to contain different size than another shape in the context that a different is doing to have different dimensional sizes. The examiner additionally notes, "decomposed", "decomposition", "inverse algorithm" and "decode" used throughout the document are synonyms with decompression. These are describing decompressing the disjoint subsets. One of ordinary skill would have been motivated to consider Stasiński because variable shape to take advantage of the different compression needs of each image/texture

rather than a "one size fits all" approach which may not take into account different patterns within image/textures.

- As for, "individually decompressing each of the one or more disjoint subsets within each partition of pixels to form an approximation of an original texture block" this is taught among two references, Govindaswamy and Dwyer.
- As is, Govindaswamy is cited for teaching individually decompressing each of the one or more disjoint subsets within each partition of pixels. From Govindaswamy, column 3 lines 57 – 67, the quantization levels for each block size can be different, which necessarily means that the decompression is different for different block sizes which suggests that the decompression happens separate for each block, also see col. 8 lines 5 – 20, Col. 3 lines 3 – 6, col. 13 lines 49 – 62. As such Govindaswamy meets this portion of the limitation.
- As for, "to form an approximation of an original texture block " this is taught by Dwyer.
- From Dwyer, ¶26-27. Dwyer is teaching an approximation. One of ordinary skill would know there are advantages of lossy in the compression that

compressed texture/images take up less space and are easier to transmit through system buses as compressed image/textures use up less bandwidth, and thus would have considered Dwyer's teaching to arrive at the claimed limitation.

- Therefore the applicant arguments aren't considered to be persuasive.

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 though the invention is not identically disclosed or described as set forth in section 102, 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 negated 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.

Claims 1, 2, 6, 7, 11, 12, 16 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) as cited in an IDS in view

of Dwyer et al. (US 20040126031 A1) in further view of Stasiński et al. “A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression” as cited in an IDS.

Regarding claim 1, Govindaswamy teaches a method for performing texture decompression comprising (See title of Govindaswamy. The examiner notes an image is considered to be a texture. Also the applicant’s specification clarifies that a texture can also be an image in ¶13 of the specification.) :

receiving a compressed texture block (See Govindaswamy col. 3 line 37 – 49, “The image decompressing means is configured to decompress compressed image information into the decompressed image information based on block size assignment information and address of data within a data block.”);

determining a partition of pixels used for the compressed texture block, wherein the partition includes one or more disjoint subsets into which data in the compressed texture block is to be unpacked (Indicates and identifies that subdivision structure of the original block is decided upon based upon block size assignment information (see column 3 lines 57 - 67, column 7 lines 1 – 36, and see Figures 4A-5D. Col. 10 line 15 – 27);

unpacking data for each subset based on the determined partition (See col. 9 line 12-23. Col. 3 line 39 - 49); and

individually decompressing each of the one or more disjoint subsets within each partition of pixels [...] (column 3 lines 57 – 67. See col. 8 lines 5 – 20, the quantization levels for each block size can be different, which necessarily means that the decompression is different for different block sizes which suggests that the decompression happens separate for each block. Col. 3 lines 3 – 6, col. 13 lines 49 - 62), but doesn't explicitly disclose to form an approximation of an original texture block; wherein a size, shape and arrange of one or more disjoint subject within the partition is variable.

Dwyer teaches to form an approximation of an original texture block (See Dwyer ¶26-27).

Therefore it would have been obvious to a person of ordinary skill at the time of the filing of the instant application filing to combine Govindaswamy in view of Dwyer as a lossy decompression allows the ability achieve a better compression ratio and have a smaller file than a lossless file, thus reducing the space required.

Govindaswamy in view of Dwyer doesn't explicitly disclose wherein a size, shape and arrange of one or more disjoint subject within the partition is variable.

Stasiński teaches wherein a size, shape and arrange of one or more disjoint subject within the partition is variable. (See abstract, See page 16, col. 1, "One such approach is based on image partitioning into irregularly shaped regions [15], [23]. Although several variants of this approach have been proposed, most assume that a segmentation of an image into regions is performed first, followed by independent compression of each region (segment). An immediate benefit of such an approach, as opposed to rectangular image partitioning, is that all pixels associated with an object are treated as one entity." [...] "The introduction of such planes permits a division of each block into arbitrarily shaped parts for the purpose of independent texture coding and motion compensation of each part. Clearly, object boundaries can be handled more efficiently in this approach than in standard block-based coding. However, any region is still divided into (perhaps partial) blocks, and therefore an independent coding of these blocks is likely to result in a distortion inside the region (block visibility) if the bit rate is severely limited." The examiner notes this disclosed arbitrary shapes. The examiner notes an arbitrary shape is considered to contain different size than another shape in the context that a different is doing to have different dimensional sizes. The examiner additionally notes, "decomposed", "decomposition", "inverse algorithm" and "decode" used throughout the document are synonyms with decompression. These are describing decompressing the disjoint subsets.)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Stasiński as a variable shape to take advantage of the different compression needs of

each image/texture rather than a “one size fits all” approach which may not take into account different patterns within image/textures.

Regarding claim 2, Govindaswamy in view of Dwyer in further view of Stasiński teaches the method of claim 1, wherein the compressed texture block represents the original texture block (See col. 3 line 11 – 25).

Regarding claim 6, Govindaswamy in view of Dwyer in further view of Stasiński teaches the method of claim 1, wherein the one or more disjoint subsets within the partition have different sizes (Indicates and identifies that subdivision structure of the original block is decided upon based upon block size assignment information see column 3 lines 57 - 67, column 7 lines 1 – 36, and see Figures 4A-5D. Examiner notes as shown in the different Figures as cited, the different values for PRQ provide a different shape, aka a variable shape. Examiner additionally notes, that in Figure 5C, the bottom right hand corner block and the upper left hand corner are disjoint from each other.).

Regarding claim 7, Govindaswamy in view of Dwyer in further view of Stasiński teaches the method of claim 1, wherein the unpacking includes extracting information from the block that is required to decompress the data stored in the one or more subsets within the partition of pixels (See col. 3 lines 36 – 49 of Govindaswamy).

Claim 11 recites similar limitations to that of claim 1 and thus is rejected under similar rationale but differs with the limitations of:

a processor and a memory, wherein the processor is configured to:

Which are taught by Govindaswamy:

a processor and a memory, wherein the processor is configured to: (See col. 6 line 35 – 45)

Claim 12 recites similar limitations to claim 2 and thus is rejected under similar rationale as detailed above.

Claim 16 recites similar limitations to claim 6 and thus is rejected under similar rationale as detailed above.

Claim 17 recites similar limitations to claim 7 and thus is rejected under similar rationale as detailed above.

Claims 3 and 13 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) as cited in an IDS in view of Dwyer et al. (US 20040126031 A1) in further view of Stasiński et al. “A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression” as cited in an IDS in further view of Reshetov et al. (US 6,891,793)

Regarding claim 3, Govindaswamy in view of Dwyer in further view of Stasiński teaches the method of claim 1, wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression.

Reshetov teaches wherein the partition provides an indication regarding a subdivision of uncompressed texture blocks into disjoint subsets prior to compression (See Fig. 9, col. 10 line 59 – col. 11 line 2, col. 11 line 12 – 20, col. 11 line 34 – 57).

Therefore it would have been obvious to a person of ordinary skill at the time of the instant application filing to combine Govindaswamy in view of Dwyer in view of Stasiński in further view of Reshetov as some areas of blocks either don't require compression or compression wouldn't be optimal system wise, therefore not compressing them would increase the flexibility offered.

Claim 13 recites similar limitations to claim 3 and thus is rejected under similar rationale as detailed above.

Claim 8 and 18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) as cited in an IDS in view of Dwyer et al. (US 20040126031 A1) in view of Stasiński et al. "A New Class of Fast Shape-

Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression” as cited in an IDS further view of Seroussi et al. (US 5488365 A)

Regarding claim 8, Govindaswamy in view of Dwyer in further view of Stasiński teaches the method of claim 1, but doesn’t explicitly disclose wherein the decompressing each of the one or more disjoint subsets is performed independently.

Seroussi teaches wherein the decompressing each of the one or more disjoint subsets is performed independently (See col. 2 line 21 – 23, Claim 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Seroussi as in as blocks may be randomly accessible and therefore it is possible to decompress each block independently.

Claim 18 recites similar limitations to claim 8 and thus is rejected under similar rationale as detailed above.

Claim 9 and 19 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy et al. (7,388,993) as cited in an IDS in view of Dwyer et al. (US 20040126031 A1) in view of Stasiński et al. “A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression” as cited in an IDS in further view of Dye et al. (US 6,208,273).

Regarding claim 9, Govindaswamy in view of Dwyer teaches the method of claim 1 but doesn't explicitly disclose further comprising applying the approximation to a rendered surface for display.

Dye teaches further comprising applying the approximation to a rendered surface for display (col. 39 line 19 – 51: the examiner notes a texture mapping is a mapping that is applied towards a surface thus a rendered surface and can be lossy.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in further view of Dye as compressing a rendered surface at a size advantage without a time delay so to increase the flexibility offered.

Claim 19 recites similar limitations to claim 9 and thus is rejected under similar rationale as detailed above.

Claim 10, 20, 21 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable Govindaswamy et al. (7,388,993) as cited in an IDS in view of Dwyer et al. (US 20040126031 A1) in view of Stasiński et al. "A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their Application to Region-Based Image Compression" as cited in an IDS in further view of Eckert et al., Perceptual quality metrics applied to still image compression, Dec. 1998, Signal Processing 70, 177-200 as cited in an IDS.

Regarding claim 10. The method of claim 1, but doesn't explicitly disclose wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold.

Eckert teaches wherein the partition of pixels is associated with a quality parameter that meets a pre-selected threshold (See page 189 col. 1 4.3 Metrics which incorporate observer preferences for suprathreshold artefacts. "There are a number of quality metrics which incorporate threshold perceptual factors, somewhat ad hoc mathematical measures, and penalties for specific suprathreshold artefacts. Mathematical measures include "correlation quality" or "local image activity". **Suprathreshold compression artefacts** which invoke **penalties include blocking artefacts** of JPEG compression or ringing artefacts around edges [11,39]. As an **example** of such a **metric**, we can consider the **picture quality scale (PQS)** developed by Miyahara et al. [51]. They incorporate luminance adaptation, the CSF, **block artefacts**, edge artefacts, and **local summation of errors in a 5x5 pixel window.**" The examiner has made a best attempt to clean up the quoted language (in British spelling/grammar), but the inline quotation should help get the gist of important portions of the reference to apply towards the reference. The examiner notes other thresholds/qualities from Eckert may be used.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in view of Stasiński in further view of Eckert as the quality metric should be able to predict the visually lossless

compression point as well as provide a perceptually meaningful scale when distortions are significantly above the visual threshold (See page 179 col. 1 2. The utility of image quality metrics).

Claim 20 recites similar limitations to claim 10 and thus is rejected under similar rationale as detailed above.

Regarding claim 21, Govindaswamy in view of Dwyer in view of Stasiński teaches the method of claim 1, but doesn't explicitly disclose wherein each of the one or more disjointed subset is associated with a quality parameter that met a preselected threshold.

Eckert teaches wherein each of the one or more disjointed subset is associated with a quality parameter that met a preselected threshold (See page 189 col. 1 4.3 Metrics which incorporate observer preferences for suprathreshold artefacts. "There are a number of quality metrics which incorporate threshold perceptual factors, somewhat ad hoc mathematical measures, and penalties for specific suprathreshold artefacts. Mathematical measures include ^acorrelation quality^a or ^alocal image activity^a.

Suprathreshold compression artefacts which invoke **penalties include blocking artefacts** of JPEG compression or ringing artefacts around edges [11,39]. As an **example of such a metric**, we can consider the **picture quality scale (PQS)** developed by Miyahara et al. [51]. They incorporate luminance adaptation, the CSF, **block artefacts**, edge artefacts, and **local summation of errors in a 5x5 pixel window.**" The examiner has made a best attempt to clean up the quoted language (in British

spelling/grammar), but the inline quotation should help get the gist of important portions of the reference to apply towards the reference. The examiner notes other thresholds/qualities from Eckert may be used.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in view of Stasiński in further view of Eckert as the quality metric should be able to predict the visually lossless compression point as well as provide a perceptually meaningful scale when distortions are significantly above the visual threshold (See page 179 col. 1 2. The utility of image quality metrics).

Regarding claim 21, Govindaswamy in view of Dwyer in view of Stasiński teaches the computer processing system of claim 11, but doesn't explicitly disclose wherein each of the one or more disjoint subsets is associated with a quality parameter that met a pre-selected threshold

Eckert teaches wherein each of the one or more disjoint subset is associated with a quality parameter that met a preselected threshold (See page 189 col. 1 4.3 Metrics which incorporate observer preferences for suprathreshold artefacts. "There are a number of quality metrics which incorporate threshold perceptual factors, somewhat ad hoc mathematical measures, and penalties for specific suprathreshold

artefacts. Mathematical measures include "correlation quality" or "local image activity".

Suprathreshold compression artefacts which invoke **penalties include blocking artefacts** of JPEG compression or ringing artefacts around edges [11,39]. As an **example** of such a **metric**, we can consider the **picture quality scale (PQS)** developed by Miyahara et al. [51]. They incorporate luminance adaptation, the CSF, **block artefacts**, edge artefacts, and **local summation of errors in a 5x5 pixel window.**" The examiner has made a best attempt to clean up the quoted language (in British spelling/grammar), but the inline quotation should help get the gist of important portions of the reference to apply towards the reference. The examiner notes other thresholds/qualities from Eckert may be used.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Govindaswamy in view of Dwyer in view of Stasiński in further view of Eckert as the quality metric should be able to predict the visually lossless compression point as well as provide a perceptually meaningful scale when distortions are significantly above the visual threshold (See page 179 col. 1 2. The utility of image quality metrics).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT J CRADDCK whose telephone number is (571)270-7502. The examiner can normally be reached on Monday - Friday 11:00 AM - 7 PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barry T Drennan can be reached on 571-270-7262. 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 <https://ppair-my.uspto.gov/pair/PrivatePair>. 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.

/ROBERT J CRADDOCK/
Primary Examiner, Art Unit 2618

<i>Search Notes</i> 	Application/Control No. 16/257,500	Applicant(s)/Patent Under Reexamination Iourcha et al.
	Examiner ROBERT J CRADDOCK	Art Unit 2618

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
See EAST for prior art and inventor name search	01/06/2021	RC

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

	Realtek Ex. 1002 Case No. IPR2023-00888
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S46	98	((("IOURCHA") near3 ("Konstantine"))) OR ((("POMIANOWSKI") near3 ("Andrew"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2021/01/05 19:06
S60	18	(uncompress\$3) same block same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S61	5	S56 and (uncompress\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S63	24	S56 and (independent)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S64	1,463	(independent) with (compression or encode) with block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S65	330	(independent) near10 (decompression or decode) near10 block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S69	0	S68 and (approximat\$3 same surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S70	0	S68 and (approximat\$3 or approximation) same (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S71	954	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2021/01/05 19:06

			DERWENT; IBM_TDB			
S72	103	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S73	103	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S74	3	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S75	46	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S76	11	S75 and 345/\$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S77	19	(decode or decompression or decompress) same (approximat\$3 or approximation) same (texture same map\$5) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06
S78	30	(decode or decompression or decompress) same (approximat\$3 or approximation or lossy) same (texture same map\$5) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/01/05 19:06

EAST Search History (Interference)

<This search history is empty>

1/7/2021 8:08:44 PM

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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 16/257,500	Filing Date 01/25/2019	☐ To be Mailed
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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 \$100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	x \$460 =	
☐ 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

	(Column 1)		(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	07/12/2021		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	* 12	Minus	** 20	= 0	x \$100 = 0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	x \$480 = 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			CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =
	☐ 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.						LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/MONICA D FRANCIS/
*** 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.						

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.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL **(Submitted Only via EFS-Web)**

Application Number	16257500	Filing Date	2019-01-25	Docket Number (if applicable)	ATI-060057-US-CNT[2]	Art Unit	2618
First Named Inventor	lourcha et al.			Examiner Name	Robert J. Craddock		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☒ Other

Petition for Extension of Time

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
 (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.
 The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to
 Deposit Account No 220493

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
 Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	Joseph P. Gushue/	Date (YYYY-MM-DD)	2021-07-12
Name	Joseph P. Gushue	Registration Number	59819

This collection of information is required by 37 CFR 1.114. 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 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.

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 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.

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) ATI-060057-US-CNT[2]
Application Number 16/257,500	Filed January 25, 2019	
For TEXTURE DECOMPRESSION TECHNIQUES		
Art Unit 2618	Examiner Robert J. Craddock	

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):

	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>	
☐ One month (37 CFR 1.17(a)(1))	\$220	\$110	\$55	\$ _____
☐ Two months (37 CFR 1.17(a)(2))	\$640	\$320	\$160	\$ _____
☒ Three months (37 CFR 1.17(a)(3))	\$1,480	\$740	\$370	\$ <u>1,480.00</u>
☐ Four months (37 CFR 1.17(a)(4))	\$2,320	\$1,160	\$580	\$ _____
☐ Five months (37 CFR 1.17(a)(5))	\$3,160	\$1,580	\$790	\$ _____

☐ 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 22-0493.☒ 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.☒ attorney or agent of record. Registration number 59,819.☐ attorney or agent acting under 37 CFR 1.34. Registration number _____./Joseph P. Gushue/

Signature

July 12, 2021

Date

Joseph P. Gushue

Typed or printed name

(215) 568-6400

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: Mail Stop PCT, 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.

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Iourcha et al.

Application No.: 16/257,500

Confirmation No.: 9063

Filed: January 25, 2019

For: TEXTURE
DECOMPRESSION TECHNIQUES

Group: 2618

Examiner: Robert J. Craddock

Our File: ATI-060057-US-CNT[2]

Date: July 12, 2021

RESPONSE PURSUANT TO 37 C.F.R. §1.114

Mail Stop RCE (via EFS)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Response is being filed in response to the Final Office Action dated January 12, 2021 and is submitted in conjunction with an appropriate petition for extension of time. A Request for Continued Examination (RCE) is filed concurrently herewith.

Please amend the application without prejudice or disclaimer as follows:

Amendments to the Claims:

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

1. (Currently Amended) A method for performing texture decompression comprising:

receiving a compressed texture block, wherein the compressed texture block includes; determining a partition of pixels used for the compressed texture block, wherein the partition includes ~~two~~ one or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein a size, shape, and arrangement of the one or more disjoint subsets within the partition is the two or more disjoint subsets include a first subset having a first set of color endpoints and a second subset having a second set of color endpoints variable; and

~~unpacking data for each subset based on the determined partition; and~~

individually decompressing each of the ~~two~~ one or more disjoint subsets ~~within each partition of pixels to form texels, an approximation of an original texture block wherein the decompressing includes:~~

determining a first texel color for a first texel that is part of the first disjoint subset by interpolating between color endpoints of the first set of color endpoints based on a first index value for the first texel; and

determining a second texel color for a second texel that is part of the second disjoint subset by interpolating between color endpoints of the second set of color endpoints based on a second index value for the second texel.

2. (Original) The method of claim 1, wherein the compressed texture block represents the original texture block.

3. Canceled.

4. Canceled.

5. Canceled.

6. (Currently Amended) The method of claim 1, wherein the one or more disjoint subsets ~~within the partition~~ have different sizes.

7. Canceled.

8. (Original) The method of claim 1, wherein the decompressing each of the one or more disjoint subsets is performed independently.

9. (Original) The method of claim 1 further comprising applying the approximation to a rendered surface for display.

10. Canceled.

11. (Currently Amended) A computer processing system comprising:
a processor and a memory, wherein the processor is configured to:
receive a compressed texture block, wherein the compressed texture block includes determine a partition of pixels used for the compressed texture block, wherein the partition includes two one or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein ~~a size, shape, and arrangement of the one or more disjoint subsets within the partition is~~ the two or more disjoint subsets include a first subset having a first set of color endpoints and a second subset having a second set of color endpoints variable; and
~~unpack data for each subset based on the determined partition; and~~

individually decompress each of the ~~two~~ one or more disjoint subsets within each partition of pixels to form texels, ~~an approximation of an original texture block~~ wherein the decompressing includes:

determining a first texel color for a first texel that is part of the first disjoint subset by interpolating between color endpoints of the first set of color endpoints based on a first index value for the first texel; and

determining a second texel color for a second texel that is part of the second disjoint subset by interpolating between color endpoints of the second set of color endpoints based on a second index value for the second texel.

12. (Original) The computer processing system of claim 11, wherein the compressed texture block represents the original texture block.

13. Canceled.

14. Canceled.

15. Canceled.

16. (Currently Amended) The computer processing system of claim 11, wherein the one or more disjoint subsets ~~within the partition~~ have different sizes.

17. Canceled.

18. (Original) The computer processing system of claim 11, wherein the processor is further configured to independently decompress each of the one or more disjoint subsets.

19. (Original) The computer processing system of claim 11, wherein the processor is further configured to apply the approximation to a rendered surface for display.

20. Canceled.

21. (Previously Presented) The method of claim 1, wherein each of the one or more disjoint subsets is associated with a quality parameter that met a pre-selected threshold.

22. (Previously Presented) The computer processing system of claim 11, wherein each of the one or more disjoint subsets is associated with a quality parameter that met a pre-selected threshold.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-2, 6, 8-9, 11-12, 16 18-19, and 21-22 are currently pending in this application. Claims 1, 6, 11, and 16 are amended. Claims 3-5, 7, 10, 13-15, 17, and 20 are canceled.

Request for an Interview

If any of the claims submitted herewith will be rejected by the Examiner, the Applicant respectfully requests a telephonic interview.

Claim Rejections - 35 U.S.C. §103

Claims 1, 2, 6, 7, 11, 12, 16 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,388,993 to Govindaswamy et al. (hereinafter “Govindaswamy”), as cited in an IDS, in view of U.S. Publication No. 2004/0126031 to Dwyer et al. (hereinafter “Dwyer”) and further in view of “A New Class of Fast Shape-Adaptive Orthogonal Transforms and Their application to Region-Based Image Compression” to Stasidski et al. (hereinafter “Stasidski”). The Applicant respectfully disagrees.

As amended, the independent claims recite the following:

- receiving a compressed texture block, wherein the compressed texture block includes two or more disjoint subsets into which data in the compressed texture block is to be unpacked, wherein the two or more disjoint subsets include a first subset having a first set of color endpoints and a second subset having a second set of color endpoints; and
- individually decompressing each of the two or more disjoint subsets to form texels, wherein the decompressing includes:
 - determining a first texel color for a first texel that is part of the first disjoint subset by interpolating between color endpoints of the first set of color endpoints based on a first index value for the first texel; and
 - determining a second texel color for a second texel that is part of the second disjoint subset by interpolating between color endpoints of the second set of color endpoints based on a second index value for the second texel.

The cited references, used either alone or in combination, are silent regarding any teachings regarding the features found in the amended independent claims. More particularly, the cited references does not teach or suggest the use of a compressed texture block including “two or more disjoint subsets of data ... the two

or more disjoint subsets of data include a first subset having a first set of color endpoints and a second subset of color endpoints” and individually decompressing each of the two or more disjoint subsets wherein the decompressing includes “determining a first texel color for a first texel that is part of the first disjoint subset by interpolating between color endpoints of the first set of color endpoints based on a first index value for the first texel; and determining a second texel color for a second texel that is part of the second disjoint subset by interpolating between color endpoints of the second set of color endpoints based on a second index value for the second texel” as recited in the amended independent claims.

Govindaswamy teaches a technique for decoding compressed information that includes an image decompressing means configured to decompress compressed image information based on block size assignment information and address of data within a data block (see column 3, lines 37-49). More particularly, Govindaswamy teaches that the PRQ information may be used to subdivide a 16x16 block into four 8x8 blocks where each 8x8 block may be further subdivided into four 4x4 blocks where each 4x4 block may be further subdivided into four 2x2 blocks (see column 7, lines 6-37).

Govindaswamy is silent regarding the claimed use of a compressed texture block including two or more disjoint subsets of data and individually

decompressing each of the two or more disjoint subsets as recited in the amended independent claims.

Dwyer fails to cure the deficiencies of Govindaswamy. Dwyer teaches techniques for compressing and decompressing a digital image (see paragraph [0008]). More particularly, Dwyer teaches a decompression technique where [[the codec]] determines whether to perform lossy or lossless decompression

Like Govindaswamy, Dwyer is also silent regarding the claimed use of a compressed texture block including two or more disjoint subsets of data and individually decompressing each of the two or more disjoint subsets as recited in the amended independent claims.

Stasidski fails to cure the deficiencies of Govindaswamy and Dwyer. Stasidski is related to region-based approaches to image and video compression. Stasidski discloses image partitioning into regions and then independent compression of each region (see page 16, column 1). However, like Govindaswamy and Dwyer, Stasidski is also silent regarding the claimed use of a compressed texture block including two or more disjoint subsets of data and individually decompressing each of the two or more disjoint subsets as recited in the amended independent claims.

Accordingly, Stasidski, in combination with Govindaswamy and Dwyer, fails to teach or suggest each of the elements found in the amended independent claims.

Claims 3 and 13 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, in further view of Stasidski, and in further view of U.S. Patent No. 6,891,793 to Reshetov et al. (hereinafter “Reshetov”). Claims 3 and 13 are canceled and the rejection of these claims is now moot.

Claims 8 and 18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, in view of Stasidski, and in further view of U.S. Patent No. 5,488,365 to Seroussi et al. (hereinafter “Seroussi”).

Claims 8 and 18 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Claims 9 and 19 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, in view of Stasidski, and in further view of U.S. Patent No. 6,208,273 to Dye et al. (hereinafter “Dye”).

Claims 9 and 19 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Claims 10, 20, 21 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Govindaswamy in view of Dwyer, in view of Stasidski, and in further view of “Perceptual quality metrics applied to still image compression”, as cited in and IDS, to Eckert et al. (hereinafter “Eckert”).

Claims 10 and 20 are canceled and the rejection of these claims is now moot. Claims 21 and 22 are dependent upon independent claims 1 and 11, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above.

Based on the arguments presented above, withdrawal of the 35 U.S.C. 103 rejection of claims 1-3, 6-13, and 16-22 is respectfully requested.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Iourcha et al.

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819

Volpe Koenig
30 South 17th Street, Suite 1800
Philadelphia, PA 19103-4009
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Facsimile: (215) 568-6499

JPG/pf
Enclosure

Electronic Patent Application Fee Transmittal

Application Number:	16257500			
Filing Date:	25-Jan-2019			
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES			
First Named Inventor/Applicant Name:	Konstantine Iourcha			
Filer:	Joseph P. Gushue/Margaret Ferello			
Attorney Docket Number:	ATI-060057-US-CNT[2]			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
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:				

Realtek Ex. 1002

Case No. IPR2023-00688

Page 182 of 215

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	1253	1	1480	1480
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1360	1360
Total in USD (\$)				2840

Electronic Acknowledgement Receipt

EFS ID:	43220584
Application Number:	16257500
International Application Number:	
Confirmation Number:	9063
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES
First Named Inventor/Applicant Name:	Konstantine Iourcha
Customer Number:	25310
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	ATI-060057-US-CNT[2]
Receipt Date:	12-JUL-2021
Filing Date:	25-JAN-2019
Time Stamp:	16:15:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$2840
RAM confirmation Number	E20217BG15414998
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

Realtek Ex. 1002

Case No. IPR2023-00688

Page 184 of 215

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	ATI_060057_US_CNT_2_RCE.pdf	1494332	no	3
			3a40bb8e2e296903d478a8f30578993dcf5400d3		
Warnings:					
Information:					
2	Extension of Time	ATI_060057_US_CNT_2_Extension_of_Time.pdf	239033	no	2
			32ed6589b759d23910234fd049d96bac0be681cf		
Warnings:					
Information:					
3		ATI_060057_US_CNT_2_Final_OA_Response_RCE_efs.pdf	174766	yes	14
			a89788a179e1e4edf4dbed488f156ddcf1f1a509		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment Submitted/Entered with Filing of CPA/RCE		1	1	
	Claims		2	7	
	Applicant Arguments/Remarks Made in an Amendment		8	14	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32848	no	2
			52d2e5fe144f82875f437e53c291e520fc311052		
Warnings:					
Information:					
Total Files Size (in bytes):			1940979		

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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

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.



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NOTICE OF ALLOWANCE AND FEE(S) DUE

25310 7590 08/05/2021
Volpe Koenig
DEPT. AMD
30 SOUTH 17TH STREET -18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER

CRADDOCK, ROBERT J

ART UNIT

PAPER NUMBER

2616

DATE MAILED: 08/05/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]	9063

TITLE OF INVENTION: TEXTURE DECOMPRESSION TECHNIQUES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	11/05/2021

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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

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.

25310 7590 08/05/2021
Volpe Koenig
DEPT. AMD
30 SOUTH 17TH STREET -18TH FLOOR
PHILADELPHIA, PA 19103

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]	9063

TITLE OF INVENTION: TEXTURE DECOMPRESSION TECHNIQUES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	11/05/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
CRADDOCK, ROBERT J	2616	345-581000

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 03-09 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,

1 _____

(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.

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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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. _____



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.
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]	9063
25310	7590	08/05/2021	EXAMINER	
Volpe Koenig DEPT. AMD 30 SOUTH 17TH STREET -18TH FLOOR PHILADELPHIA, PA 19103			CRADDOCK, ROBERT J	
			ART UNIT	PAPER NUMBER
			2616	

DATE MAILED: 08/05/2021

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 30 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.

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 the Federal Bureau of Investigation or other law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law.

Notice of Allowability	Application No. 16/257,500	Applicant(s) Iourcha et al.	
	Examiner ROBERT J CRADDOCK	Art Unit 2616	AIA (FITF) 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 Applicant's Arguments filed 7/12/2021.
☐ 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 1-2,6,8-9,11-12,16,18-19 and 21-22. 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 _____.
---	--

/ROBERT J CRADDOCK/
Primary Examiner, Art Unit 2616

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

Claims 1, 2, 6, 8, 9, 11, 12, 16, 18, 19, 21 and 22 are allowed.

The following is an examiner's statement of reasons for allowance:

The applicant's argument filed on 7/12/2021 page 8-11 are considered to be persuasive. Therefore the claims distinguish from the cited prior art of record and thus are considered to be allowable over the cited prior art of record.

Additionally, the features of the explicitly claimed limitations claim 1 and similar limitations of other independents of the currently pending application only make sense when taken into account the claim as a whole, so therefore the limitations as cited/argued are not the exclusive determination of allowability, but rather the limitations as cited/argued above when taken into account with the claim language as a whole does the above limitations determine allowability.

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 ROBERT J CRADDICK whose telephone number is (571)270-7502. The examiner can normally be reached on Monday - Friday 11:00 AM - 7 PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devona E Faulk can be reached on 571-272-7515. 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 <https://ppair-my.uspto.gov/pair/PrivatePair>. 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.

/ROBERT J CRADDOCK/
Primary Examiner, Art Unit 2616

<i>Search Notes</i> 	Application/Control No. 16/257,500	Applicant(s)/Patent Under Reexamination Iourcha et al.
	Examiner ROBERT J CRADDOCK	Art Unit 2616

CPC - Searched*		
Symbol	Date	Examiner
G06t with search	07/28/2021	RC

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
See EAST for prior art and inventor name search	01/06/2021	RC
Updated Above	07/20/2021	RC
Google Scholar with like search terms	07/20/2021	RC

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	See EAST for Interference Search	07/28/2021	RC

/ROBERT J CRADDOCK/ Primary Examiner, Art Unit 2616	Realtek Ex. 1002
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Issue Classification 	Application/Control No. 16/257,500	Applicant(s)/Patent Under Reexamination Iourcha et al.
	Examiner ROBERT J CRADDOCK	Art Unit 2616

CPC						
Symbol					Type	Version
H04N	/	19	/	426	F	2014-11-01
H04N	/	19	/	176	I	2014-11-01
H04N	/	19	/	119	I	2014-11-01
H04N	/	19	/	46	I	2014-11-01
H04N	/	19	/	60	I	2014-11-01
H04N	/	19	/	96	I	2014-11-01
H04N	/	19	/	154	I	2014-11-01
H04N	/	19	/	54	I	2014-11-01
G06T	/	9	/	00	I	2013-01-01
H04N	/	19	/	182	I	2014-11-01

CPC Combination Sets					
Symbol				Type	Set
	/		/		

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 12	
/ROBERT J CRADDOCK/ Primary Examiner, Art Unit 2616 (Primary Examiner) _____ (Date) _____		29 July 2021 (Date)	O.G. Print Claim(s) 1 O.G. Print Figure 4

Issue Classification 	Application/Control No. 16/257,500	Applicant(s)/Patent Under Reexamination Iourcha et al.
	Examiner ROBERT J CRADDOCK	Art Unit 2616

INTERNATIONAL CLASSIFICATION			
CLAIMED			
G06T9/00	/	9	/ 00

NON-CLAIMED			
/	/		

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	12	
/ROBERT J CRADDOCK/ Primary Examiner, Art Unit 2616	29 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

Issue Classification 	Application/Control No. 16/257,500	Applicant(s)/Patent Under Reexamination Iourcha et al.
	Examiner ROBERT J CRADDOCK	Art Unit 2616

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		10	11	19										
2	2	7	11		20										
	3	8	12	6	21										
	4		13	12	22										
	5		14												
3	6		15												
	7	9	16												
4	8		17												
5	9	10	18												

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 12	
/ROBERT J CRADDOCK/ Primary Examiner, Art Unit 2616 (Primary Examiner) _____ (Date) _____		29 July 2021 (Date)	O.G. Print Claim(s) 1 O.G. Print Figure 4

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S92	17	(uncompress\$3) with block same (compress\$3 or encod\$3) same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S93	20	(uncompress\$3) same block same (compress\$3 or encod\$3) same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S94	21	(uncompress\$3) same block same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S98	1,537	(independent) with (compression or encode) with block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S99	343	(independent) near10 (decompression or decode) near10 block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S105	990	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S106	116	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24

S107	116	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S108	3	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S109	46	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S113	101	((("IOURCHA") near3 ("Konstantine")) OR (("POMIANOWSKI") near3 ("Andrew"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2021/07/20 08:24
S124	2	S123 and (uncompress\$3) with block same (compress\$3 or encod\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S125	17	(uncompress\$3) with block same (compress\$3 or encod\$3) same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S126	20	(uncompress\$3) same block same (compress\$3 or encod\$3) same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S127	21	(uncompress\$3) same block same disjoint\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S131	1,537	(independent) with (compression or encode) with block	US-PGPUB; USPAT;	OR	ON	2021/07/20 08:24

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S132	343	(independent) near10 (decompression or decode) near10 block	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S138	990	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S139	116	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S140	116	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S141	3	(decode or decompression or decompress) with (approximat\$3 or approximation) with (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S142	46	(decode or decompression or decompress) same (approximat\$3 or approximation) same (surface) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S144	19	(decode or decompression or decompress) same (approximat\$3 or approximation) same (texture same map\$5) same render\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 08:24
S145	30	(decode or decompression or decompress) same (approximat\$3 or	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2021/07/20 08:24

		approximation or lossy) same (texture same map\$5) same render\$3	EPO; JPO; DERWENT; IBM_TDB			
S146	0	(decode or decompression or decompress) same (texel or texture near2 element) same (partition or subset or subdivision or portion or section or batch) same (disjoint or disarticulat\$3) same (color OR colour or hue or chroma\$6 or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 21:07
S147	0	(decode or decompression or decompress) same (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoint or disarticulat\$3) same (color OR colour or hue or chroma\$6 or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 21:08
S148	0	(decode or decompression or decompress) same2 (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoint or disarticulat\$3) same (color OR colour or hue or chroma\$6 or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 21:09
S149	0	(decode or decompression or decompress decompress\$3 or compress\$4 or uncompress\$3 or extract\$3 or read\$3) same2 (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoint or disarticulate) same (color OR colour or hue or chroma or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/20 21:13

7/28/2021 1:07:31 PM

C:\Users\rcraddock\Documents\EAST\Workspaces\16257500_3.wsp

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	630	(decode or decompression or decompress decompress\$3 or compress\$4 or uncompress\$3 or extract\$3 or read\$3) same2 (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3) same (color OR colour or hue or chroma or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/28 23:28
L2	90	L1 and (g06t\$.cpc.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/28 23:28

7/28/2021 11:54:18 PM

C:\Users\rcraddock\Documents\EAST\Workspaces\16257500_3.wsp

Bibliographic Data

Application No: 16/257,500

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged: /ROBERT J CRADDOCK/

Examiner's Signature

Initials

Title: TEXTURE DECOMPRESSION TECHNIQUES

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
01/25/2019	345	2616	ATI-060057-US-CNT[2]
RULE			

APPLICANTS

ATI Technologies ULC, Markham, CANADA

INVENTORS

Konstantine Iourcha, Santa Clara, CA, UNITED STATES

Andrew S. C. Pomianowski, Sunnyvale, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 15237134 08/15/2016 PAT 10205956

15237134 is a CON of 11513190 08/31/2006 PAT 9418450

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

02/25/2019

STATE OR COUNTRY

UNITED STATES

ADDRESS

Volpe Koenig

DEPT. AMD

30 SOUTH 17TH STREET -18TH FLOOR

PHILADELPHIA, PA 19103

UNITED STATES

FILING FEE RECEIVED

\$1,720

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S156	2	((decode or decompression or decompress decompress\$3 or compress\$4 or uncompress\$3 or extract\$3 or read\$3) same2 (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3) same (color OR colour or hue or chroma or chromaticity) same (endpoint or vertex or vertices or line)).clm.	USPAT	OR	ON	2021/07/28 13:11

7/28/2021 11:36:01 PM

C:\Users\rcraddock\Documents\EAST\Workspaces\16257500_3.wsp

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	90	L1 and (g06t\$.cpc.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/28 23:28

7/28/2021 11:33:55 PM

C:\Users\rcraddock\Documents\EAST\Workspaces\16257500_3.wsp

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S153	630	(decode or decompression or decompress decompress\$3 or compress\$4 or uncompress\$3 or extract\$3 or read\$3) same2 (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3) same (color OR colour or hue or chroma or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/28 13:08
S154	604	(decode or decompression or decompress decompress\$3 or compress\$4 or uncompress\$3 or extract\$3 or read\$3) same (texel or texture near2 element or texture or bump near2 map) same (partition or subset or subdivision or portion or section or batch) same (disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3) same (color OR colour or hue or chroma or chromaticity) same (endpoint or vertex or vertices or line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/28 13:13
S155	38	(decode or decompression or decompress decompress\$3 or compress\$4 or uncompress\$3 or extract\$3 or read\$3) same ((texel or texture near2 element or texture or bump near2 map) with (partition or subset or subdivision or portion or section or batch) with (disjoin split adj up decouple disunite part separate disassociate disarticulate divorce divide dissociate or Nullary adj intersection or disjoint\$3) with (color OR colour or hue or chroma or chromaticity) same (endpoint or vertex or vertices or line))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/07/28 13:16

7/28/2021 11:58:55 PM

C:\Users\rcraddock\Documents\EAST\Workspaces\16257500_3.wsp

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

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.

25310 7590 08/05/2021
Volpe Koenig
DEPT. AMD
30 SOUTH 17TH STREET -18TH FLOOR
PHILADELPHIA, PA 19103

Electronically filed on October 15, 2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/257,500	01/25/2019	Konstantine Iourcha	ATI-060057-US-CNT[2]	9063

TITLE OF INVENTION: TEXTURE DECOMPRESSION TECHNIQUES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	11/05/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
CRADDOCK, ROBERT J	2616	345-581000

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 03-09 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 Volpe Koenig

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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

ATI Technologies ULC

Markham, Ontario CANADA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 22-0493

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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 /Joseph P. Gushue/

Date October 15, 2021

Typed or printed name Joseph P. Gushue

Registration No. 59,819

Realtex Ex. 1002

Electronic Patent Application Fee Transmittal

Application Number:	16257500			
Filing Date:	25-Jan-2019			
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES			
First Named Inventor/Applicant Name:	Konstantine Iourcha			
Filer:	Joseph P. Gushue/Margaret Ferello			
Attorney Docket Number:	ATI-060057-US-CNT[2]			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
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	1200	1200

Realtek Ex. 1002

Case No. IPR2023-00688

Page 210 of 215

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1200

Electronic Acknowledgement Receipt

EFS ID:	44035698
Application Number:	16257500
International Application Number:	
Confirmation Number:	9063
Title of Invention:	TEXTURE DECOMPRESSION TECHNIQUES
First Named Inventor/Applicant Name:	Konstantine Iourcha
Customer Number:	25310
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	ATI-060057-US-CNT[2]
Receipt Date:	15-OCT-2021
Filing Date:	25-JAN-2019
Time Stamp:	13:40:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1200
RAM confirmation Number	E20210ED41102655
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

Realtek Ex. 1002

Case No. IPR2023-00688

Page 212 of 215

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	ATI_060057_US_CNT_2_Issue_Fee_Form_PTOL_85_efs.pdf	398755	no	1
			8f24bca80d346819961e0f8bfbd295e43e693d1f		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37929	no	2
			ae4bcf5a3a0e4afed97392dac035afe92d7d47		
Warnings:					
Information:					
Total Files Size (in bytes):			436684		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/257,500	11/23/2021	11184628	ATI-060057-US-CNT[2]	9063

25310 7590 11/03/2021
Volpe Koenig
DEPT. AMD
30 SOUTH 17TH STREET -18TH FLOOR
PHILADELPHIA, PA 19103

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 0 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):

ATI Technologies ULC, Markham, CANADA;

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.

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:22-cv-00134	DATE FILED 5/5/2022	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF ADVANCED MICRO DEVICES, INC.; and ATI TECHNOLOGIES ULC		DEFENDANT TCL INDUSTRIES HOLDINGS CO., LTD.; TCL INDUSTRIES HOLDINGS (H.K.) LIMITED; TCL ELECTRONICS HOLDINGS LIMITED; TCL TECHNOLOGY GROUP CORPORATION; TTE CORPORATION
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,742,053	6/22/2010	ATI Technologies ULC
2 8,760,454	6/24/2014	ATI Technologies ULC
3 11,184,628	11/23/2021	ATI Technologies ULC
4 8,468,547	6/18/2013	Advanced Micro Devices Inc., ATI Technologies ULC
5 8,854,381	10/7/2014	Advanced Micro Devices Inc.

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
-------	-------------------	------

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy Realtek Ex. 1002

Case No. IPR2023-00688

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