US 20080297617A1

(19) United States

(12) Patent Application Publication

JEONG

(10) Pub. No.: US 2008/0297617 A1

(43) Pub. Date: Dec. 4, 2008

(54) TERMINAL AND IMAGE CAPTURING METHOD THEREOF

(75) Inventor: **Moon Sang JEONG**, Daegu Metropolitan City (KR)

Correspondence Address:
**Jefferson IP Law, LLP**
**1730 M Street, NW, Suite 807**
**Washington, DC 20036 (US)**

(73) Assignee: **SAMSUNG ELECTRONICS CO. LTD.**, Suwon-si (KR)

(21) Appl. No.: **12/121,715**

(22) Filed: **May 15, 2008**

(30) **Foreign Application Priority Data**

Jun. 1, 2007 (KR) ..... 2007-0053674

**Publication Classification**

(51) **Int. Cl.**
*H04N 5/228* (2006.01)
*G06K 9/00* (2006.01)

(52) **U.S. Cl.** ..... **348/222.1**; 382/118

(57) **ABSTRACT**

A terminal with an image capture function and an image capturing method thereof are provided that can display a capture guide on a preview screen and optimize the arrangement of persons in a photographic image. The image capturing method of a terminal includes recognizing a face in an image displayed on a preview screen in a capture mode, overlaying a capture guide on the preview screen according to the recognized face, and capturing the image when the image is arranged to substantially correspond to the capture guide. The terminal and the image capturing method can capture an image to overlay a capture guide according to a recognized face on a preview screen. Also, the terminal and the image capturing method can capture an image to select a capture guide and overlay the particular capture guide on the preview screen during the capture mode. Furthermore, the terminal and the image capturing method can edit saved images according to a capture guide. Therefore, an image can be optimized where persons are properly arranged and convenience of the terminal is improved.

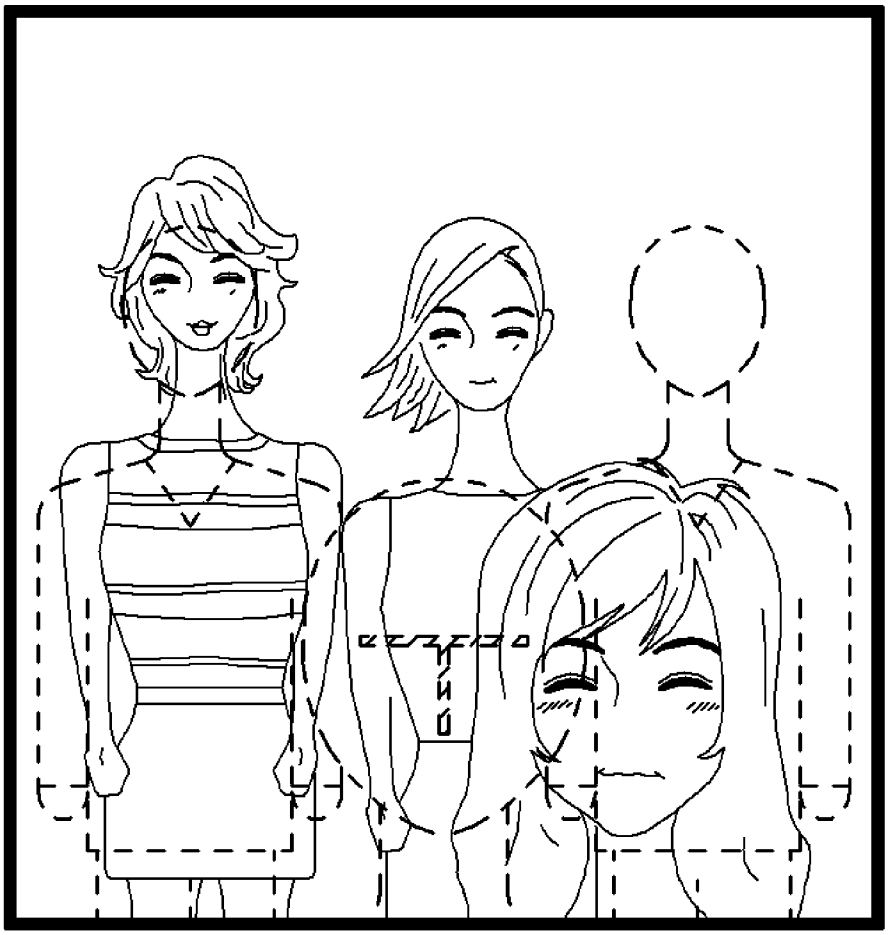


FIG . 1

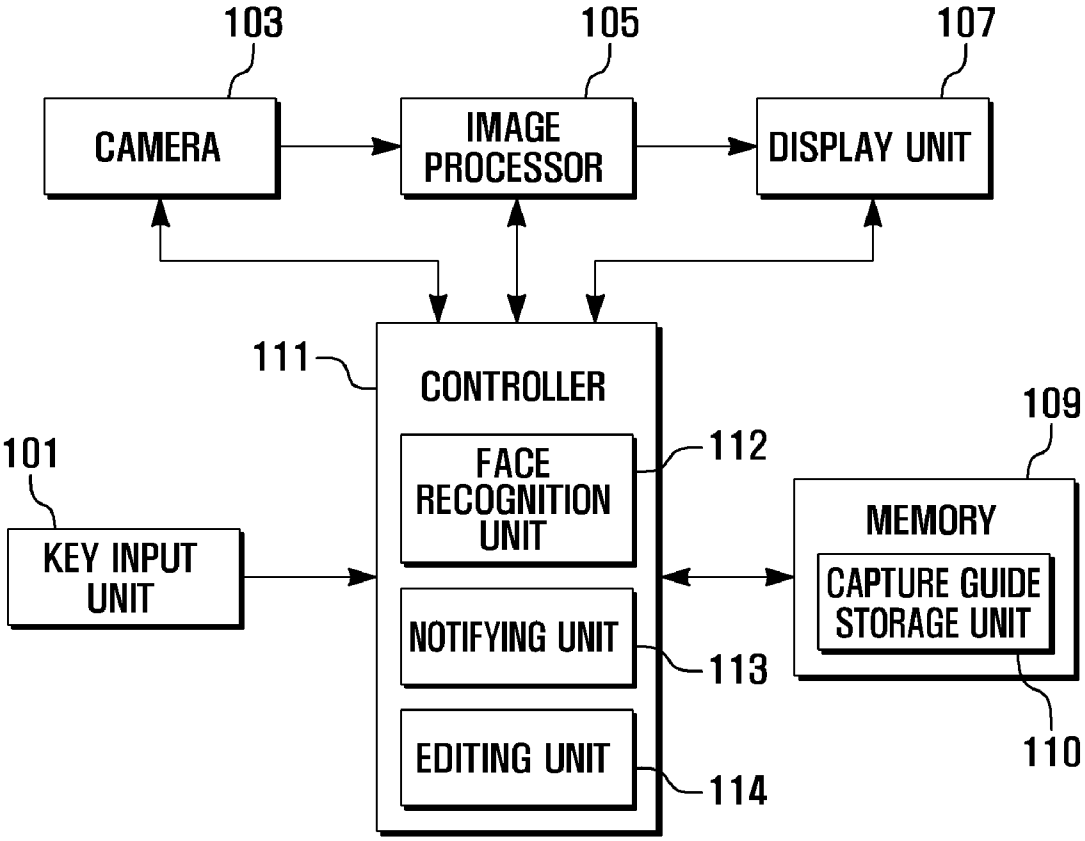

103
105
107
CAMERA
IMAGE PROCESSOR
DISPLAY UNIT
111
CONTROLLER
FACE RECOGNITION UNIT
112
NOTIFYING UNIT
113
EDITING UNIT
114
101
KEY INPUT UNIT
109
MEMORY
CAPTURE GUIDE STORAGE UNIT
110

FIG . 2

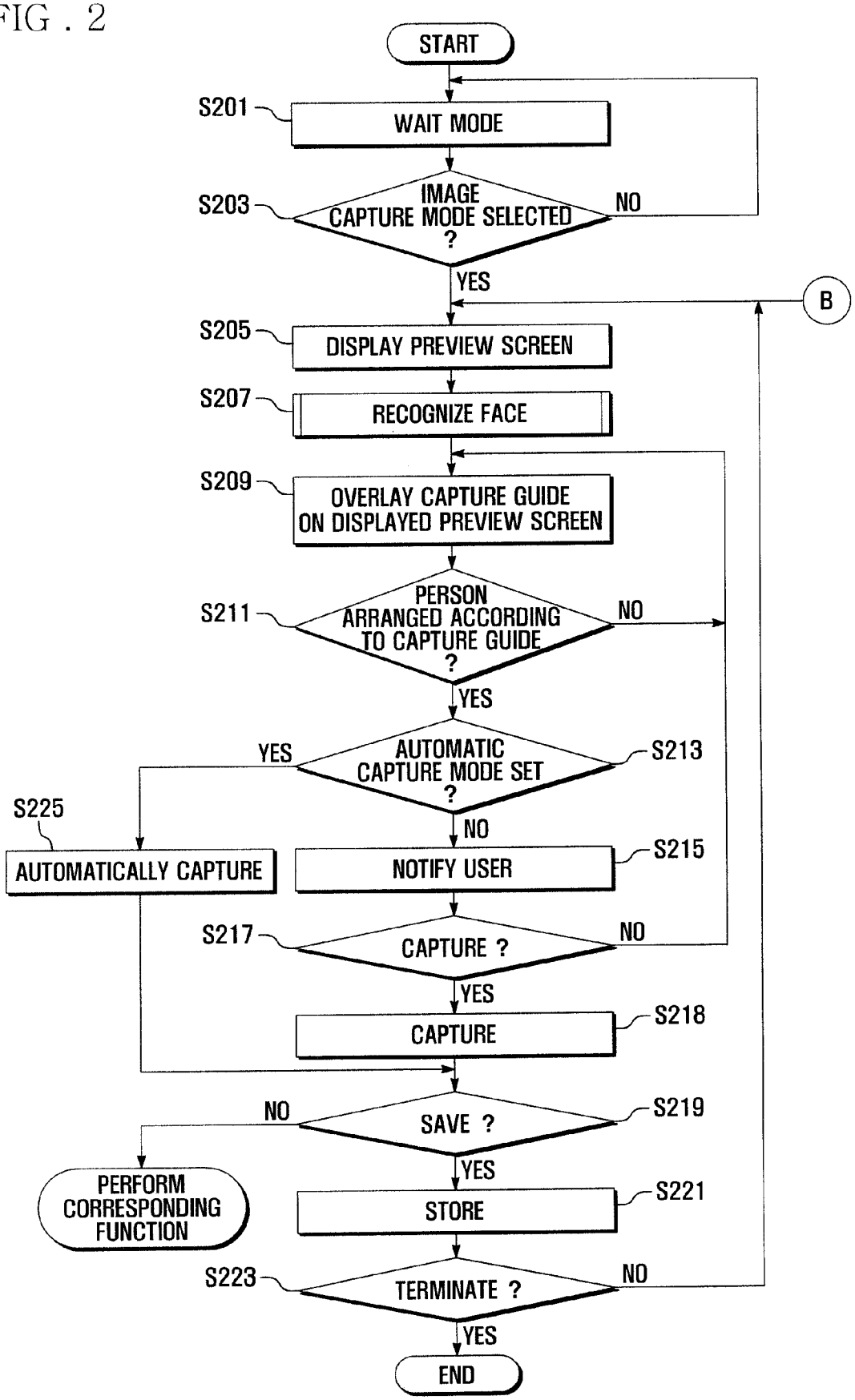

START
S201
WAIT MODE
S203
IMAGE CAPTURE MODE SELECTED ?
NO
YES
B
S205
DISPLAY PREVIEW SCREEN
S207
RECOGNIZE FACE
S209
OVERLAY CAPTURE GUIDE ON DISPLAYED PREVIEW SCREEN
S211
PERSON ARRANGED ACCORDING TO CAPTURE GUIDE ?
NO
YES
YES
AUTOMATIC CAPTURE MODE SET ?
S213
S225
NO
AUTOMATICALLY CAPTURE
NOTIFY USER
S215
S217
CAPTURE ?
NO
YES
CAPTURE
S218
NO
SAVE ?
S219
YES
PERFORM CORRESPONDING FUNCTION
STORE
S221
S223
TERMINATE ?
NO
YES
END

FIG . 3A

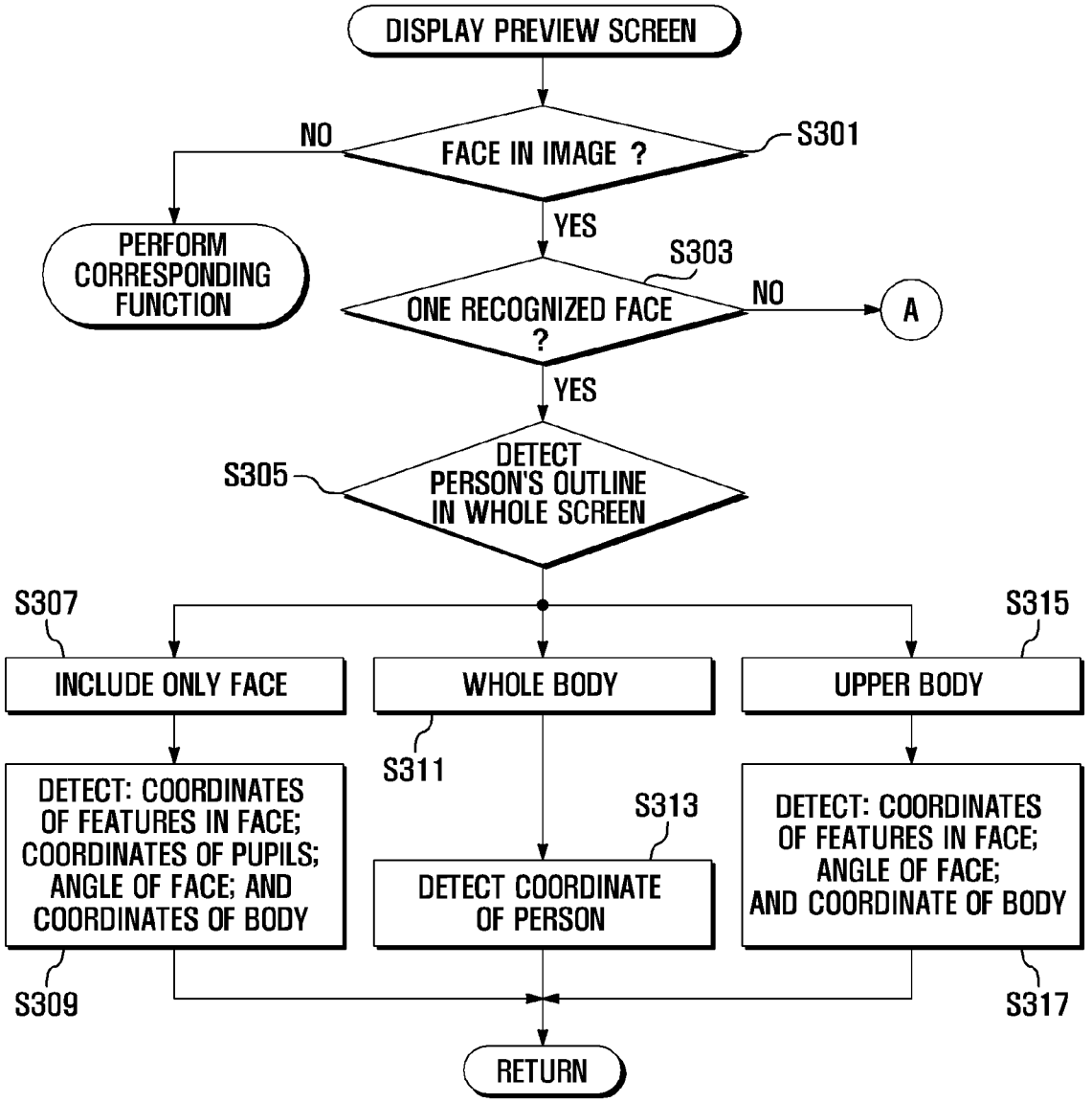

DISPLAY PREVIEW SCREEN
FACE IN IMAGE ?
S301
NO
PERFORM CORRESPONDING FUNCTION
YES
S303
ONE RECOGNIZED FACE ?
NO
A
YES
S305
DETECT PERSON'S OUTLINE IN WHOLE SCREEN
S307
S315
INCLUDE ONLY FACE
WHOLE BODY
UPPER BODY
S311
S313
DETECT: COORDINATES OF FEATURES IN FACE; COORDINATES OF PUPILS; ANGLE OF FACE; AND COORDINATES OF BODY
DETECT COORDINATE OF PERSON
DETECT: COORDINATES OF FEATURES IN FACE; ANGLE OF FACE; AND COORDINATE OF BODY
S309
S317
RETURN

FIG . 3B

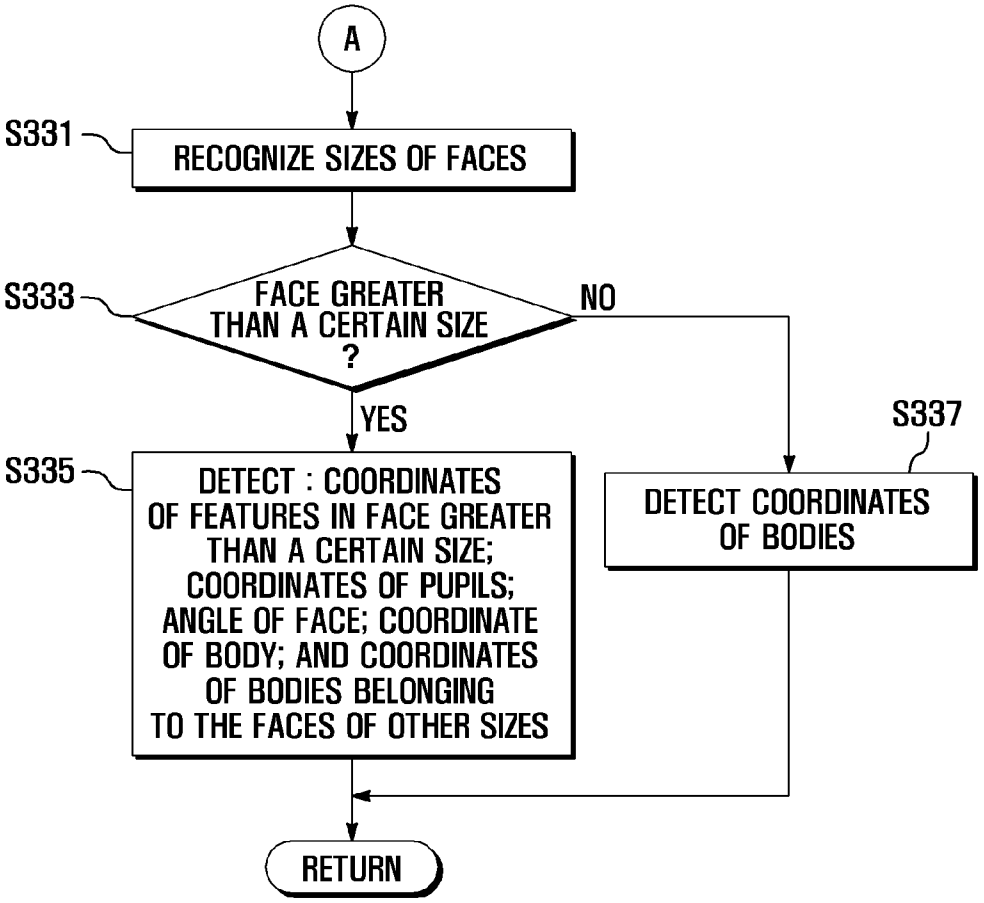

A
S331
RECOGNIZE SIZES OF FACES
S333
FACE GREATER THAN A CERTAIN SIZE ?
NO
YES
S335
DETECT : COORDINATES OF FEATURES IN FACE GREATER THAN A CERTAIN SIZE; COORDINATES OF PUPILS; ANGLE OF FACE; COORDINATE OF BODY; AND COORDINATES OF BODIES BELONGING TO THE FACES OF OTHER SIZES
S337
DETECT COORDINATES OF BODIES
RETURN

FIG . 4A

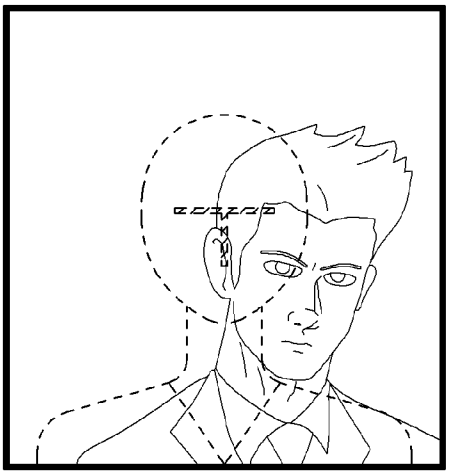


FIG . 4B

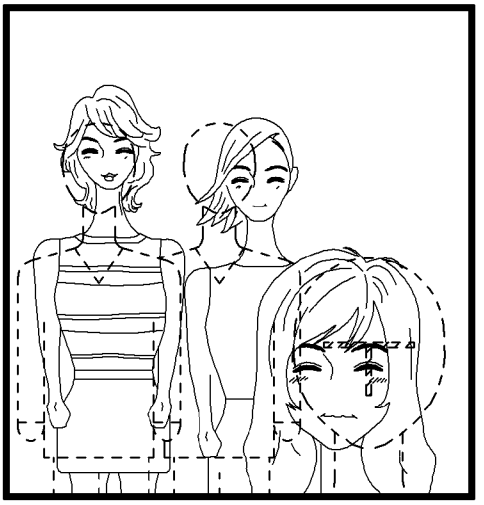


FIG . 4C

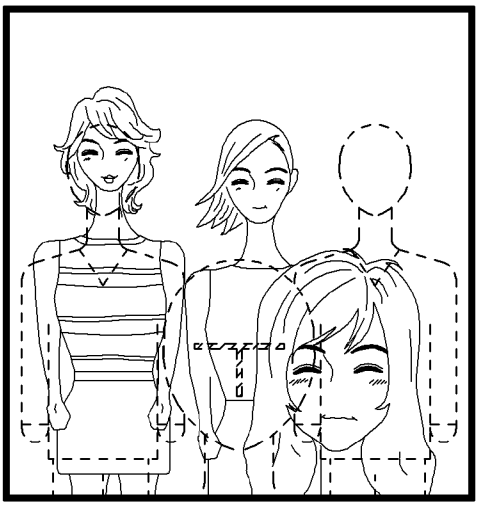


FIG . 4D

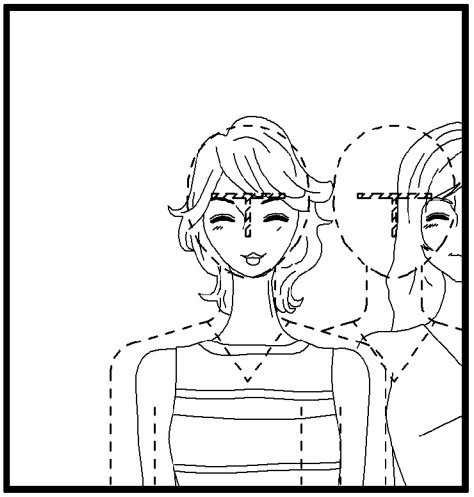


FIG . 4E

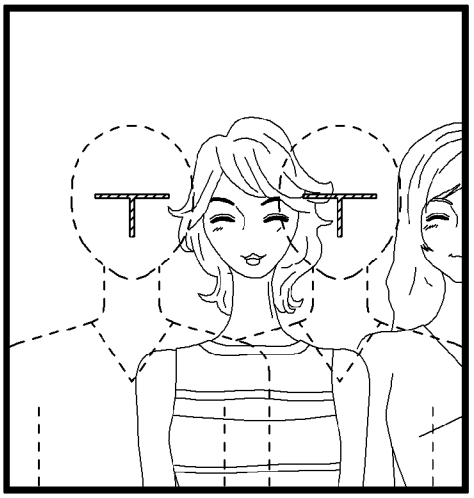


FIG . 5

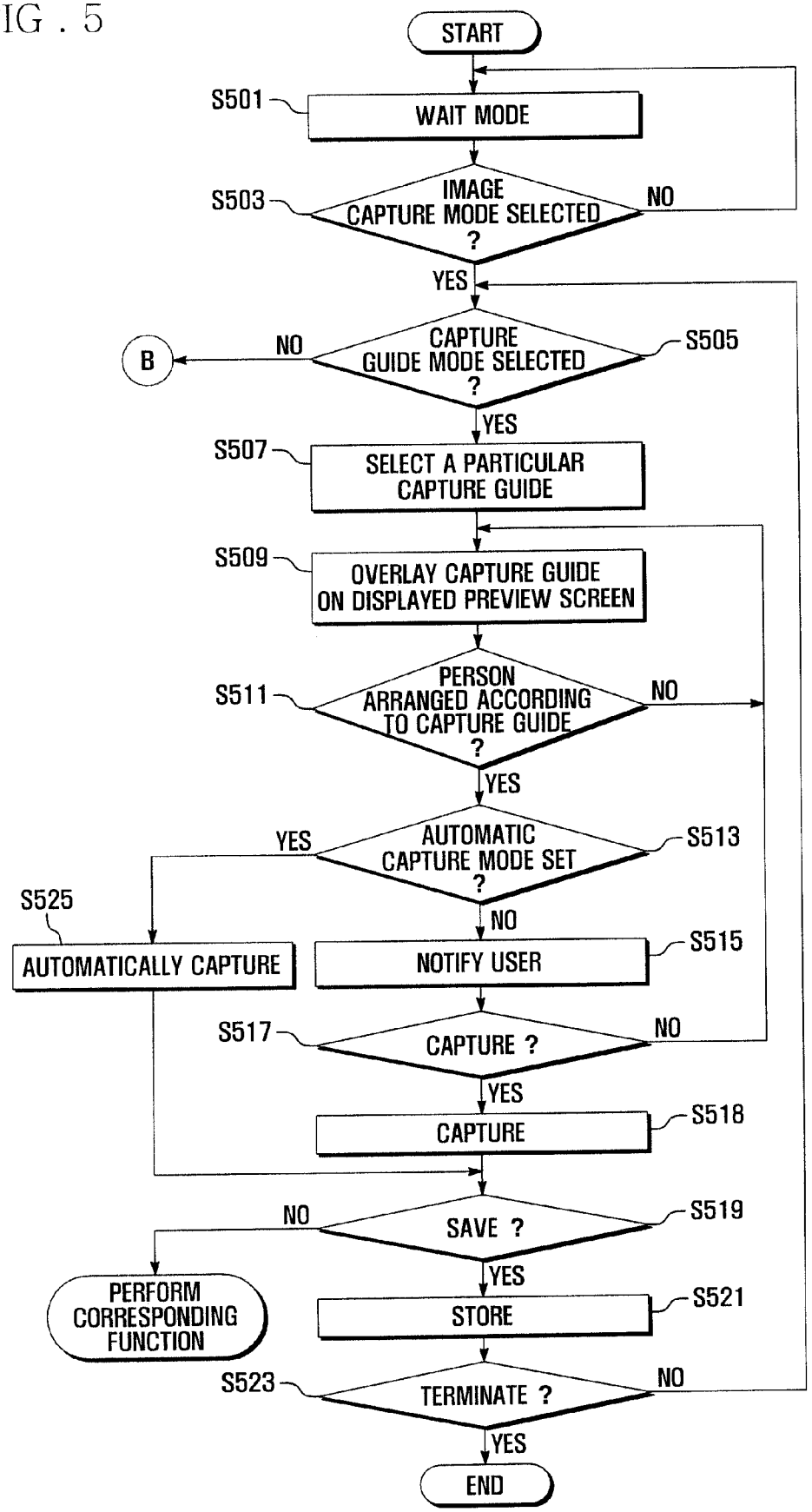
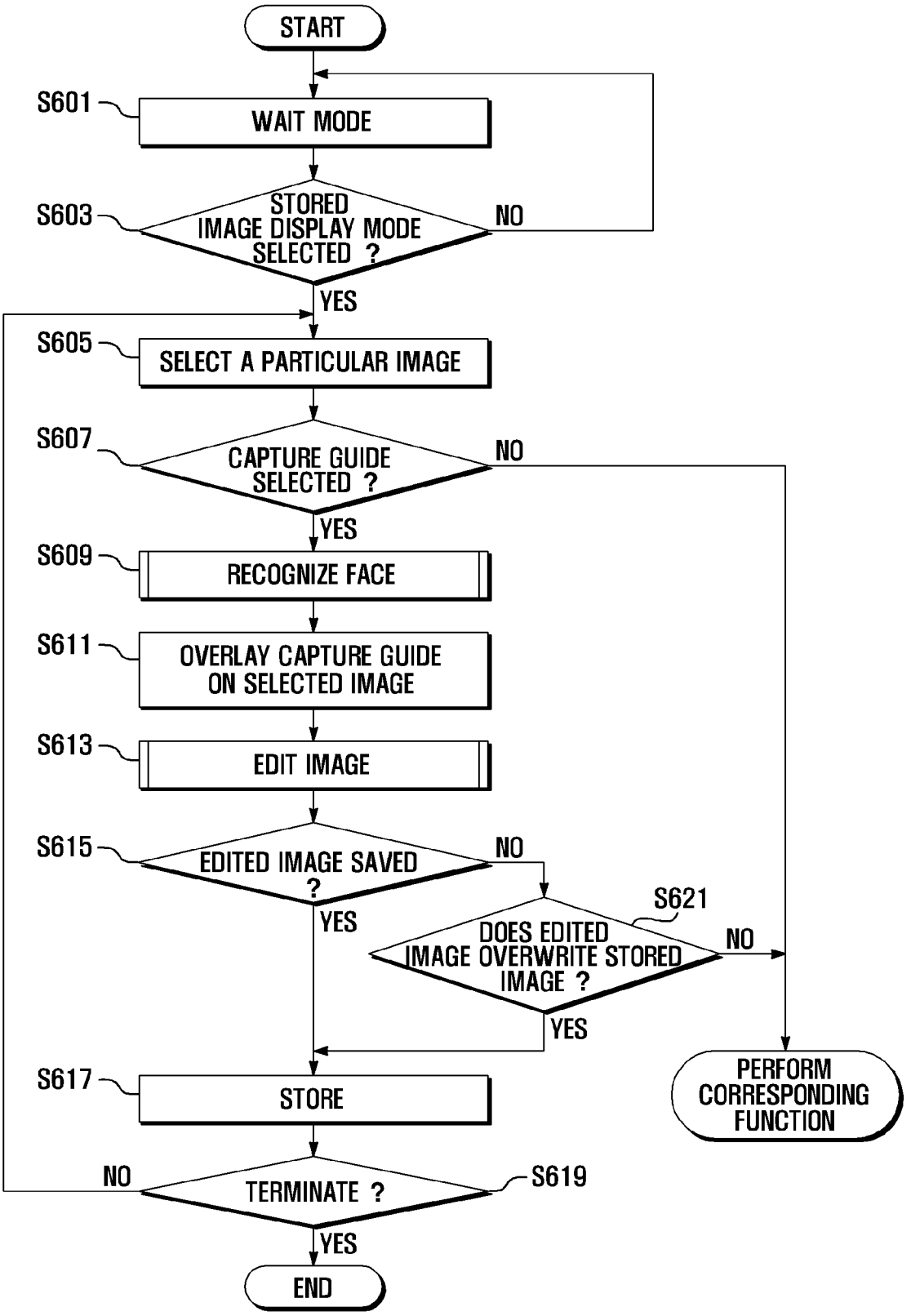

START
S501
WAIT MODE
S503
IMAGE CAPTURE MODE SELECTED ?
NO
YES
B
NO
CAPTURE GUIDE MODE SELECTED ?
S505
YES
S507
SELECT A PARTICULAR CAPTURE GUIDE
S509
OVERLAY CAPTURE GUIDE ON DISPLAYED PREVIEW SCREEN
S511
PERSON ARRANGED ACCORDING TO CAPTURE GUIDE ?
NO
YES
YES
AUTOMATIC CAPTURE MODE SET ?
S513
S525
NO
AUTOMATICALLY CAPTURE
NOTIFY USER
S515
S517
CAPTURE ?
NO
YES
CAPTURE
S518
NO
SAVE ?
S519
YES
PERFORM CORRESPONDING FUNCTION
STORE
S521
S523
TERMINATE ?
NO
YES
END

FIG . 6


START
S601
WAIT MODE
S603
STORED IMAGE DISPLAY MODE SELECTED ?
NO
YES
S605
SELECT A PARTICULAR IMAGE
S607
CAPTURE GUIDE SELECTED ?
NO
YES
S609
RECOGNIZE FACE
S611
OVERLAY CAPTURE GUIDE ON SELECTED IMAGE
S613
EDIT IMAGE
S615
EDITED IMAGE SAVED ?
NO
YES
S621
DOES EDITED IMAGE OVERWRITE STORED IMAGE ?
NO
YES
PERFORM CORRESPONDING FUNCTION
S617
STORE
NO
TERMINATE ?
S619
YES
END

# TERMINAL AND IMAGE CAPTURING METHOD THEREOF

## PRIORITY

**[0001]** This application claims the benefit under 35 U.S.C. § 119(a) of a Korean patent application filed in the Korean Intellectual Property Office on Jun. 1, 2007 and assigned Serial No. 2007-0053674, the entire disclosure of which is hereby incorporated by reference.

## BACKGROUND OF THE INVENTION

**[0002]** 1. Field of the Invention

**[0003]** The present invention relates to image capturing technology. More particularly, the present invention relates to a terminal with an image capture function and an image capturing method thereof that can display a capture guide on a preview screen and optimize the arrangement of persons in a photographic image.

**[0004]** 2. Description of the Related Art

**[0005]** In recent years, as increasingly smaller and lighter electronic parts are manufactured, terminals employing those electronic parts, such as mobile communication terminals, etc., have accordingly decreased in size. Also, due to consumer demand, terminals have been developed that are equipped with a variety of functions, such as a camera function, in addition to a voice call function. Recently, terminals including a camera have been developed and sold on the market.

**[0006]** Users often take photographs of persons using the camera equipped in such a terminal. However, these photographs may be of poor quality, especially concerning the placement of persons within the photographic image, due to the users' lack of photographic skill. In order to address these problems, users refer to guide books on how to capture an image of a person. However, users still have difficulty applying directions included in the guidebooks to an actual image capturing situation.

## SUMMARY OF THE INVENTION

**[0007]** An aspect of the present invention to address at least the above-mentioned problems and/or disadvantages and to provide at least the advantages described below. Accordingly, an aspect of the present invention is to provide a terminal with an image capture function and an image capturing method thereof that can facilitate the capturing of images of persons by overlaying a capture guide on the preview screen of the terminal.

**[0008]** An aspect of the present invention further provides a terminal with an image capture function and an image capturing method thereof that can easily facilitate the arrangement of persons and the capture of images of the persons according to a capture guide selected in a capture mode.

**[0009]** An aspect of the present invention further provides a terminal with an image capture function and an image capturing method thereof that can select saved images, and edit the selected images according to a particular capture guide.

**[0010]** In accordance with an exemplary embodiment of the present invention, an image capturing method of a terminal is provided. The method includes recognizing a face in an image displayed on a preview screen in a capture mode; overlaying a capture guide on the preview screen according to the recognized face; and capturing the image when the image is arranged to substantially correspond to the capture guide.

**[0011]** In accordance with another exemplary embodiment of the present invention, an image capturing method of a terminal is provided. The method includes selecting a capture guide provided in an image capture mode, according to at least one of a pose, an arrangement, and a number of persons to be captured, overlaying the selected capture guide on a preview screen, and capturing the image, when an image is substantially arranged according to the capture guide.

**[0012]** In accordance with another exemplary embodiment of the present invention, an image capturing method of a terminal is provided. The method includes determining, when saved images are selected, whether a capture guide is selected, recognizing, when the capture guide is selected, a face in the selected image, overlaying the capture guide on the image according to the recognized face, and editing the image.

**[0013]** In accordance with another exemplary embodiment of the present invention, a terminal is provided. The terminal includes a camera for capturing an image, a face recognition unit for recognizing one or a plurality of faces in the image, a memory for storing the image and a capture guide according to the recognized face, and a controller for overlaying the capture guide on a preview screen on which the image is displayed, and for capturing an image when the image is arranged to substantially correspond to the capture guide.

**[0014]** Preferably, the capture guide includes template types of information about the number, position, pose, size, etc., of persons to be captured. The capture guide may include similar capture guides that provide a plurality of selections allowing for different positions and poses, etc. regarding the same number of persons. One of a plurality of similar capture guides can be provided as a capture guide displayed during the capturing. Similar capture guides can be displayed and selected according to a user's input. For example, when the same number and position regarding a person is determined, a capture guide is provided to allow for selection of different poses. Also, when the same number of the persons is determined, a capture guide for a particular position can be selected.

**[0015]** Other aspects, advantages, and salient features of the invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses exemplary embodiments of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** The above and other aspects, features, and advantages of certain exemplary embodiments of the present invention will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:

**[0017]** FIG. **1** is a schematic block diagram illustrating a terminal with an image capture function, according to an exemplary embodiment of the present invention;

**[0018]** FIG. **2** is a flowchart illustrating an image capturing method according to a first exemplary embodiment of the present invention;

**[0019]** FIG. **3**A and FIG. **3**B are flowcharts illustrating, in detail, a face recognition process of FIG. **2** according to an exemplary embodiment of the present invention;

**[0020]** FIG. **4**A to FIG. **4**E are views illustrating screens of a terminal with an image capture function according to an exemplary embodiment of the present invention;

**[0021]** FIG. **5** is a flowchart describing an image capturing method according to an second exemplary embodiment of the present invention; and

**[0022]** FIG. **6** is a flowchart describing an image capturing method according to a third exemplary embodiment of the present invention.

**[0023]** Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

## DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

**[0024]** The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of exemplary embodiments of the invention as defined by the claims and their equivalents. It includes various specific details to assist in that understanding but these are to be regarded as merely exemplary. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the embodiments described herein can be made without departing from the scope and spirit of the invention. Also, descriptions of well-known functions and constructions are omitted for clarity and conciseness.

**[0025]** Although a terminal according to exemplary embodiments of the present invention is described based on a terminal with a camera, it will be appreciated that the terminal can be applied to all information communication devices, multimedia devices, and their applications, such as a mobile communication terminal, a portal phone, wired/wireless phones, a personal digital assistant (PDA) terminal, a smart phone, an MP3 player, a laptop computer, a personal computer, and the like.

### Exemplary Embodiment 1

**[0026]** FIG. **1** is a schematic block diagram illustrating a terminal with an image capture function, according to a first exemplary embodiment of the present invention.

**[0027]** Referring to FIG. **1**, the terminal includes a key input unit **101**, camera **103**, image processor **105**, display unit **107**, memory **109**, and controller **111**.

**[0028]** The key input unit **101** receives input from a user for controlling the operation of the terminal. The key input unit **101** may be operated to drive the camera **103**, select image capture modes, capture and save images, select a capture guide, or the like.

**[0029]** The camera **103** captures a subject and generates image signals. The camera **103** is configured to include a camera sensor for converting an optical signal corresponding to a captured image into an electrical signal (i.e., an analog image signal), and a signal processor for converting the analog image signal of the camera sensor into a digital signal. The camera **103** may capture an image including a person.

**[0030]** The image processor **105** generates screen data for displaying image data output from the camera **103**. The image processor **105** includes an image codec that compresses image data displayed on the display unit **107** according to a preset method or decompresses the compressed image data to the original image data.

**[0031]** The display unit **107** displays a variety of information related to the state and operation of the terminal. The display unit **107** displays images captured through the camera **103**. The display unit **107** displays an image on the preview screen, overlaying a capture guide thereon. When a person to be photographed is arranged to be displayed on the preview screen, the display unit **107** may also display a pop-up window through which a notifying unit **113** indicates that the person is properly arranged.

**[0032]** The memory **109** stores programs and information necessary for the operation of the terminal. The memory **109** includes a capture guide storage unit **110** that stores a plurality of capture guides based on a template type. The capture guide storage unit **110** stores various types of capture guides according to a number of faces, size of the faces, coordinates of the features in the faces, coordinates of the pupils, angle of the faces, coordinates of bodies, etc., which can be recognized in one image.

**[0033]** The controller **111** controls operations of the various components in the terminal. The controller **111** can control an image capture function according to an exemplary embodiment of the present invention. The controller **111** may control a preview screen to be displayed on the display unit **107** in the image capture mode. The controller **111** includes a face recognition unit **112** for recognizing a face in the image displayed on the preview screen. The face recognition unit **112**, when recognizing a face in the image displayed on the preview screen, determines whether a face is there and recognizes the number of faces.

**[0034]** When a single face is included in the image, the face recognition unit **112** detects the person's outline in the screen, and recognizes whether the face, whole body or upper body is included in the screen. When a singe face is included in an image, the face recognition unit **112** detects the coordinates of the features in the face, coordinates of pupils, angle of the face, and coordinates of the person. That is, the face recognition unit **112** detects the coordinates of eyes, nose, and mouth in the face, coordinates of pupils in the eyes, angle of the face, and coordinates of the face displayed in the screen. It should be understood that the present invention is not limited by the coordinates listed above and instead can be implemented by other types of coordinates. When substantially a whole body is included in an image, the face recognition unit **112** detects the coordinates of the person rather than the face, i.e., only a position of a person displayed in the screen, because the face recognition unit **112** has difficulty detecting detailed portions in an image that includes the whole body. It should be noted that the face recognition unit **112** could recognize other portions of a body in addition to faces. When a face and upper body are included in an image, the face recognition unit **112** detects the coordinates of the features in the face, angle of the face, and coordinates of the body. That is, the face recognition unit **112** can not recognize as much detailed information in an image that includes the upper body than an image that includes only a face, but can recognize more detailed information in the image that includes the upper body than an image that includes a whole body. It should be understood that the face recognition unit **112** is not restricted to the recognition of the attributes described above and that the attributes described above are merely an example of recognizable attributes.

**[0035]** When a plurality of faces appears in an image, the face recognition unit **112** recognizes whether a face greater than a preset size is included. When a face greater than a preset size is in an image, the face recognition unit **112** detects the coordinates of the features in the face, the coordinates of pupils, angle of the face, coordinate of the person, and coordinates of persons of the other faces.

**[0036]** The controller **111** displays a capture guide on a preview screen on which an image is displayed according to the face recognized through the face recognition unit **112**. When the controller **111** recognizes that persons are properly arranged in the image according to the capture guide, it automatically captures images. Also, the controller **111** can include a notifying unit **113**. Here, when the controller **111** recognizes that persons are properly arranged in the image according to the capture guide, it allows the notifying unit **113** to notify the user. For example, the notifying unit **113** displays a pop-up window on the display unit **107**, turns on/off lighting devices, such as an LED, or generates a one or more sounds. An exemplary embodiment is configured in such a way that the controller **111** includes an editing unit **114** as shown in FIG. **1**, however, in another exemplary embodiment the editing unit **114** may be omitted. The editing unit **114** will be described in detail below.

**[0037]** The terminal of an exemplary embodiment of the present invention may further include a radio frequency (RF) unit for performing wireless communications. The RF unit is configured to include an RF transmitter for up-converting the frequency of transmitted signals and amplifying the signals to be transmitted. The RF unit is also configured to include an RF receiver for low-noise amplifying received RF signals and down-converting the frequency of the received RF signals.

**[0038]** In the following description, the image capturing method of the terminal, according to an exemplary embodiment of the present invention, will be describing with reference to FIG. **2**, FIG. **3**A, FIG. **3**B and FIG. **4**A to FIG. **4**E. FIG. **2** is a flowchart illustrating a first exemplary embodiment of an image capturing method according to the present invention. FIG. **3**A and FIG. **3**B are flowcharts illustrating, in detail, a face recognition process of FIG. **2**. FIG. **4**A to FIG. **4**E are views illustrating screens of a terminal with an image capture function.

**[0039]** First, as shown in FIG. **2**, the controller **111** recognizes a wait mode in step S**201**.

**[0040]** The controller **111** determines whether an image capture mode is selected in step S**203**. The image capture mode can be selected as a camera function is initiated in response to a user input at key input unit **101**.

**[0041]** When an image capture mode is selected, the controller **111** displays a preview screen on the display unit **107** in step S**205**. While displaying the preview screen, the controller **111** recognizes a face in an image of the displayed preview screen in step S**207**. That is, the face recognition unit **112** of the controller **111** recognizes a face in an image displayed through the preview screen. In order to determine whether a person is in the image of the current preview screen and, if there, to determine the position of the person, the controller **111** recognizes a face in the image shown in the preview screen. This process will be described in detail with reference to FIG. **3**A and FIG. **3**B.

**[0042]** As shown in FIG. **3**A, while displaying the preview screen, the controller **111** determines whether a face appears in the displayed image in step S**301**. When a face appears in the image, the controller **111** determines whether the number of recognized faces in the image is one or more in step S**303**.

**[0043]** When the number of recognized faces is one, the controller **111** detects the outline of the person in the whole screen in step S**305**. Detecting the outline of the person is a process where the controller **111** determines what portion of the recognized face size occupies the whole screen. The controller **111** determines whether an image, displayed in a preview screen on the display unit **107**, includes only a face, the whole body, or the upper body.

**[0044]** When recognizing that the image substantially includes only a face during the detection of the person's outline in step S**307**, the controller **111** detects the coordinates of the features in the recognized face, the coordinates of pupils, the angle of the face, and the coordinates of a body in step S**309**. When only one face is recognized, an image including only the face is displayed on a preview screen, as shown FIG. **4**A.

**[0045]** As shown in FIG. **4**A, when the controller **111** determines that one face is displayed in a preview screen, it detects the coordinates of features in the face, coordinates of pupils, angle of face, and coordinates of a body. The features in the face refer to the eyes, a nose, a mouth and the like. The controller **111** detects the above described items to determine where the person in the current preview screen is positioned. The controller **111** detects the coordinates of the eyes, nose, and mouth so that these features face forward, and also detects the coordinates of the pupils. Also, the controller **111** detects the angle of the face in the screen so that it is not tilted to one side, and detects the coordinates of the person to determine the position of the person. Here, it should be understood that the controller **111** can detect not only the coordinates of a face, as described above, but also various other portions of a person.

**[0046]** When the controller recognizes the whole body in step S**311**, during the detection of a person's outline at step S**305**, it detects the coordinates of the person's body corresponding to the recognized face in step S**313**. When the coordinates of a body are detected, the controller **111** can recognize the position of the person in the preview screen. Here, unlike in step S**309**, only the coordinates of a body are detected in the image in order to show the face and whole body. To this end, the controller **111** can provide a capture guide. However, it is understood that the present invention is not limited to detect only the coordinates of a body, but instead can also be implemented to detect various coordinates as described with respect to step S**309**.

**[0047]** When the controller **111** recognizes the upper body in step S**315**, during the detection of a person's outline in step S**305**, it detects coordinates or features in the recognized face, angle of the face, and coordinate of the person in step S**317**. Here, unlike step S**309**, the coordinates of pupils are not detected because the face is too small to enable their detection in the upper body image. However, it is understood that the present invention is not limited to detect only the coordinates of a body but instead exemplary embodiments of the present invention can be implemented to detect various coordinates as described with respect to step S**309**.

**[0048]** As shown in FIG. **3**B, when the controller **111** recognizes a plurality of faces in the image in step S**303**, it recognizes the sizes of the recognized faces in step S**331**. The controller **111** determines whether there are faces greater than a preset size among the recognized faces in step S**333**. Here, the preset size may be a face size in an image including only a face as described with respect to step S**307**, or a face size in an image including the upper body as described with respect to step S**315**.

**[0049]** When there is no face greater than the preset size at step S**333**, the controller **111** detects the coordinates of the bodies associated with the recognized faces in step S**337**. That is, in this case, the face size is small relative to the whole screen, and accordingly this image may be an image that

includes the whole body. The controller **111** detects the coordinates of bodies of recognized faces displayed in the screen.

**[0050]** When there are faces greater than the preset size at step S**333**, the controller **111** detects the coordinates of features in the faces greater than the preset size, coordinates of pupils, angles of faces, coordinates of the bodies, and coordinates of the bodies belonging to the faces of other sizes in step S**335**. That is, the controller **111** detects detailed coordinates of the bodies belonging to faces greater than the preset size, and coordinates of the bodies belonging to faces other than the faces that are greater than the preset size. When a plurality of faces are recognized, an image including the faces that are greater than the preset size is displayed on a preview screen, as shown in FIG. **4**B to FIG. **4**E.

**[0051]** As shown FIG. **4**B to FIG. **4**E, when the controller **111** determines that a plurality of faces are displayed on a preview screen, it determines whether faces greater than the preset size are in the image. After that, the controller **111** detects detailed coordinates of the bodies belonging to the faces that are greater than the preset size and coordinates of bodies belonging to the other faces in the image. It should be understood that the controller **111** detects not only the coordinates of the face described above but also a variety of other items.

**[0052]** Referring to FIG. **2** again, after recognizing the faces through the steps illustrated in FIG. **3**A and FIG. **3**B, the controller **111** overlays a capture guide on the displayed preview screen in step S**209**. When the controller **111** recognizes one face and thus recognizes that an image includes only a face in step S**309**, as shown in FIG. **4**A, it detects the coordinates of the face and overlays the capture guide on the preview screen. For example, the controller **111** recognizes that an image displayed on the preview screen is intended to be captured as a type of photograph for photo-identification, and overlays a capture guide for photo identification on the preview screen. That is, the controller **111** provides a capture guide so that the eyes, nose, and mouth of the person face forward, the pupils face forward, the face is not tilted, and the person is in the center.

**[0053]** As shown in FIG. **4**B and FIG. **4**C, when the controller **111** recognizes a plurality of faces in step S**335** and recognizes an image that includes only faces or whole bodies, it detects the coordinates corresponding to the recognized objects and overlays a capture guide on the preview screen. FIG. **4**B and FIG. **4**C show an example where different capture guides are displayed on the same preview screen. In particular, when one person with a face greater than the preset size and two other person's whole bodies are displayed on the preview screen, the controller **111** detects the coordinates corresponding to the respective persons and displays a corresponding capture guide. That is, although the preview screen displays the same image, a variety of capture guides may be displayed thereon. These various capture guides include template types of information regarding the number, position, and size of persons to be captured, and their various preset poses. The capture guides can be displayed in a variety of different ways according to the image recognized by the controller **111**.

**[0054]** The capture guide storage unit **110** includes similar capture guides that allow for a plurality of different options, such as positions, poses, etc., to be selected for the same number of persons. The controller **111** provides a representative capture guide of the plurality of similar capture guides. The capture guide can be selected from the provided similar capture guides by keys of the key input unit **101**. For example, regarding the same number and position of the persons, a capture guide allowing for different poses can be provided. Also, regarding the same number of persons, the user can select a capture guide located at a particular position.

**[0055]** As shown in FIG. **4**D and FIG. **4**E, when the controller **111** recognizes a plurality of faces at step S**335** and recognizes an image that includes the upper body, it detects the coordinates corresponding to the recognized objects and overlays a capture guide on the preview screen. That is, when two persons' upper bodies are displayed on the preview screen, the controller **111** detects the coordinates corresponding to the respective persons and displays a corresponding capture guide.

**[0056]** After that, the controller **111** determines whether persons are arranged to meet the capture guide in step S**211**. The controller **111** determines whether the terminal is set to an automatic capture mode in step S**213**. The automatic capture mode can be set by a user when an image capture mode is selected. The exemplary embodiment is implemented in such a way that the automatic capture mode can be automatically set when an image capture mode is selected. The controller **111** performs an automatic capturing operation while the automatic capture mode is set in step S**225**.

**[0057]** On the contrary, when the automatic capture mode is not set in step S**213**, the notifying unit **113** of the controller **111** notifies a user that persons are arranged to meet the capture guide in step S**215**. The notifying unit **113** displays a pop-up window on the display unit **107**, turns on/off a lighting device such as an LED, or generates a sound. After that, the controller **111** determines whether a user has taken a photograph in step S**217** and the controller **111** performs a capturing operation in step S**218**.

**[0058]** When the capturing operation is automatically performed through step S**225** or manually performed through step S**217**, the controller **111** inquires whether the captured image will be stored in step S**219**. When the response to the inquiry is positive, the captured image is stored in step S**221**. After that, the controller **111** determines whether the present procedure is terminated in step S**223**. When the response to the inquiry is positive, the controller **111** ends the present procedure, and when negative, the controller **111** returns the procedure to step S**205**. On the contrary, when the inquiry as to whether the capture image will be stored at step S**219** is negative, corresponding functions are performed.

**[0059]** In the first exemplary embodiment of the terminal with an image capture function and the image capturing method, a capturing operation is performed in such a way as to recognize and capture faces through a preview screen, overlaying a capture guide on the preview screen. Therefore, the first exemplary embodiment can obtain an image where persons are properly arranged and enhance the convenience of the device.

## Exemplary Embodiment 2

**[0060]** In the following description, the explanation of elements that are similar to or correspond to those in Exemplary Embodiment 1 will be omitted.

**[0061]** The terminal and the image capturing method of Exemplary Embodiment 2 is similar to Exemplary Embodiment 1. However, Exemplary Embodiment 2 includes a feature in that a capture guide is first selected when an image capture mode is selected, and then an image is captured according to the selected capture guide.

**[0062]** Referring to FIG. **1**, the key input unit **101** serves to select a capture guide mode for an image capture mode and a particular capture guide, etc. For example, the key input unit **101** selects the number of persons to be captured, and selects one of the capture guides for a variety of arrangements or positions of persons, according to the selected number of persons. In order to change the poses of persons according to the selected capture guide, the key input unit **101** can additionally select a capture guide. Therefore, the user directs and arranges the persons and poses and takes a photograph, according to the capture guide.

**[0063]** The display unit **107** overlays a particular capture guide, selected when the camera **103** is operated, on the preview screen. The display unit **107** displays an image to be captured on the preview screen on which the capture guide is currently displayed.

**[0064]** The controller **111** determines whether a capture guide mode is selected in the image capture mode. When the capture guide mode is selected, the controller **111** overlays a capture guide selected by the key input unit **101** on the preview screen of the display unit **107**. When persons are arranged in the preview screen, on which the capture guide is displayed, to substantially correspond to the capture guide, the controller **111** notifies, through the notifying unit **113**, that the persons are properly arranged or automatically captures the image.

**[0065]** In the following description, the image capturing method of the terminal according to an exemplary embodiment of the present invention is explained with reference to the drawings.

**[0066]** FIG. **5** is a flowchart illustrating an image capturing method according to a second exemplary embodiment of the present invention.

**[0067]** Referring to FIG. **1**, as illustrated in FIG. **5**, the controller **111** recognizes a wait mode in step S**501**.

**[0068]** The controller **111** determines whether an image capture mode is selected in step S**503**. When the image capture mode is selected, the controller **111** determines whether a capture guide mode is selected in step S**505**. The controller **111** recognizes that the capture guide mode is selected as a user operates the key input unit **101** in the image capture mode.

**[0069]** When the capture guide mode is selected, the controller **111** recognizes that a particular capture guide is selected through the key input unit **101** in step S**507**. A user selects a particular capture guide provided in a capture guide mode to capture an image.

**[0070]** After that, the controller **111** overlays the selected capture guide on the preview screen in step S**509**. The controller **111** determines whether people are arranged to meet the capture guide in step S**511**. The user selects his/her desired capture guide and displays it on the preview screen, so that the user can capture an image according to the displayed capture guide.

**[0071]** When the controller **111** concludes that people are arranged to meet the selected capture guide, it determines whether an automatic capture mode is set in step S**513**. When an automatic capture mode is set in step S**513**, the controller **111** automatically performs a capturing operation in step S**525**.

**[0072]** On the contrary, when an automatic capture mode is not set, the notifying unit **113** of the controller **111** notifies the user that people are arranged to meet the capture guide in step S**515**. The controller **111** determines whether the user takes a photograph in step S**517** and the controller **111** performs a capturing operation in step S**518**.

**[0073]** When the capturing operation is automatically performed through step S**525** or manually performed through step S**517**, the controller **111** inquires whether the captured image will be stored in step S**519**. When the inquiry as to whether the capture image will be stored is positive, the captured image is stored in step S**521**. After that, the controller **111** determines whether the present procedure is terminated in step S**523**. When the response to the inquiry as to whether the present procedure is terminated is positive, the controller **111** ends the present procedure, and when the response to the inquiry is negative, the controller **111** returns the procedure to step S**505**. On the contrary, when the response to the inquiry as to whether the capture image will be stored in step S**519** is negative, corresponding functions are performed.

**[0074]** In the second exemplary embodiment of the terminal with an image capture function and the image capturing method, a capturing operation is performed in such a way as to select a particular capture guide in a capture mode, overlay it on the preview, and capture an image. Therefore, the second exemplary embodiment can obtain an image where persons are properly arranged and enhance the convenience of the device.

## Exemplary Embodiment 3

**[0075]** In the following description, the explanation of elements that are similar to or correspond to those of Exemplary Embodiments 1 and 2 will be omitted.

**[0076]** The terminal and the image capturing method of Exemplary Embodiment 3 is similar to Exemplary Embodiments 1 and 2. However, Exemplary Embodiment 3 has a feature in that a saved image can be edited in such a way as to select the saved image, recognize a face in the selected image, and overlay a capture guide corresponding to the recognized face on an image.

**[0077]** Referring to FIG. **1**, the key input unit **101** serves to select saved images and to edit the selected image in a state where a capture guide is overlaid on the selected image.

**[0078]** Exemplary Embodiment 3 of the present invention may be implemented without the camera **103** because it processes images saved in the memory **109**. That is, Exemplary Embodiment 3 can use images received from the external devices as well as saved images that were captured by the camera **103**.

**[0079]** The display unit **107** displays an image selected by a user. The display unit **107** overlays a capture guide on a particular image currently displayed thereon. Also, the display unit **107** displays an image edited according to the capture guide.

**[0080]** The memory **109** saves images and capture guides. Also, the memory **109** stores an application program for editing images.

**[0081]** When an image saved in the memory **109** is selected by a user, the controller **111** determines whether a capture guide is selected. When the controller **111** recognizes that the capture guide is selected, it recognizes a face from the selected image through the face recognition unit **112** as described in Exemplary Embodiment 1. The controller **111** displays a capture guide according to the recognized face on the display unit **107**.

**[0082]** The controller **111** includes an edit unit **114**. When a capture guide is overlaid on a selected image, the edit unit

**114** edits the selected image. The edit unit **114** serves to cut/magnify/reduce an image selected according to a capture guide, to cut/magnify/reduce a particular portion of an image, and to cancel the edit execution.

**[0083]** In addition, the controller **111** saves images, edited by the edit unit **114**, in the memory **109**. The controller **111** overwrites the edited image on the images previously saved in the memory **109**.

**[0084]** In the following description, the image capturing method of the terminal according to an exemplary embodiment of the present invention is explained with reference to the drawings.

**[0085]** FIG. **6** is a flowchart describing an image capturing method according to a third exemplary embodiment of the present invention.

**[0086]** Referring to FIG. **1**, as shown in FIG. **6**, the controller **111** recognizes a wait mode in step S**601**.

**[0087]** The controller **111** determines whether a mode for displaying saved images is selected in step S**603**. When the mode for displaying saved images is selected, the controller **111** recognizes that a particular one of the images saved in the memory **109** is selected through the key input unit **101** in step S**605**.

**[0088]** Next, the controller **111** determines whether a capture guide is selected in step S**607**. When the capture guide is selected, the face recognition unit **112** of the controller **111** recognizes a face in the selected image, as described in Exemplary Embodiment 1, in step S**609**. That is, the face recognition unit **112** recognizes a face in an image displayed in the preview screen as in Exemplary Embodiment 1. However, in Exemplary Embodiment 3, the image displayed in the preview screen originates from a saved image.

**[0089]** After that, the controller **111** overlays a capture guide on the selected image in step S**611**. That is, the controller **111** overlays a capture according to the face recognized in step S**609** on the image selected in step S**605**. For example, when the image selected in step S**605** includes only one face, the face recognition unit **112** of controller **111** recognizes the face and detects the coordinates of features in the face, coordinates of pupils, angle of the face, and coordinate of the body associated with the face. The controller **111** overlays a proper capture guide on the selected image, according to detected items.

**[0090]** Afterwards, the edit unit **114** edits the image on which the capture guide is overlaid in step S**613**. When the capture guide is overlaid, in step S**611**, on the image selected in step S**605**, the edit unit **114** edits the selected image. The edit unit **114** cuts, magnifies, or reduces the image selected according to the capture guide. Also, the edit unit **114** cuts, magnifies, or reduces a particular portion of the selected image. In addition, the edit unit **114** cancels its edit execution.

**[0091]** Next, the controller **111** determines whether the edited image is saved in step S**615**. When the controller **111** detects that a signal for terminating an image edit function is input from the user, it determines whether the edited image is saved.

**[0092]** When the controller **111** detects a signal for saving an edited image in S**615**, it saves the edited image in the memory in step S**617**. On the contrary, when the controller does detect a signal for saving an edited image in S**615**, it determines whether the edited image is overwritten on the saved image in step S**621**. That is, the controller **111** determines whether the image edited in step S**613** is saved in the memory **109**, instead of the image that is selected in step S**605** and saved in the memory **109**.

**[0093]** When the controller **111** detects a signal that allows for overwriting an edited image on the saved image in step S**621**, it overwrites the edited image on the saved image in step S**617**. After that, the controller **111** determines whether to terminate the present function in step S**619**. When this inquiry as to whether the present function is terminated is positive, the controller **111** ends the present procedure, and when the inquiry is negative, the controller **111** returns the procedure to step S**605**. On the contrary, when the controller **111** does not detect a signal that allows for overwriting an edited image on the saved image in step S**621**, corresponding functions are performed.

**[0094]** In the third exemplary embodiment of the terminal with an image capture function and the image capturing method, saved images can be edited using a particular capture guide. Therefore, the third exemplary embodiment can obtain an image where persons are properly arranged and enhance the convenience of the device.

**[0095]** As described above, a terminal with an image capture function and an image capturing method thereof, according to exemplary embodiments of the present invention, can capture an image, overlay a capture guide according to a recognized face on a preview screen, capture an image, select a particular capture guide and overlay the particular capture guide on the preview screen, during the capture mode, and edit saved images according to a particular capture guide, thereby obtaining an image where persons are properly arranged and enhancing the convenience of the device.

**[0096]** While the invention has been shown and described with reference to certain exemplary embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims and their equivalents.

What is claimed is:

**1**. An image capturing method of a terminal comprising:

recognizing a face in an image displayed on a preview screen in a capture mode;

overlaying a capture guide on the preview screen according to the recognized face; and

capturing the image when the image is arranged to substantially correspond to the capture guide.

**2**. The method of claim **1**, wherein the recognizing of the face comprises:

determining, when the face appears in the image, whether there is one or a plurality of faces in the image;

detecting, when there is one face in the image, an outline of a person associated with the face in the image; and

detecting coordinates of the face, when detecting the outline of the person, if one face is determined to be in the image.

**3**. The method of claim **2**, wherein the coordinates of the face comprises at least one of coordinates of features in the face, coordinates of pupils, angle of the face, and coordinates of a body of the person.

**4**. The method of claim **2**, wherein the detecting of the coordinates of the face further comprises detecting coordinates of a body of the person when the image substantially includes the entire body when detecting the outline of the person.

**5**. The method of claim **2**, wherein the detecting of the coordinates of the face comprises detecting coordinates of an

upper portion of a body of the person when the image includes the upper portion of the body when detecting the outline of the person.

**6**. The method of claim **5**, wherein the coordinates of the upper body comprises at least one of coordinates of features in the face, angle of the face, and coordinates of the body.

**7**. The method of claim **2**, further comprising:

determining, when there is a plurality of faces in the image, whether there is a face greater than a preset size; and

detecting, when there is a face greater than the preset size, coordinates of the face greater than the preset size and coordinates of faces other than the face that is greater than the preset size.

**8**. The method of claim **7**, wherein the coordinates of the face that is greater than the preset size comprises at least one of coordinates of features in the face that is greater than the preset size, coordinates of pupils, angle of the face, and coordinates of the person.

**9**. The method of claim **7**, wherein the detecting of the coordinates of the face further comprises detecting coordinates of bodies associated with the other faces when there is no face greater than the preset size.

**10**. The method of claim **1**, wherein the overlaying of the capture guide on the preview screen comprises:

storing respective preset template types of information for a number, a position, a size of persons to be captured and a variety of capture poses of the persons to be captured;

storing groups of a plurality of capture guides, each group of the plurality of capture guides comprising capture guides for a same number of persons, wherein each capture guide of the group of the plurality of capture guides is for at least one of positions and poses; and

providing a representative capture guide of each of the groups of the plurality of capture guides.

**11**. An image capturing method of a terminal comprising:

selecting a capture guide provided in an image capture mode, according to at least one of a pose, an arrangement, and a number of persons to be captured;

overlaying the selected capture guide on a preview screen; and

capturing the image, when an image is substantially arranged according to the capture guide.

**12**. An image capturing method of a terminal comprising:

determining, when saved images are selected, whether a capture guide is selected;

recognizing, when the capture guide is selected, a face in the selected image;

overlaying the capture guide on the image according to the recognized face; and

editing the image.

**13**. The method of claim **12**, wherein the recognizing of the face comprises:

determining, when the face appears in the image, whether there is one or a plurality of faces in the image;

detecting, when one face appears in the image, an outline of a person associated with the face in the image; and

detecting coordinates of the face, when detecting the outline of the person, if one face is determined to be in the image.

**14**. The method of claim **13**, wherein the detecting of the coordinates of the face further comprises detecting coordinates of a body of the person, when the image substantially includes an entire body of the person when detecting the outline of the person.

**15**. The method of claim **13**, wherein the detecting of the coordinates of the face comprises detecting coordinates of an upper portion of a body of the person, when the image includes the upper portion of the body of the person when detecting the outline of the person.

**16**. The method of claim **13**, wherein the detecting of the outline of the person comprises:

determining, when there is a plurality of faces in the image, whether there is a face greater than a preset size; and

detecting, when there is a face greater than the preset size, coordinates of the face greater than the preset size and coordinates of faces other than the face that is greater than the preset size.

**17**. The method of claim **16**, wherein the detecting of the coordinates of the face further comprises detecting, when there is no face greater than the preset size, coordinates of bodies associated with the plurality of faces.

**18**. The method of claim **12**, wherein the editing of the image comprises at least one of cutting the image, magnifying the image, reducing the image, partially cutting the image, partially magnifying the image, partially reducing the image, and canceling the editing of the image.

**19**. A terminal comprising:

a camera for capturing an image;

a face recognition unit for recognizing one or a plurality of faces in the image;

a memory for storing the image and a capture guide according to the recognized face; and

a controller for overlaying the capture guide on a preview screen on which the image is displayed, and for capturing an image when the image is arranged to substantially correspond to the capture guide.

**20**. The terminal of claim **19**, wherein the face recognition unit determines whether one or a plurality of faces appear in the image and detects an outline of a person in the image when one face appears in the image.

**21**. The terminal of claim **20**, wherein, when the image substantially includes only a face when detecting the outline of the person, the face recognition unit detects coordinates of the person in the image.

**22**. The terminal of claim **20**, wherein, when the image substantially includes an entire body of the person when detecting the outline of the person, the face recognition unit detects coordinates of the person.

**23**. The terminal of claim **20**, wherein, when the image includes an upper portion of a body of the person when detecting the outline of the person, the face recognition unit detects coordinates of the upper portion of the body.

**24**. The terminal of claim **19**, wherein the face recognition unit determines whether there is a face greater than a preset size in the image, and, when there is a face greater than the preset size, detects coordinates of the face greater than the preset size and coordinates of faces other than the face that is greater than the preset size.

**25**. The terminal of claim **19**, wherein:

the controller recognizes an image saved in the memory when the saved image is selected and the capture guide is selected, and overlays the capture guide on the image according to the recognized face; and

the controller further comprises an edit unit for editing the image.

* * * * *