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(54) **ELECTRONIC DEVICE AND CONTROL METHOD FOR ELECTRONIC DEVICE**

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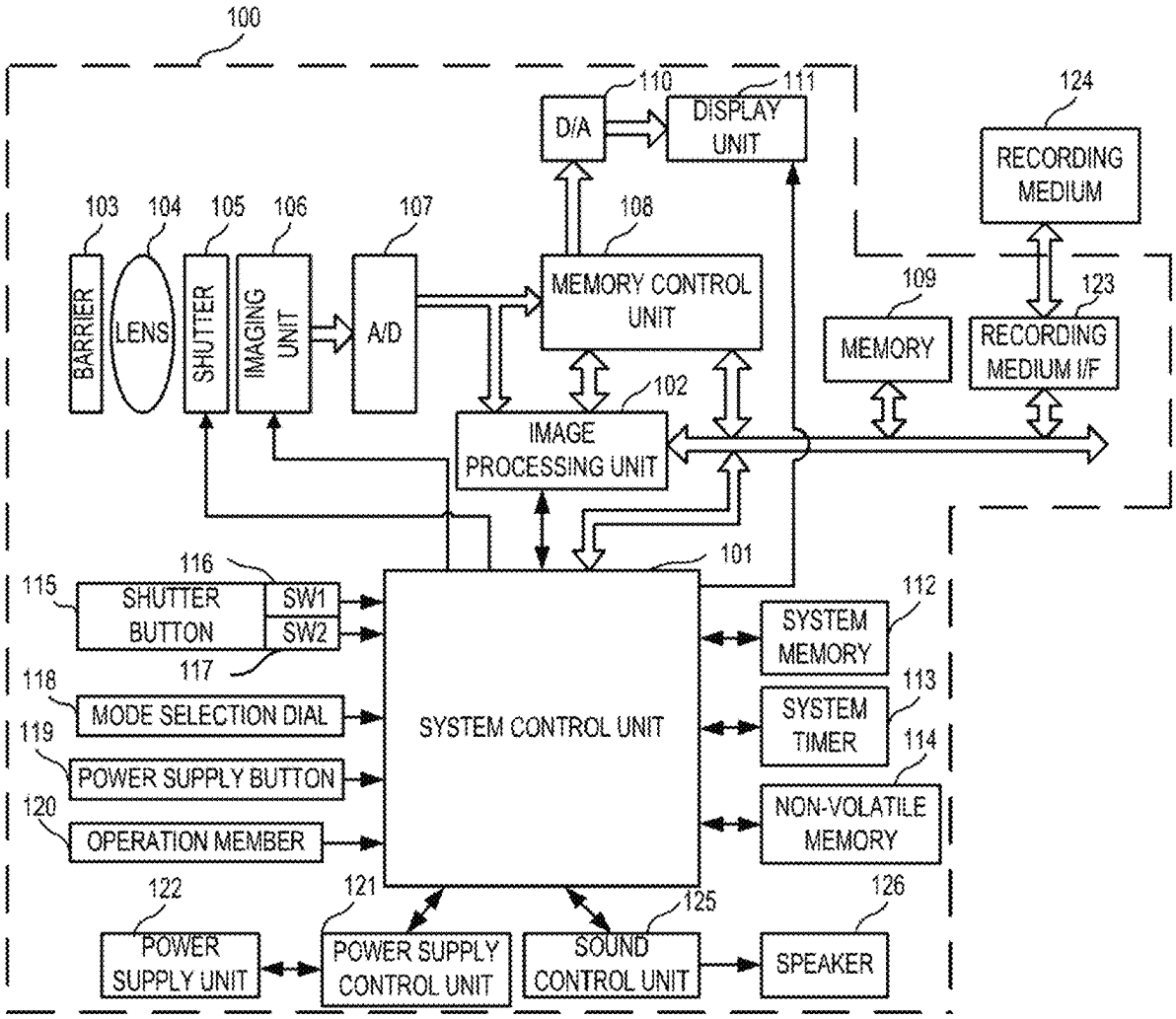
(57) **ABSTRACT**

An electronic device acquires a captured image. The electronic device performs control such that a plurality of acquired captured images are arranged and displayed in order of image capturing in a plurality of image display regions. In a case where a delimiting image, which indicates delimitation, in order of image capturing, is included in the acquired images, the electronic device performs control so as to display a display item, which indicates delimitation, in a region outside the plurality of image display regions, without displaying the delimiting image in the plurality of image display regions.



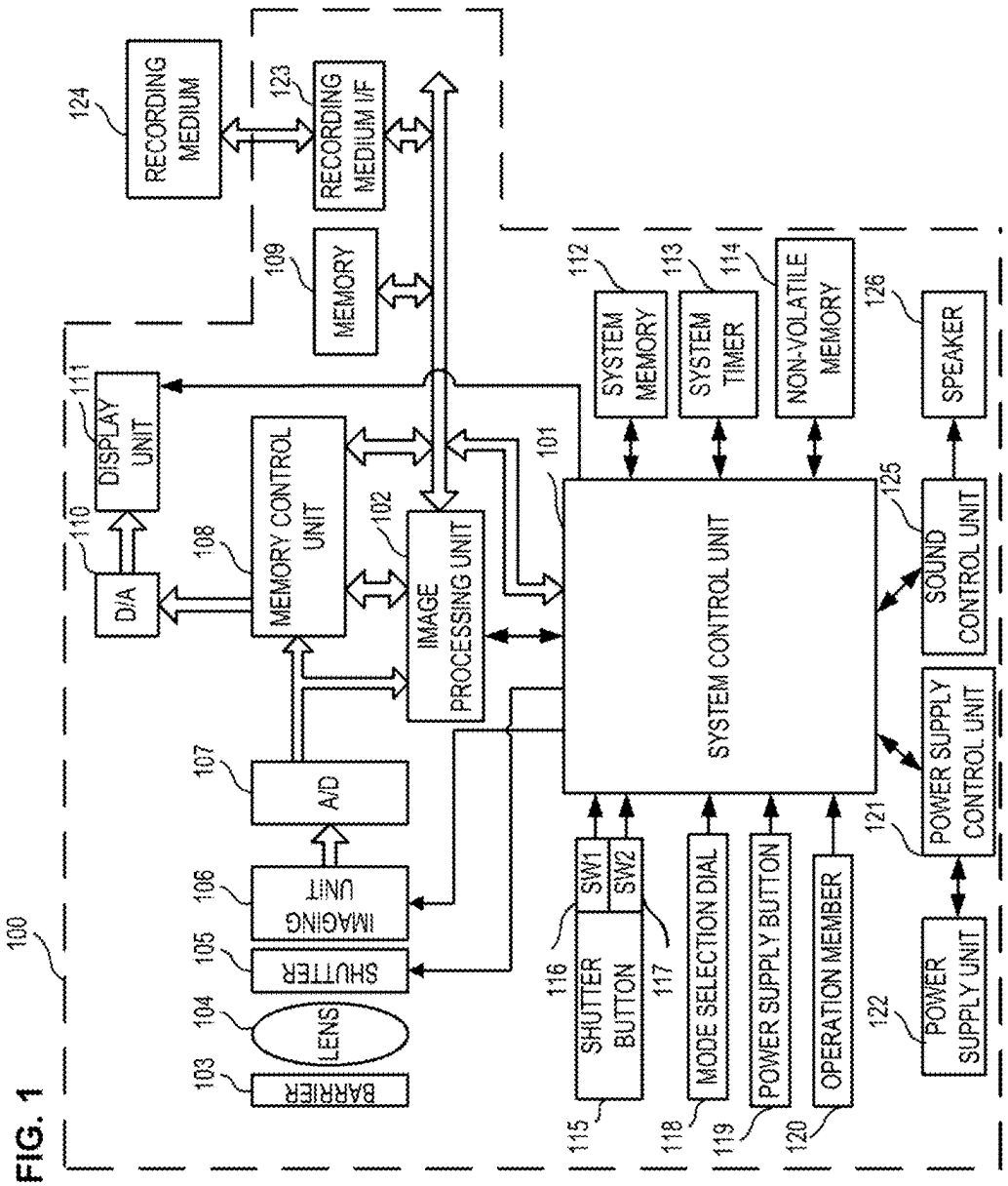

100
RECORDING MEDIUM
124
RECORDING MEDIUM I/F
123
MEMORY
109
SYSTEM MEMORY
112
SYSTEM TIMER
113
NON-VOLATILE MEMORY
114
SPEAKER
126
DISPLAY UNIT
111
D/A
110
MEMORY CONTROL UNIT
108
IMAGE PROCESSING UNIT
102
101
SYSTEM CONTROL UNIT
SOUND CONTROL UNIT
125
A/D
107
IMAGING UNIT
106
SHUTTER
105
LENS
104
BARRIER
103
SW1
SW2
SHUTTER BUTTON
116
117
115
MODE SELECTION DIAL
118
POWER SUPPLY BUTTON
119
OPERATION MEMBER
120
POWER SUPPLY CONTROL UNIT
121
POWER SUPPLY UNIT
122

FIG. 1

FIG. 2

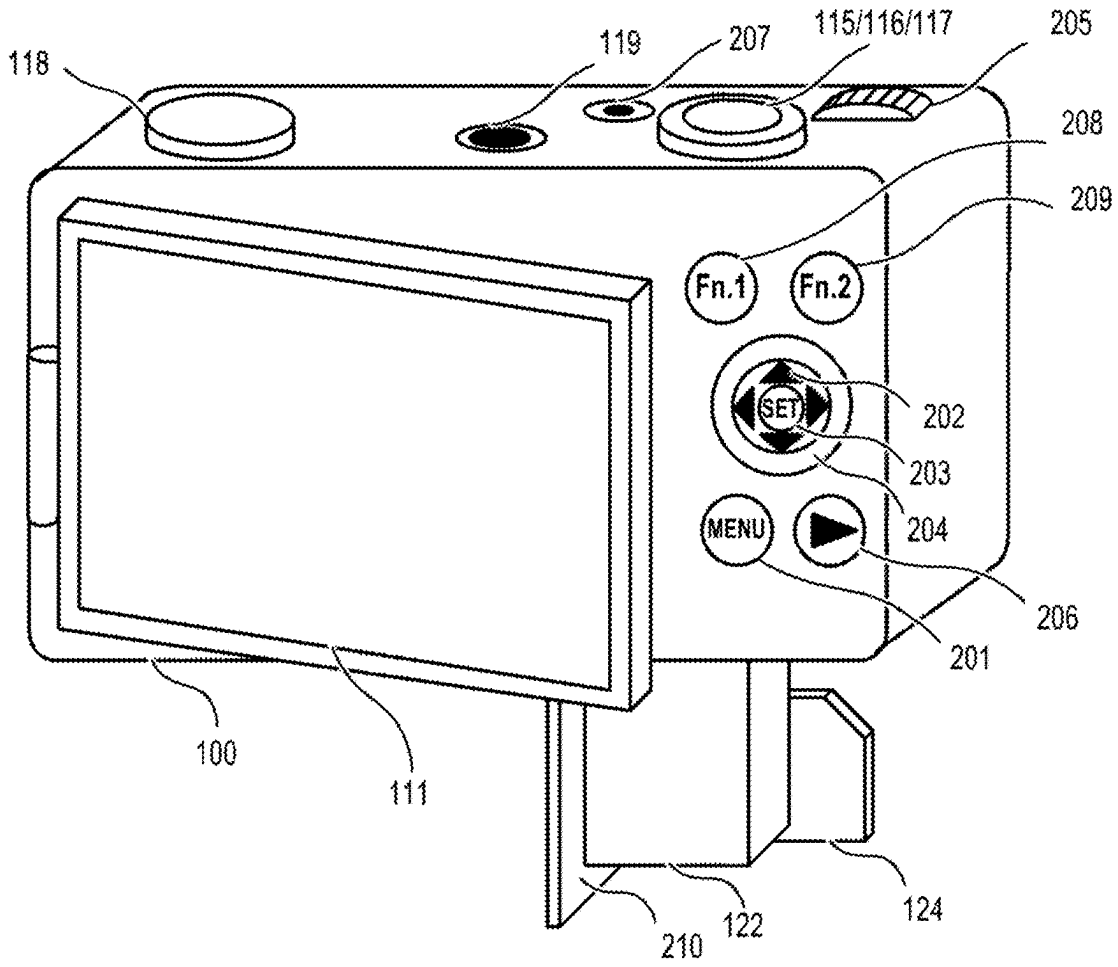

118
119
207
115/116/117
205
208
209
Fn.1
Fn.2
SET
202
203
204
MENU
206
201
100
111
210
122
124

FIG. 3A

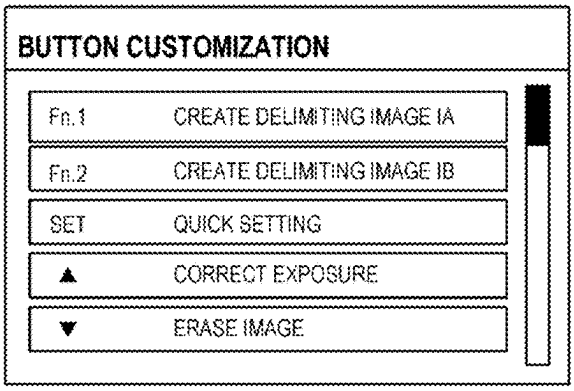


FIG. 3B

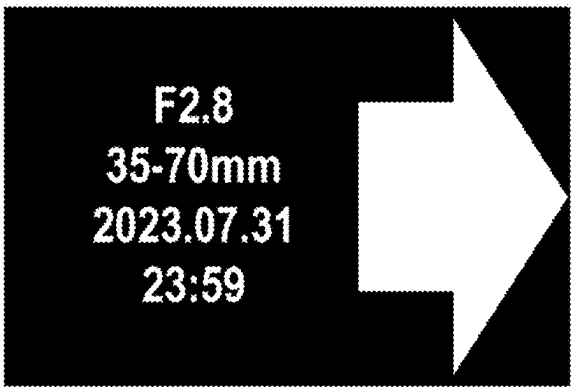


FIG. 3C

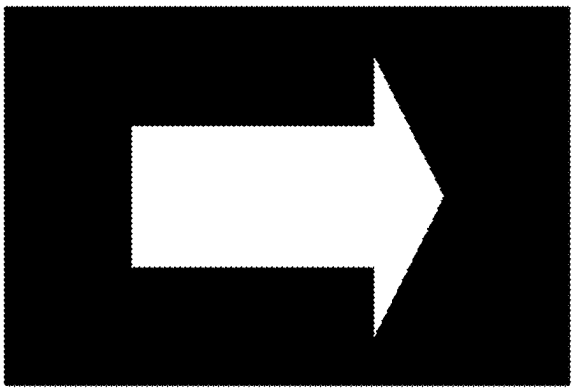


FIG. 3D

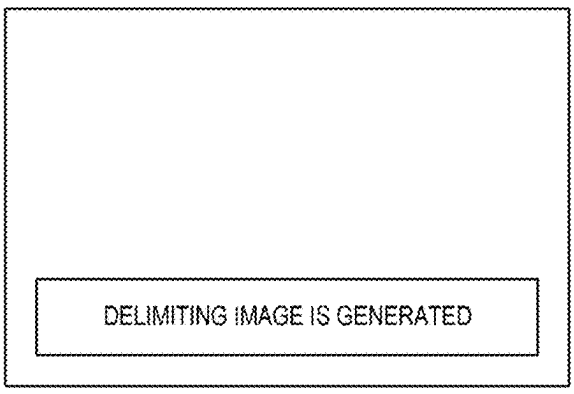


FIG. 3E

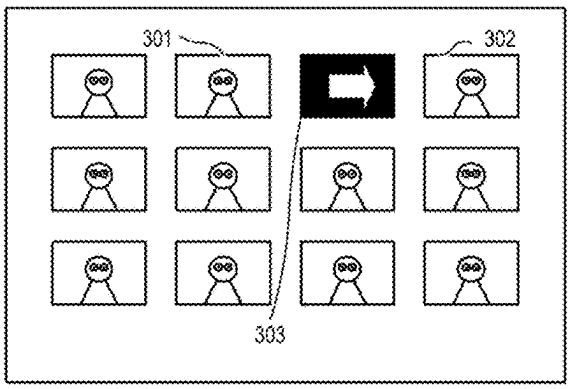


FIG. 3F

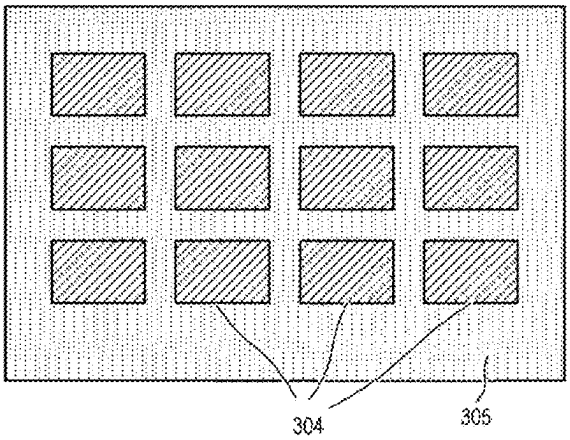


FIG. 3G

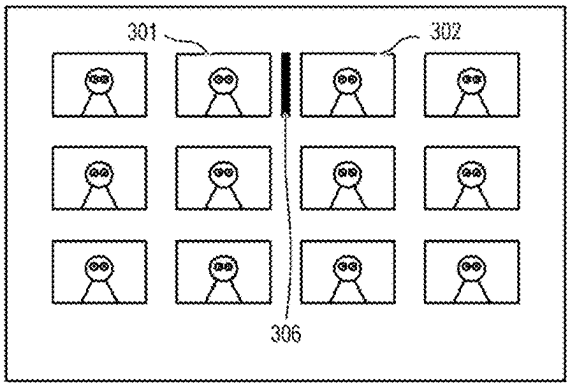


FIG. 3H

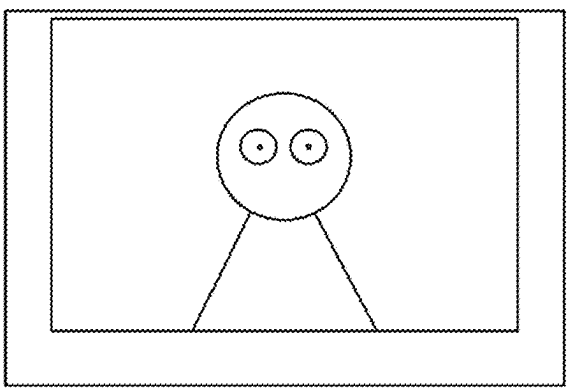


FIG. 4

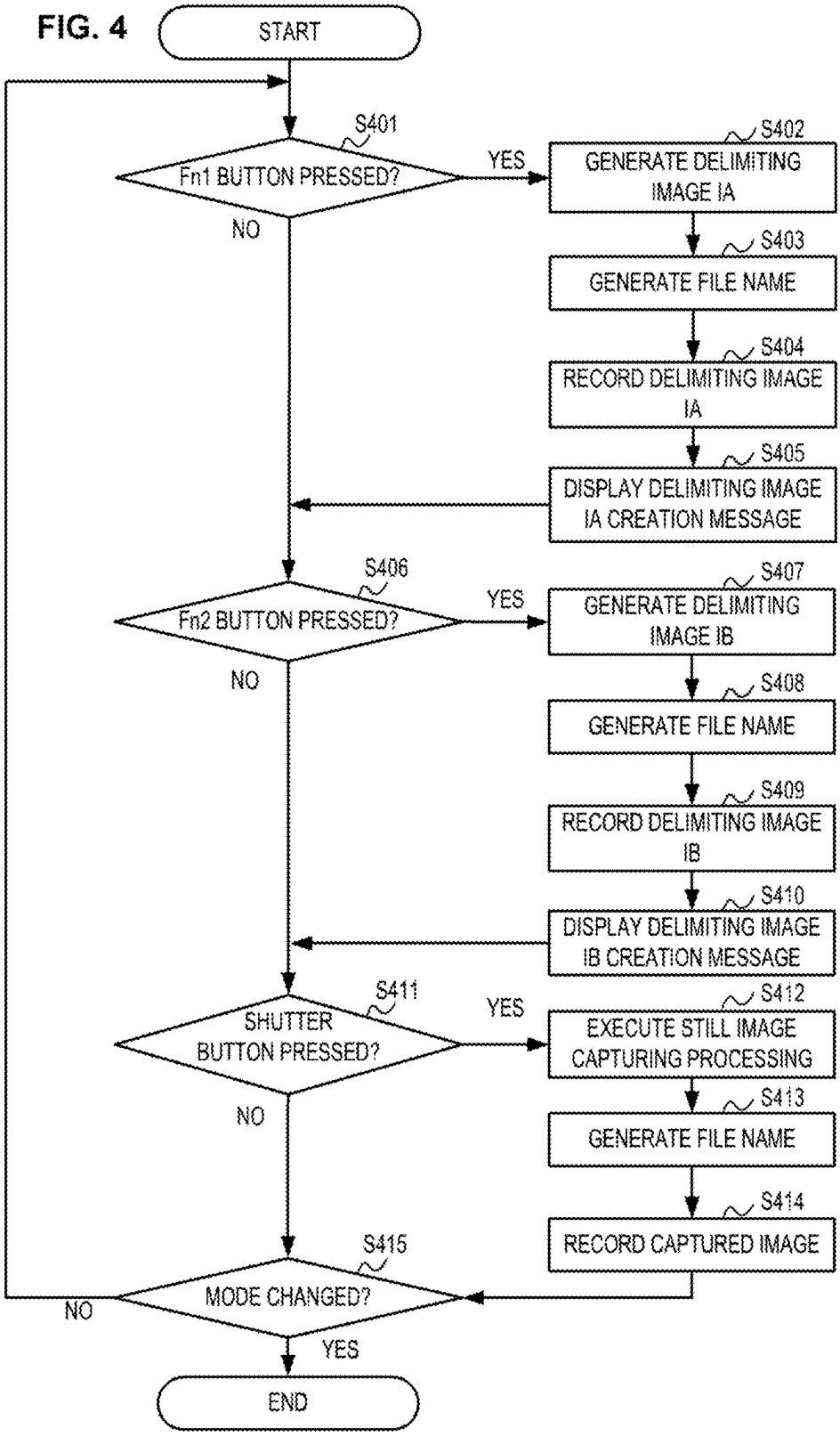

START
S401
Fn1 BUTTON PRESSED?
YES
NO
S402
GENERATE DELIMITING IMAGE IA
S403
GENERATE FILE NAME
S404
RECORD DELIMITING IMAGE IA
S405
DISPLAY DELIMITING IMAGE IA CREATION MESSAGE
S406
Fn2 BUTTON PRESSED?
YES
NO
S407
GENERATE DELIMITING IMAGE IB
S408
GENERATE FILE NAME
S409
RECORD DELIMITING IMAGE IB
S410
DISPLAY DELIMITING IMAGE IB CREATION MESSAGE
S411
SHUTTER BUTTON PRESSED?
YES
NO
S412
EXECUTE STILL IMAGE CAPTURING PROCESSING
S413
GENERATE FILE NAME
S414
RECORD CAPTURED IMAGE
S415
MODE CHANGED?
NO
YES
END

FIG. 5

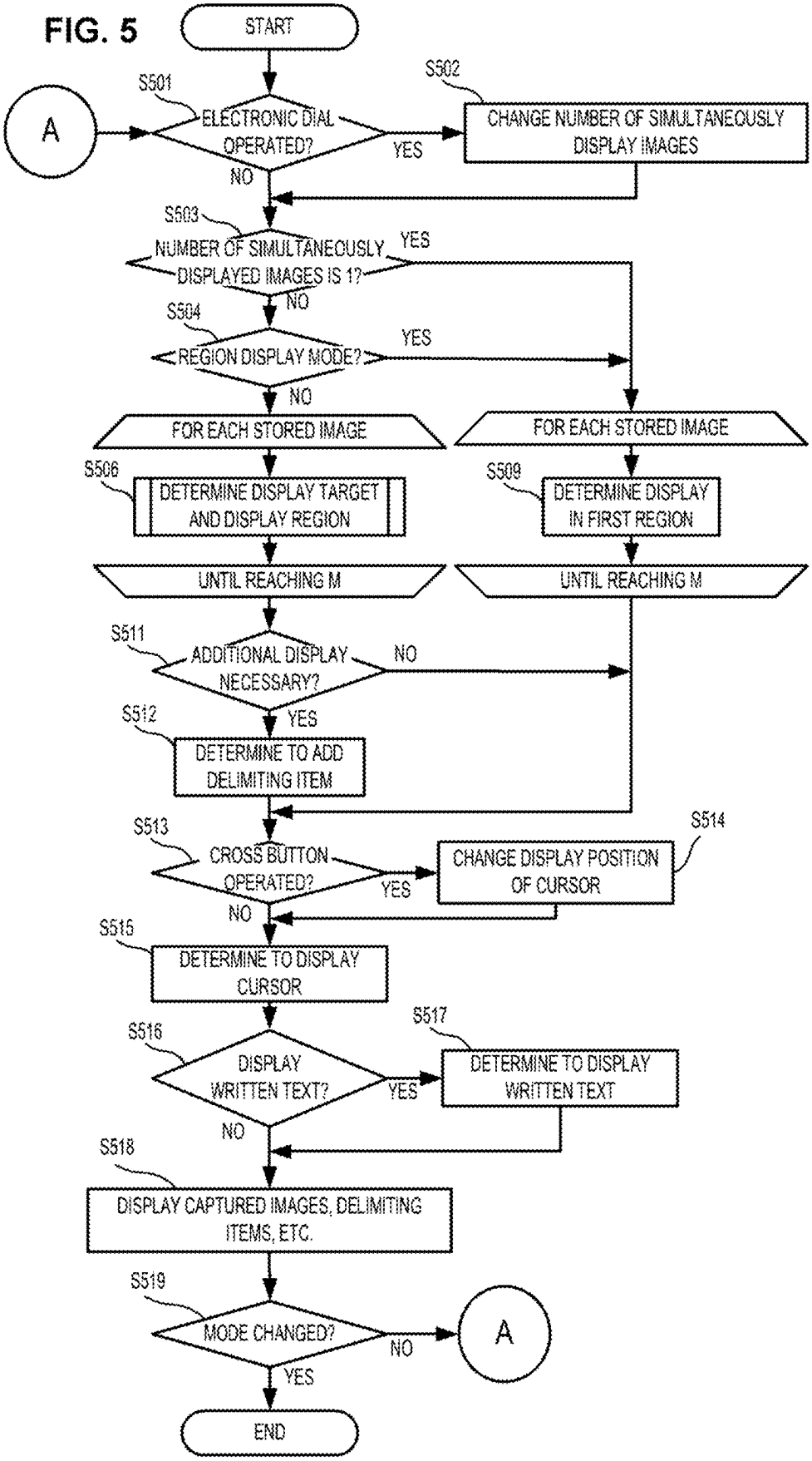
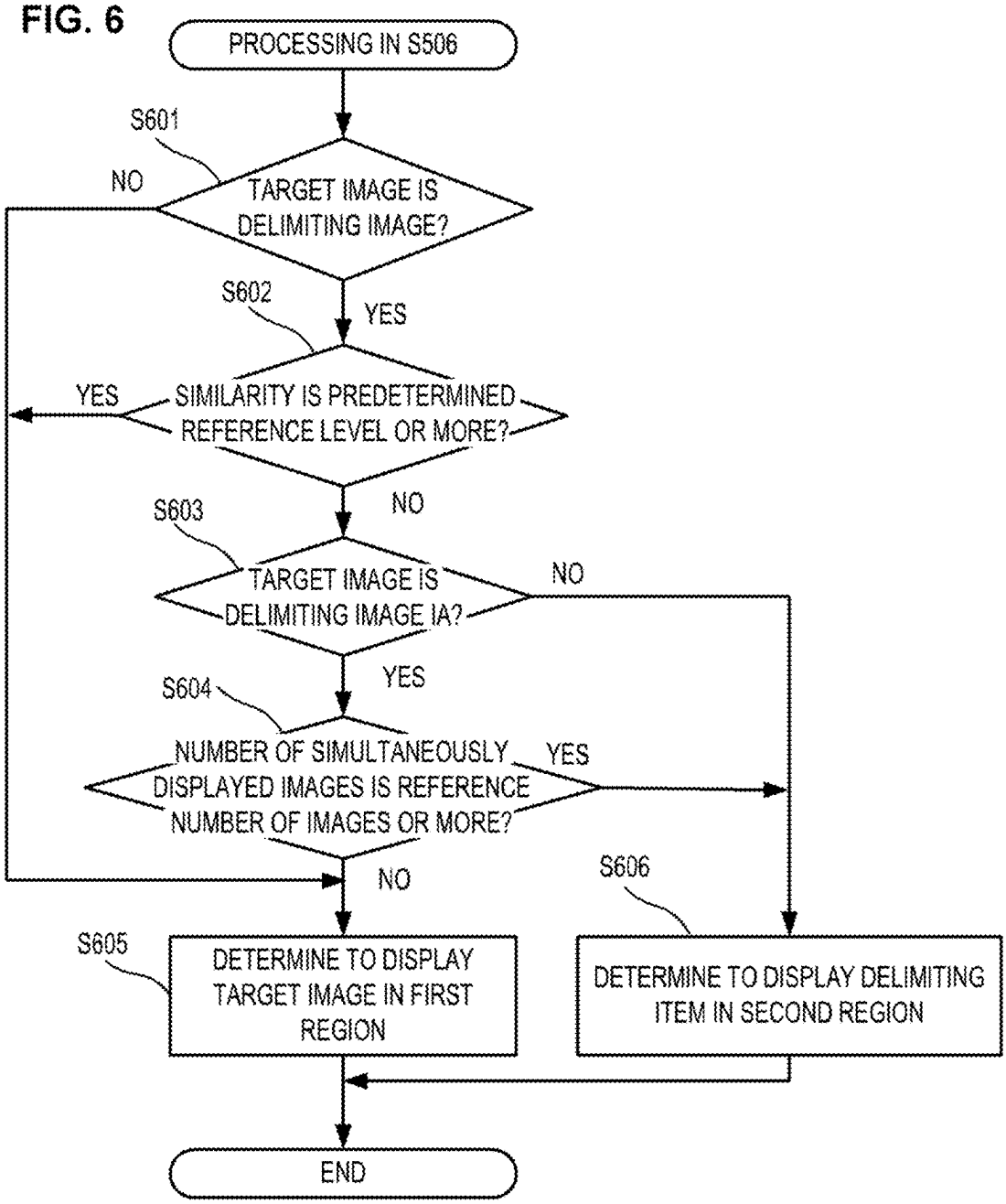

START
A
S501
ELECTRONIC DIAL OPERATED?
YES
NO
S502
CHANGE NUMBER OF SIMULTANEOUSLY DISPLAY IMAGES
S503
NUMBER OF SIMULTANEOUSLY DISPLAYED IMAGES IS 1?
YES
NO
S504
REGION DISPLAY MODE?
YES
NO
FOR EACH STORED IMAGE
FOR EACH STORED IMAGE
S506
DETERMINE DISPLAY TARGET AND DISPLAY REGION
S509
DETERMINE DISPLAY IN FIRST REGION
UNTIL REACHING M
UNTIL REACHING M
S511
ADDITIONAL DISPLAY NECESSARY?
NO
YES
S512
DETERMINE TO ADD DELIMITING ITEM
S513
CROSS BUTTON OPERATED?
YES
NO
S514
CHANGE DISPLAY POSITION OF CURSOR
S515
DETERMINE TO DISPLAY CURSOR
S516
DISPLAY WRITTEN TEXT?
YES
NO
S517
DETERMINE TO DISPLAY WRITTEN TEXT
S518
DISPLAY CAPTURED IMAGES, DELIMITING ITEMS, ETC.
S519
MODE CHANGED?
NO
YES
A
END

FIG. 6


PROCESSING IN S506
S601
TARGET IMAGE IS DELIMITING IMAGE?
NO
YES
S602
SIMILARITY IS PREDETERMINED REFERENCE LEVEL OR MORE?
YES
NO
S603
TARGET IMAGE IS DELIMITING IMAGE IA?
NO
YES
S604
NUMBER OF SIMULTANEOUSLY DISPLAYED IMAGES IS REFERENCE NUMBER OF IMAGES OR MORE?
YES
NO
S605
DETERMINE TO DISPLAY TARGET IMAGE IN FIRST REGION
S606
DETERMINE TO DISPLAY DELIMITING ITEM IN SECOND REGION
END

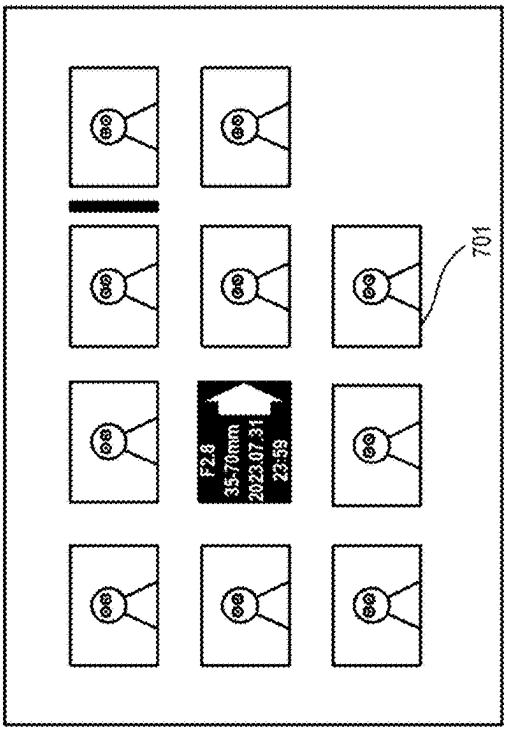


FIG. 7B

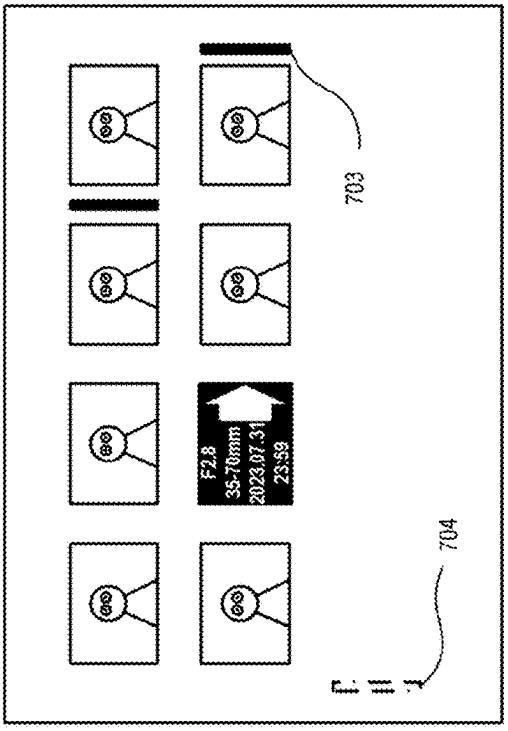


FIG. 7D

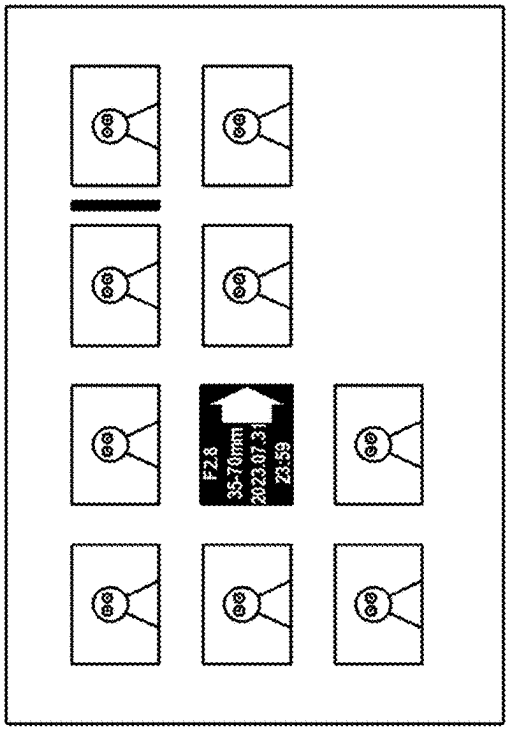


FIG. 7A

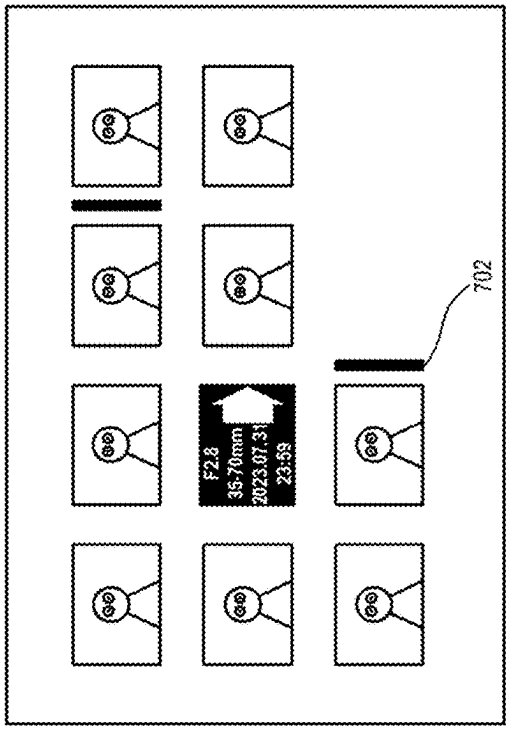


FIG. 7C

FIG. 8A

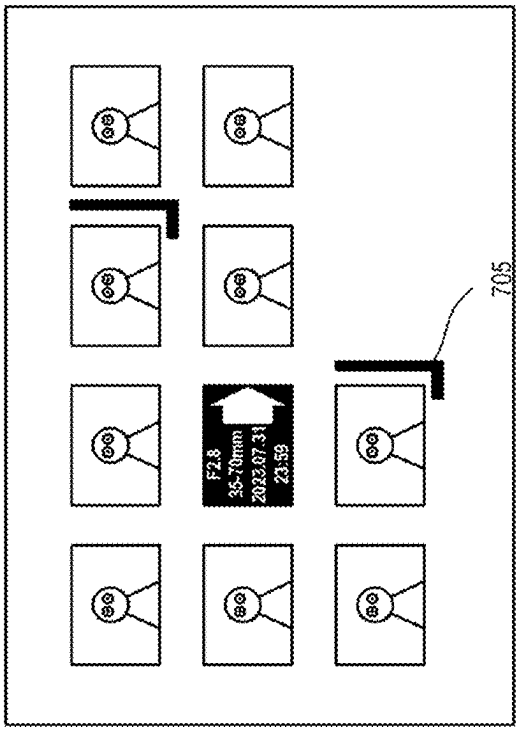


FIG. 8B

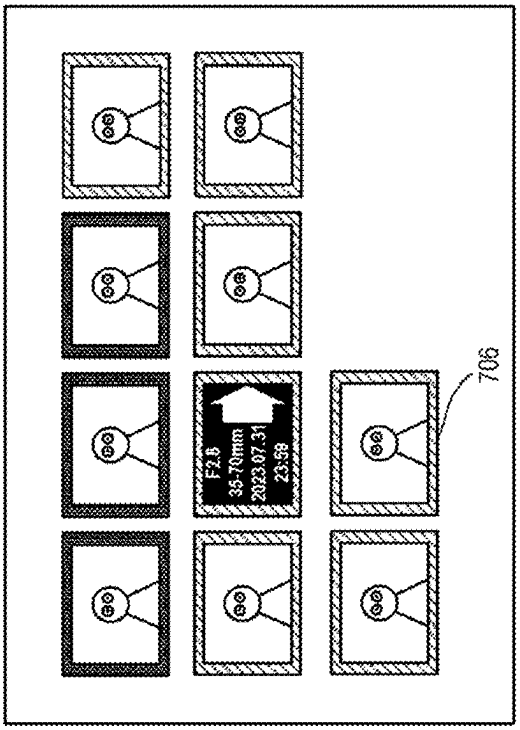


FIG. 8C

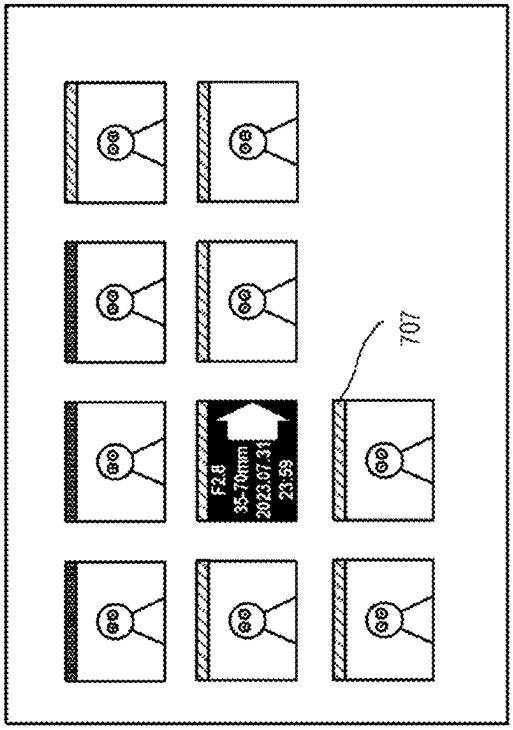


FIG. 8D

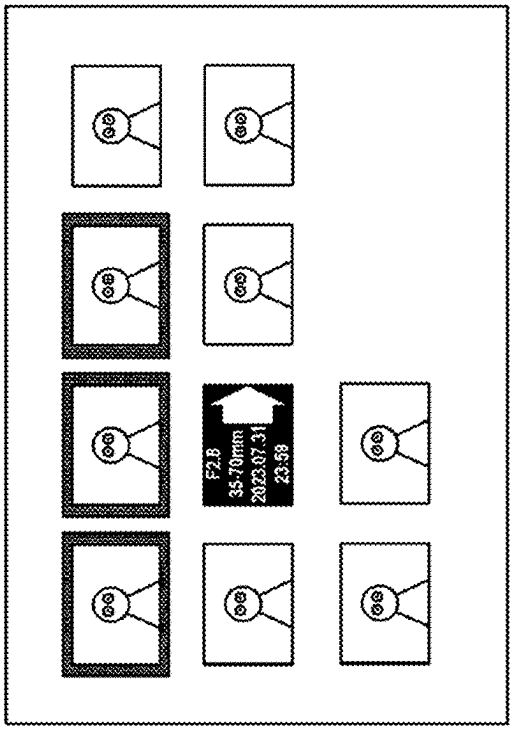


FIG. 9A

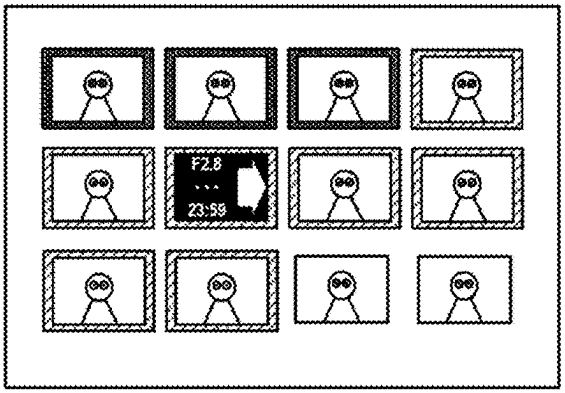


FIG. 9B

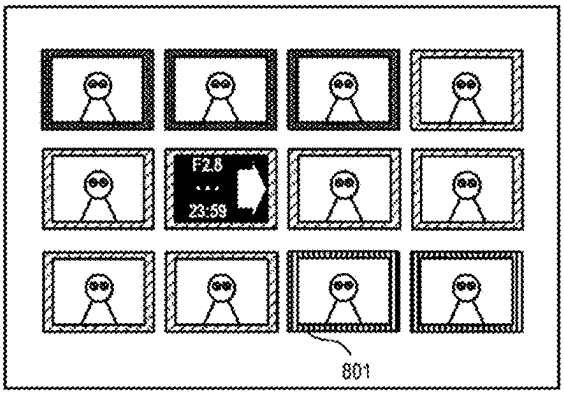


FIG. 9C

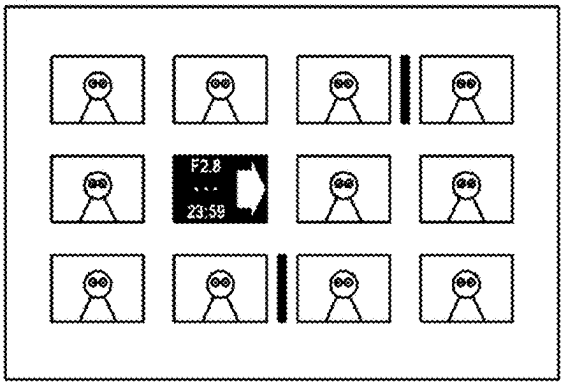


FIG. 9D

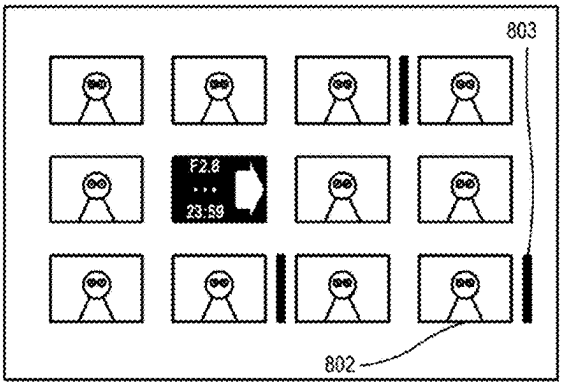


FIG. 9E

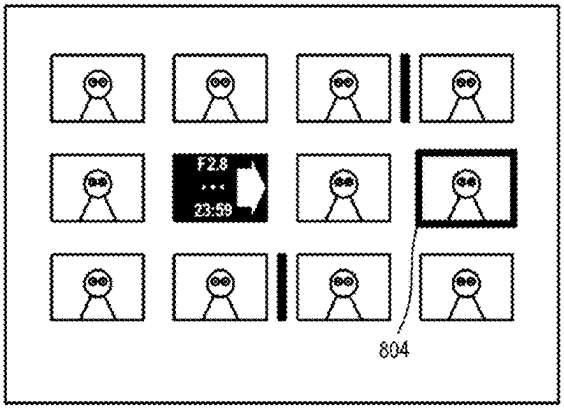
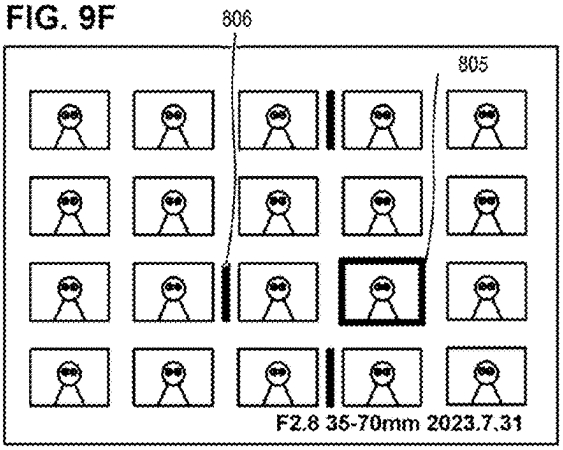


FIG. 9F



ELECTRONIC DEVICE AND CONTROL METHOD FOR ELECTRONIC DEVICE

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an electronic device and a control method for the electronic device.

Description of the Related Art

[0002] In a case of displaying a list of a plurality of images, acquired by consecutive shooting by a camera, many thumbnails having similar patterns are disposed. Therefore, a user cannot easily determine images belonging to a same group among the plurality of images.

[0003] Japanese Patent Application Publication No. 2008-141270 discloses a technique to acquire meaningful delimitation between captured image groups, and dispose a delimiting image at the delimiting position, so that the user can visually determine the delimitation more easily.

[0004] In the technique according to Japanese Patent Application Publication No. 2008-141270, the user can determine the delimiting positions among a plurality of images by viewing a display device.

[0005] With this technique however, the delimiting image is displayed in the display region of the captured images, hence the number of captured images displayed decreases by the number of delimiting images displayed.

SUMMARY OF THE INVENTION

[0006] With the foregoing in view, it is an object of the present invention to provide a technique to suppress a decrease of the number of images displayed in a list, and still allow the user to recognize the delimiting positions.

[0007] An aspect of the present invention is an electronic device, including: an acquisition unit configured to acquire a captured image; and a control unit configured to perform control such that a plurality of captured images acquired by the acquisition unit are arranged and displayed in order of image capturing in a plurality of image display regions, wherein in a case where a delimiting image, which indicates a delimitation in order of image capturing, is included in the images acquired by the acquisition unit, the control unit performs control so as to display a display item, which indicates delimitation, in a region outside the plurality of image display regions, without displaying the delimiting image in the plurality of image display regions.

[0008] An aspect of the present invention is a control method for an electronic device, the method including: an acquisition step of acquiring a captured image; and a control step of performing control such that a plurality of captured images acquired in the acquisition step are arranged and displayed in order of image capturing in a plurality of image display regions, wherein in a case where a delimiting image, which indicates a delimitation in order of image capturing, is included in the images acquired in the acquisition step, control is performed in the control step so as to display a display item, which indicates delimitation, in a region outside the plurality of image display regions, without displaying the delimiting image in the plurality of image display regions.

[0009] Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a system block diagram of a digital camera according to Embodiment 1;

[0011] FIG. **2** is an external view of the digital camera according to Embodiment 1;

[0012] FIGS. **3**A to **3**H indicate screens according to Embodiment 1;

[0013] FIG. **4** is a flow chart of processing to record a delimiting image according to Embodiment 1;

[0014] FIG. **5** is a flow chart of reproducing an image according to Embodiment 1;

[0015] FIG. **6** is a flow chart of processing to determine a display target and a display region according to Embodiment 1;

[0016] FIGS. **7**A to **7**D are diagrams for describing control of a reproduction screen according to Embodiment 1;

[0017] FIGS. **8**A to **8**D are diagrams for describing control of a reproduction screen according to Embodiment 1; and

[0018] FIGS. **9**A to **9**F are diagrams for describing the reproduction screens according to Embodiment 1.

DESCRIPTION OF THE EMBODIMENTS

[0019] Embodiments of the present invention will now be described with reference to the accompanying drawings.

Embodiment 1

[0020] FIG. **1** is a block diagram depicting an example of a system configuration of a digital camera **100** (imaging apparatus) according to Embodiment 1. FIG. **2** is an external view of the digital camera **100**. Instead of the digital camera **100**, Embodiment 1 may be applied to any electronic device (e.g. smartphone, personal computer) having an imaging unit.

[0021] An image capturing lens **104** is a lens group including a zoom lens and a focus lens. A shutter **105** is a shutter including an aperture function. An imaging unit **106** is an image pickup element constituted of elements (e.g. CCD, CMOS element) to convert an optical image into electric signals. The imaging unit **106** acquires an image captured by imaging a real space. An A/D converter **107** converts analog signals into digital signals. The A/D converter **107** is used for converting analog signals, which are outputted from the imaging unit **106**, into digital signals. A barrier **103** covers an imaging system (including the image capturing lens **104**) of the digital camera **100**. Thereby the barrier **103** prevents contamination of and damage to the imaging system (including the image capturing lens **104**, the shutter **105**, and the imaging unit **106**).

[0022] An image processing unit **102** performs predetermined pixel interpolation, resize processing (e.g. reduction), or color conversion processing on the data from the A/D converter **107**, or the data from a memory control unit **108**. The image processing unit **102** also performs predetermined arithmetic processing using the captured image data. Based on the acquired arithmetic operation result, a system control unit **101** performs exposure control and the distance measurement control. Thereby a through-the-lens (TTL) type auto focus (AF) processing, auto exposure (AE) processing, or pre-flash emission (EF) processing is performed. Further,

the image processing unit **102** performs predetermined arithmetic processing using the captured image data, and performs TTL type auto white balance (AWB) processing using the acquired arithmetic operation result.

[0023] The output data from the A/D converter **107** is directly written to a memory **109** by the "image processing unit **102** and a memory control unit **108**", or by the "memory control unit **108**" alone. The memory **109** stores image data, which is acquired by the imaging unit **106**, and then is converted into digital data by the A/D converter **107**. The memory **109** stores image data displayed on a display unit **111**. The memory **109** has a storage capacity that is sufficient for storing a predetermined number of still images, or a predetermined duration of moving images and sounds.

[0024] The memory **109** is also a memory for image display (video memory). A D/A converter **110** converts the data for image display, stored in the memory **109**, into analog signals, and supplies the analog signals to the display unit **111**. When the image data for display, written in the memory **109**, is supplied to the display unit **111** via the D/A converter **110** like this, the image based on the image data is displayed on the display unit **111**.

[0025] The display unit **111** performs display in accordance with the analog signals supplied from the D/A converter **110** on such a display as an LCD. The digital signals, which were A/D-converted once by the A/D converter **107** and were stored in the memory **109**, are converted into analog signals by the D/A converter **110**. Further, by sequentially display images based on the transferred signals, the display unit **111** can function as an electronic view finder, and display through-images (hereafter a through-image is called a "live view image").

[0026] A non-volatile memory **114** is an electrically erasable/recordable memory. For the non-volatile memory **114**, an EEPROM, for example, is used. In the non-volatile memory **114**, constants, programs and the like, for operating the system control unit **101**, are stored. The "programs" here refers to the programs for executing the processing steps of various flow charts, described later in this embodiment.

[0027] The system control unit **101** controls the digital camera **100** in general. The system control unit **101** implements each later mentioned processing of this embodiment, by executing the above mentioned programs recorded in the non-volatile memory **114**. For a system memory **112**, a RAM is used. In the system memory **112**, constants and variables for operating the system control unit **101**, programs (programs read from the non-volatile memory **114**), and the like are developed. The system control unit **101** also performs display control by controlling the memory **109**, the D/A converter **110**, the display unit **111** and the like. A system timer **113** is a timer unit that measures the time used for various controls, and measures the time of an internal clock.

[0028] A shutter button **115**, a mode selection dial **118**, a power supply button **119** and an operation unit **120** are operation units to input various operation instructions to the system control unit **101** respectively.

[0029] The mode selection dial **118** switches the operation mode of the system control unit **101** to one of: a still image recording mode, a moving image recording mode, and a detail mode included in each operation mode.

[0030] A first shutter switch **116** turns ON in mid-operation of the shutter button **115**, which is disposed on the digital camera **100**, that is, in the half-depressed state (image capturing preparation instruction), and generates a first shutter switch signal SW**1**. In response to the generation of the first shutter switch signal SW**1**, such an operation as auto focus (AF) processing, auto exposure (AE) processing, auto white balance (AWB) processing, or pre-flash emission (EF) processing is started

[0031] A second shutter switch **117** turns ON when operation of the shutter button **115** is completed, that is, in the fully-depressed state (image capturing instruction), and generates a second shutter switch signal SW**2**. In response to the generation of the second shutter switch signal SW**2**, the system control unit **101** starts a series of operations of image capturing processing (processing from reading signals from the imaging unit **106** to writing image data to the recording medium **124**).

[0032] A power supply control unit **121** includes a battery detection circuit, a DC-DC converter, a switch circuit (circuit to switch a block to be energized) and the like. The power supply control unit **121** detects the state of the power supply button **119**, whether or not a battery is installed, a type of battery, and the residual amount of battery charge. The power supply control unit **121** also controls the DC-DC converter based on this detection result and instructions from the system control unit **101**. Thereby the power supply control unit **121** supplies the required voltage to each component (including a recording medium **124**) for a required period.

[0033] A power supply unit **122** includes a primary battery (e.g. alkali battery, lithium battery), a secondary battery (e.g. NiCd battery, NiMH battery, Li battery), an AC adapter and the like. In this embodiment, a case of using a secondary battery for the power supply unit **122** (hereafter called a "battery **122**") will be described.

[0034] A recording medium I/F **123** is an interface to connect the recording medium **124** (e.g. memory card, hard disk). The recording medium **124** is such a medium as a memory card, which is used for recording captured images. The recording medium **124** is constituted of a semiconductor memory, a magnetic disk, or the like.

[0035] The digital camera **100** can perform notification, such as a warning, by sound. Specifically, a speaker **126** can output a sound generated by a sound control unit **125**.

[0036] Each operation member of the operation unit **120** operates as a specific functional button. An appropriate function is assigned to each operation member in accordance with the selection from various function icons displayed on the display unit **111**. The function button assigned to each member is, for example, an end button, a return button, an image switching button, a jump button, a filter button, and an attribute change button.

[0037] For example, when a menu button **201** in FIG. **2** is pressed, a menu screen, on which various settings can be performed, is displayed on the display unit **111** (see FIG. **3**A). The user can perform various settings intuitively while checking the menu screen displayed on the display unit **111**, using a cross button **202** (an operation member having buttons in four directions: up, down, left, right) and a SET button **203**.

[0038] A controller wheel **204** and an electronic dial **205** are rotatable operation members included in the operation unit **120**. The controller wheel **204** and the electronic dial **205** are used with the cross button **202** to instruct a selected item, for example. By pressing a reproduction button **206**, an image capturing mode or a reproduction mode of the digital

camera **100** can be selected. By pressing a moving image recording start button **207**, recording of a moving image can be started or stopped

[0039] The user can freely assign an arbitrary function to a function button **208** (hereafter called an "Fn1 button **208**") and a function button **209** (hereafter called an "Fn2 button **209**"). When a function button is pressed, the digital camera **100** executes the function assigned to this function button.

[0040] The battery **122** and the recording medium **124** can be inserted into the digital camera **100** from the bottom face of the digital camera **100**. The bottom face of the digital camera **100** can be covered by a cover **210** which can be opened/closed.

[0041] An overview of generating a delimiting image, which indicates a delimitation between two captured images, will be described next. A function to generate the delimiting image can be assigned to an operation member on a menu screen, as indicated in FIG. **3**A. The delimiting image is an image to indicate a delimitation of a plurality of captured images when a list of the plurality of captured images (images of a real space captured by the imaging unit **106**) is displayed (list reproduction), as indicated in FIGS. **3**B and **3**C.

[0042] When a button, to which the function to generate the delimiting image is assigned, is pressed in the image capturing standby state immediately after performing consecutive image capturing, the delimiting image is generated as an image next to the series of captured images. The generated delimiting image is recorded in the recording medium **124** as a file.

[0043] If the delimiting image is used, the user can easily confirm the delimitation of a plurality of consecutively captured images, even if a plurality of thumbnails having a similar pattern lineup in the list display (on the displayed reproduction screen), as illustrated in FIG. **3**E. The system control unit **101** may also generate a specific delimiting image at a timing when a predetermined change occurred, and records this delimiting image in the recording medium **124**. The specific delimiting image here is preferably a delimiting image which is different from both the delimiting image IA and a delimiting image IB, which will be described later. Then in the list display, the user can more easily recognize images, captured before the timing when the predetermined change occurred. The timing when a predetermined change occurred is a timing when a set value of the digital camera **100** was changed, a timing when a lens was replaced, or a timing when the date was changed, for example.

[0044] In Embodiment 1, two types of delimiting images are provided. One of the two delimiting images is called a "delimiting image IA" (see FIG. **3**B), and the other is called a "delimiting image IB" (see FIG. **3**C). As illustrated in FIG. **3**A, the delimiting image IA can be generated by pressing the Fn1 button **208**. The delimiting image IB can be generated by pressing the Fn2 button **209**.

[0045] A file name, conforming to a "predetermined naming rule" the same as a naming rule of captured images, is attached to a delimiting image, and the delimiting image is recorded in the recording medium **124**. For the file name, a unique number may be attached in order of image capturing (in order of generation; in order of recording). In other words, the predetermined naming rule may be any naming rule with which files (images) can be rearranged in order of generation based on the file names. For example, the design rule for a camera file system (DCF) may be used for the naming rule of still images. The file name may also be a number which indicates a date and time of image capturing (year+month+day+hour+minute+second). In this case, if a file name of a certain image is "20231117025030", for example, it is known that this image was captured (generated) on Nov. 17, 2023, at 2:50:30. Even in a case where a delimiting image and a plurality of captured images are sent from the digital camera **100** to a PC, the PC can rearrange the images in order of file numbers, whereby the delimiting image can be displayed at a desired position.

[0046] On the reproduction screen, which is a screen on which a plurality of captured images are displayed as a list in order of image capturing times, a plurality of captured images are displayed side-by-side, as illustrated in FIG. **3**E. As illustrated in FIG. **3**F, the reproduction screen includes a first region **304** (shaded portion in FIG. **3**F) where captured images or delimited images are displayed, and a second region **305** (dotted portion in FIG. **3**F) which is a region other than the first region **304**. The first region **304** is basically a set of a plurality of rectangular regions (except a case of displaying only one image). The plurality of rectangular regions are disposed next to each other at specific intervals, without touching each other. Instead of a rectangular region, a specific form of region, such as a circular region or a polygonal region, may be used. As illustrated in FIG. **3**E, if a delimiting image **303** is displayed in the first region **304** in the same manner as the captured images **301** and **302**, for example, a number of captured images that can be displayed on the reproduction screen decreases by a number of delimiting images displayed.

[0047] On the other hand, as illustrated in FIG. **3**G, the digital camera **100** may display a delimiting item **306**, which is a display item to indicate delimitation, in the second region **305**, instead of displaying the delimiting image in the first region **304**. In this case, the digital camera **100** can clearly indicate the position of delimitation without decreasing a number of captured images that can be displayed on the reproduction screen.

[0048] The delimiting item **306** is displayed in the second region **305** between the first regions **304**, where the images before and after the delimiting image in order of image capturing are displayed. If the image before or after the delimiting image is displayed at an end column of the plurality of first regions **304** in a matrix, the delimiting item **306** is displayed in the second region **305** on the front side (left side) of the first region **304**, where the image after the delimiting image in order of image capturing is displayed. The delimiting item **306** may also be displayed in the second region **305** on the rear side (right side) of the first region **304**, where the image before the delimiting image in order of image capturing is displayed.

[0049] The processing of recording delimiting images according to Embodiment 1 will now be described with reference to the flow chart in FIG. **4**. When the digital camera **100** is set to the image capturing mode, the state of the digital camera **100** changes to the image capturing standby state. In the image capturing standby state, the processing of the flow chart in FIG. **4** is cyclically executed.

[0050] In step S**401**, the system control unit **101** determines whether the Fn1 button **208** is pressed. Processing advances to step S**402** if it is determined that the Fn1 button **208** is pressed. Processing advances to step S**406** if it is determined that the Fn1 button **208** is not pressed.

[0051] In step S**402**, the system control unit **101** generates the delimiting image IA.

[0052] In step S**403**, the system control unit **101** generates a file name of the delimiting image IA in accordance with a predetermined naming rule. The predetermined naming rule here is a naming rule the same as a naming rule of the file name of a still image in step S**413**, which will be described later.

[0053] In step S**404**, the system control unit **101** records the delimiting image IA attached with the generated file name in the recording medium **124**.

[0054] In step S**405**, the system control unit **101** displays a message to notify that the delimiting image IA was generated (recorded) on the display unit **111**, as indicated in FIG. **3**D.

[0055] In step S**406**, the system control unit **101** determines whether the Fn2 button **209** is pressed. Processing advances to step S**407** if it is determined that the Fn2 button **209** is pressed. Processing advances to step S**411** if it is determined that the Fn2 button **209** is not pressed.

[0056] Processing in steps S**407** to S**410** is processing to generate and record the delimiting image IB. The processing in steps S**407** to S**410** is the same processing as the processing in steps S**402** to S**405**, which is processing to generate and record the delimiting image IA, hence description thereof will be omitted.

[0057] In step S**411**, the system control unit **101** determines whether the shutter button **115** is pressed (second shutter switch **117** is pressed). Processing advances to step S**412** if it is determined that the shutter button **115** is pressed. Processing advances to step S**415** if it is determined that the shutter button **115** is not pressed.

[0058] In step S**412**, the system control unit **101** controls the imaging unit **106** and executes image capturing. Thereby the system control unit **101** performs processing to generate a still image (captured image).

[0059] In step S**413**, the system control unit **101** generates a file name of the generated still image (captured image) in accordance with a predetermined naming rule.

[0060] In step S**414**, the system control unit **101** records the still image (captured image) attached with the generated file name in the recording medium **124**.

[0061] In step S**415**, the system control unit **101** determines whether the operation mode is changed from the image capturing mode. The processing of this flow chart ends if it is determined that the operation mode is changed from the image capturing mode. Processing advances to step S**401** if it is determined that the operation mode is not changed from the image capturing mode.

[0062] FIG. **5** is a flow chart of reproduction processing (list display) of captured images and delimiting images by the digital camera **100** according to this embodiment. In a case where the digital camera **100** is in the image reproduction mode, the system control unit **101** executes the processing in the flow chart in FIG. **5** periodically.

[0063] In step S**501**, the system control unit **101** determines whether the electronic dial **205** is operated by the user. Processing advances to step S**502** if it is determined that the electronic dial **205** is operated. Processing advances to S**503** if it is determined that the electronic dial **205** is not operated.

[0064] In step S**502**, the system control unit **101** changes (determines) a number of images displayed in the first region **304** on the reproduction screen (hereafter called "a number of simultaneously displayed images") in accordance with the operation amount of the electronic dial **205** (rotation amount of the electronic dial **205**). In the following, a number of simultaneously displayed images is expressed as "M number of images". FIG. **3**H is a reproduction screen in a case where the M number of images (a number of simultaneously displayed images) is 1, and only 1 image is displayed in the first region **304**. FIG. **3**E is a reproduction screen in a case where the M number of images is 12, and 12 images are displayed in the first region **304**. Based on the number of simultaneously displayed images determined in step S**502**, the system control unit **101** sets (generates) the first region **304**, which includes rectangular regions for the M number of images.

[0065] In step S**503**, the system control unit **101** determines whether the M number of images (a number of simultaneously displayed images) is 1. Processing advances to step S**509** if it is determined that the M number of images is 1. Processing advances to step S**504** if it is determined that the M number of images is not 1.

[0066] In step S**504**, the system control unit **101** determines whether a mode to display all the delimiting images in the first region **304** (hereafter called "region display mode") is set. Processing advances to step S**509** if it is determined that the region display mode is set. Processing advances to step S**506** if it is determined that the region display mode is not set.

[0067] The processing in step S**506** is executed for each image stored in the recording medium **124** until specific conditions are satisfied. Here in the recording medium **124**, N number (N≥M) of captured images have been stored in the processing of the flow chart in FIG. **4**. Further, in the recording medium **124**, at least one of the delimiting image IA and the delimiting image IB have been stored. The system control unit **101** repeats "performing processing in step S**506** for one image stored in the recording medium **124**, and then performing processing in step S**506** for the next one image".

[0068] The processing in step S**506**, which will be described later with reference to FIG. **6**, is processing to determine a "display target and display region" corresponding to a processing target image (hereafter called "target image"). The first target image, for which the system control unit **101** performs the processing in step S**506**, may be an image specified by a cursor (described later), or may be an image of which generation timing is closest to the present. After performing the processing in step S**506** for the first target image, the system control unit **101** executes the processing in step S**506** for the image group, of which generation timings are older than the above target image, in order from the image of which generation timing is closest to the present.

[0069] In step S**506**, the system control unit **50** determines whether the target image is displayed in the first region **304**. If a number of images, which are determined to be displayed in the first region **304**, reaches the M number of images (a number of simultaneously display images), processing advances to step S**511**. Then the system control unit **50** selects (determines) M number of images to be displayed in order in the first region **304**, out of at least one image (N number of captured images and at least one delimiting image) stored in the recording medium **124**.

Step S506

[0070] A specific processing for one target image in step S**506** will be described with reference to a flow chart in FIG. **6**.

[0071] In step S**601**, the system control unit **101** determines whether the target image is a delimiting image. Processing advances to step S**602** if it is determined that the target image is a delimiting image. Processing advances to step S**605** if it is determined that the target image is not a delimiting image.

[0072] In step S**602**, the system control unit **101** determines whether the similarity of the image before the target image (hereafter called a "previous image") and the image after the target image (hereafter called a "subsequent image") is a predetermined reference level or more. Processing advances to step S**605** if it is determined that the similarity of the previous image and the subsequent image is a predetermined reference level or more. Processing advances to step S**603** if it is determined that the similarity of the previous image and the subsequent image is less than the predetermined reference level.

[0073] For example, in a case where the similarity of the captured image **301** and the captured image **302** is high in FIG. **3**G, there is a possibility (risk) that the user may miss the delimiting item **306**. However if the system control unit **101** displays the delimiting image **303** in the first region **304**, as illustrated in FIG. **3**E, instead of displaying the delimiting item **306**, the delimitation between the captured image **301** and the captured image **302** becomes clear. Thereby the user is less likely to miss the delimitation. The similarity between a plurality of images may be determined using machine learning. Further, the system control unit **101** may always advance the processing to step S**603**, without determining the similarity in step S**602**.

[0074] In step S**603**, the system control unit **101** determines whether the target image is a delimiting image including text (that is, delimiting image IA). Processing advances to step S**604** if it is determined that the target image is the delimiting image IA. Processing advances to step S**606** if it is determined that the target image is not the delimiting image IA.

[0075] In the delimiting image IA, text, indicating information on the setting and the like of the digital camera **100** or the image capturing lens **104** at the image capturing, is written, as illustrated in FIG. **3**B. Therefore an advantage of displaying the delimiting image IA in the first region **304** is that, "the user can recognize this information". In the delimiting image IB, on the other hand, this information is not written. Therefore even if the delimiting image IB is replaced with a delimiting item which only indicates the delimiting position, the user is not affected very much by the replacement.

[0076] In step S**604**, the system control unit **101** determines whether the M number of images (a number of simultaneously displayed images) is a reference number of images (predetermined number of images) or more. Processing advances to step S**606** if it is determined that the M number of images is the reference number of images or more. Processing advances to step S**605** if the M number of images is less than the reference number of images.

[0077] In the case where the number of simultaneously displayed images is high, each image is displayed in a small size. If the size of the image is smaller than a predetermined size, it is difficult for the user to visually recognize the text of the camera setting or the like in the delimiting image IA, even if the delimiting image IA is displayed in the first region **304**. In other words, the benefit of displaying the delimiting image IA in the first region **304** is low, hence in the subsequent step (step S**606**), the system control unit **101** determines that the delimiting item is displayed instead of the delimiting image IA.

[0078] The reference number of images here may be specified by the user in advance, or may be a value in accordance with a physical size of the display screen of the display unit **111**. For example, the reference number of images may be a bigger value as the physical size of the display screen of the display unit **111** is larger, since the user can visually recognize the details of each image if the screen is large, even if a number of simultaneously displayed images is high. The reference number of images may be a value in accordance with a relative size of the characters written in the delimiting image IA with respect to the size of the delimiting image IA. The reference number of images may be a smaller value as the relative size of the characters written in the delimiting image IA is smaller, since it becomes more difficult for the user to recognize the characters as the characters become smaller.

[0079] In step S**605**, the system control unit **101** determines to display the target image in the first region **304**. For example, if the system control unit **101** determines to display the target image in step S**605** in the state where display of **10** images has been determined, as illustrated in FIG. **7**A, an image **701** is added, as illustrated in FIG. **7**B.

[0080] In step S**606**, the system control unit **101** determines to display a delimiting item (delimiting item corresponding o the target image) to indicate the delimitation in the second region **305**, instead of the target image of the delimiting image. For example, if the system control unit **101** determines to display the delimiting item in step S**606** in the state where display of **10** images have been determined, as illustrated in FIG. **7**A, a delimiting item **702** is added, as illustrated in FIG. **7**C.

[0081] In other words, the system control unit **101** disposes the delimiting item at a position between an image of which display is previously determined and the next image, so as to express the delimitation of the captured images. Depending on a number of images of which display is determined just before the processing in step S**606**, the system control unit **101** may determine to display the delimiting item at both or at one of a position **703** and a position **704** indicated in FIG. **7**D.

[0082] The delimiting item to be displayed may be the delimiting item **702** expressed by a vertical line, as illustrated in FIG. **7**C, or may be an L-shaped delimiting item **705**, as illustrated in FIG. **8**A. Further, the delimiting item to be displayed may be a frame type delimiting item **706** or a bar type delimiting item **707** that trims the image displayed on the first region **304**, as illustrated in FIGS. **8**B and **8**C. In the case where the delimiting item to be displayed is a frame or a bar, the user can visually recognize the delimiting position by color or pattern of the frame or bar. In a case where the reproduction screen to be drawn is as illustrated in FIG. **8**D, if display of a new delimiting item **706** is determined in step S**606**, the delimiting item is added to the "images after the image trimmed by the previous delimiting item", as illustrated in FIG. **8**B.

[0083] Description on the flow chart in FIG. **5** will be continued. In step S**509**, the system control unit **101** deter-

mines to display one image, stored in the recording medium **124**, in the first region **304**. Just like step S**506**, the system control unit **101** repeats "performing processing in step S**509** for one image stored in the recording medium **124**, and then performing processing in step S**509** for the next image "until specific conditions are satisfied". "Specific conditions are satisfied" means "a number of images, of which display in the first region **304** is determined, reaches M number of images (a number of simultaneously displayed images)".

[0084] In step S**509**, the system control unit **101** determines to constantly display the processing target image in the first region **304**. Processing advances to step S**513** if a number of images, of which display in the first region **304** is determined, reaches M number of images (a number of simultaneously displayed images).

[0085] In step S**511**, the system control unit **101** determines whether display of an additional delimiting item (hereafter called "additional display") is necessary. Processing advances to step S**512** if it is determined that additional display is necessary. Processing advances to step S**513** if it is determined that additional display is not necessary.

[0086] For example, in a case where the reproduction screen to be drawn is the screen in FIG. **9**A at the starting point of the processing in step S**511**, only the lower right two images are not trimmed. Hence the system control unit **101** determines that display of the delimiting items to trim the lower right two images is necessary. This means that the system control unit **101** determines that display of the additional delimiting item **801** is necessary, as illustrated in FIG. **9**B, for example. On the other hand, in a case where the delimiting item not a frame type but a bar type, as illustrated in FIG. **7**C, the system control unit **101** determines that display of the additional delimiting item is not necessary in step S**511**. However even in the case where the delimiting item is a bar type, the system control unit **101** may determine that the display of the additional delimiting item **803** is necessary if the image next to the image displayed last (captured image **802** in FIG. **9**D) is the delimiting image.

[0087] In step S**512**, the system control unit **101** determines to display the additional delimiting item.

[0088] In step S**513**, the system control unit **101** determines whether the cross button is operated by the user. Processing advances to step S**514** if it is determined that the cross button is operated. Processing advances to step S**515** if it is determined that the cross button is not operated.

[0089] In step S**514**, the system control unit **101** changes the position of a cursor displayed on the reproduction screen, in accordance with the operation performed with the cross button. The cursor is, for example, a frame surrounding an image displayed in the first region **304**, as illustrated in FIG. **9**E.

[0090] In step S**515**, the system control unit **101** determines the display of the cursor.

[0091] In step S**516**, the system control unit **101** determines whether a text written in the delimiting image IA (hereafter called "written text") need be displayed at the edge of the screen. Processing advances to step S**517** if it is determined that the written text need be displayed at the edge of the screen. Processing advances to step S**518** if it is determined that the written text need not be displayed at the edge of the screen.

[0092] For example, in a case where the delimiting image IA is not displayed in the first region **304** as an image, and the delimiting item is displayed in the second region **305** instead of the delimiting image IA, the user cannot visually recognize the written text. In such a case, the system control unit **101** may determine that the written text need be displayed at the edge of the screen (see FIG. **9**F).

[0093] For example, the system control unit **101** specifies a delimiting image IA of which generation time is newer than the image **805** indicated by the cursor, and of which generation time is closest to the image **805**. Then if this delimiting image IA is not displayed in the first region **304** as an image and a delimiting item **806** is displayed instead, the system control unit **101** determines that the written text of the delimiting image IA need be displayed at the edge of the screen. In other words, the system control unit **101** regards an image group delimited by the delimiting item as a group, and determines that the text written in the delimiting image IA, corresponding to the group where the image indicated by the cursor belongs, need be displayed at the edge of the screen. Thereby in a case where the user generates the delimiting image IA every time the date changes, the user can select an image of interest by cursor and visually recognize the generation data and the like of the image in the display at the edge of the screen.

[0094] In step S**517**, the system control unit **101** determines to display the written text at the edge of the reproduction screen.

[0095] In step S**518**, the system control unit **101** actually displays the "image, delimiting item, cursor and text", of which display was determined in steps S**506**, S**512** and S**515**, on the reproduction screen (display unit **111**).

[0096] In step S**519**, the system control unit **101** determines whether the operation to change mode is performed. Processing of this flow chart ends if it is determined that the operation to change mode is performed (the image reproduction mode ends). Processing advances to step S**501** if it is determined that the operation to change mode is not performed.

[0097] As described above, in a specific case, the digital camera **100** displays the delimiting item corresponding to the delimiting images, outside the display region of the captured images. Thereby more captured images can be simultaneously displayed, than the case of displaying the delimiting image in the display region of the captured images, while allowing the user to visually recognize the delimitation of the images.

[0098] Whereas a case of using two types of delimiting images (delimiting image IA and delimiting image IB) was described above, a number of types of the delimiting images may be 1 or 3 or more.

[0099] In the case where only one type of delimiting image is used, the system control unit **101** may always advance the processing to step S**604**, without performing the determination in step S**603**. In the case where 3 or more types of delimiting images are used, the system control unit **101** may set levels for the delimiting images, and perform determination in step S**603** according to the level. For example, a level is set for each delimiting image depending on the type. Processing advances to step S**604** if the level of the target image is a specific level or more. Processing advances to step S**606** if the level of the target image is less than the specific level. For example, the system control unit **101** sets (classifies) each delimiting image to any one of level 1, level 2 and level 3, then processing advances to step

S**604** if the level of the target image is level 2 or higher. Processing advances to step S**606** if the level of the target image is level 1.

[0100] The present invention is applicable not only to the digital camera **100**, but also to a display device which can display a list of captured images. For example, instead of the digital camera **100**, a person computer, PDA, portable telephone terminal, portable image viewer, digital photo frame, game machine, electronic book reader, tablet terminal or smartphone may be used. Further, instead of the digital camera **100**, a home electronic device, an on-vehicle device, or medical apparatus, including a display, may be used. The digital camera **100** may be an electronic device (display control device) for controlling a display device which can display a list of captured images. In this case, the electronic apparatus may have a configuration other than the display unit **111** of the digital camera **100**.

[0101] According to the present invention, a decrease in a number of images displayed in a list can be suppressed, and the user is can still recognize the delimiting positions.

[0102] Whereas the present invention has been described based on embodiments, the present invention is not limited to these specific embodiments, and various modes in a scope not departing from the spirit of the invention are included in the present invention. A part of each embodiment described above may be combined as required.

[0103] In addition, in the above, "when A is equal to or larger than B, the processing proceeds to Step S1, while when A is smaller (lower) than B, the processing proceeds to Step S2" may read "when A is larger (higher) than B, the processing proceeds to Step S1, while when A is equal to or smaller than B, the processing proceeds to Step S2". To the contrary, "when A is larger (higher) than B, the processing proceeds to Step S1, while when A is equal to or smaller than B, the processing proceeds to Step S2" may read "when A is equal to or larger (higher) than B, the processing proceeds to Step S1, while when A is smaller (lower) than B, the processing proceeds to Step S2". Thus, unless contradiction occurs, "equal to or larger than A" may read "larger (higher; longer; more) than A", and "equal to or smaller than A" may read "smaller (lower; shorter; less) than A". And "larger (higher; longer; more) than A" may read "equal to or larger than A", and "smaller (lower; shorter; less) than A" may read "equal to or smaller than A". Note that the above-described various types of control may be processing that is carried out by one piece of hardware (e.g., processor or circuit), or otherwise. Processing may be shared among a plurality of pieces of hardware (e.g., a plurality of processors, a plurality of circuits, or a combination of one or more processors and one or more circuits), thereby carrying out the control of the entire device.

[0104] Also, the above processor is a processor in the broad sense, and includes general-purpose processors and dedicated processors. Examples of general-purpose processors include a central processing unit (CPU), a micro processing unit (MPU), a digital signal processor (DSP), and so forth. Examples of dedicated processors include a graphics processing unit (GPU), an application-specific integrated circuit (ASIC), a programmable logic device (PLD), and so forth. Examples of PLDs include a field-programmable gate array (FPGA), a complex programmable logic device (CPLD), and so forth.

Other Embodiments

[0105] Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) recorded on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)™), a flash memory device, a memory card, and the like.

[0106] While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

[0107] This application claims the benefit of Japanese Patent Application No. 2024-021146, filed on Feb. 15, 2024, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. An electronic device, comprising one or more processors and/or circuitry configured to:

perform acquisition processing to acquire a captured image; and

perform control processing such that a plurality of captured images acquired by the acquisition processing are arranged and displayed in order of image capturing in a plurality of image display regions, wherein

in a case where a delimiting image, which indicates a delimitation in order of image capturing, is included in the images acquired by the acquisition processing, it is controlled in the control processing to display a display item, which indicates delimitation, in a region outside the plurality of image display regions, without displaying the delimiting image in the plurality of image display regions.

2. The electronic device according to claim **1**, wherein

it is controlled in the control processing to display the display item between image display regions in which images before and after the delimiting image in order of image capturing are displayed, or on a front side of an image display region in which an image after the

delimiting image in order of image capturing is displayed, or on a rear side of an image display region in which an image before delimiting image in order of image capturing sequence is displayed.

3. The electronic device according to claim **1**, wherein in the control processing,

in a first case, it is controlled to display the delimiting image without displaying the display item, and

in a second case, it is controlled to display the display item without displaying the delimiting image.

4. The electronic device according to claim **3**, wherein

the first case is a case of displaying one image, and

the second case is a case of displaying a plurality of images in the plurality of image display regions.

5. The electronic device according to claim **3**, wherein

the first case is a case where a number of the plurality of image display regions is less than a predetermined number, and

a second case is a case where the number of the plurality of image display regions is at least the predetermined number.

6. The electronic device according to claim **5**, wherein

the predetermined number is a value in accordance with a physical size of a display surface on which the plurality of image display regions are displayed.

7. The electronic device according to claim **1**, wherein

the delimiting image is not a captured image but an image including text.

8. The electronic device according to claim **7**, wherein

in a case where the display item is displayed outside the plurality of image display regions, in the control processing, it is controlled to display the text outside the plurality of image display regions.

9. The electronic device according to claim **3**, wherein

the second case is a case where the delimiting image is an image which does not include text.

10. The electronic device according to claim **3**, the one or more processors and/or circuitry further configured to perform determination processing to determine similarity of two captured images delimited by the delimiting image, wherein

the first case is a case where the similarity determined by the determination processing is higher than a predetermined reference level.

11. The electronic device according to claim **3**, wherein

a level is set for the delimiting image, and

the second case is a case where the level of the delimiting image is less than a specific level.

12. The electronic device according to claim **1**, wherein

the plurality of image display regions are M number of rectangular regions, each having a predetermined shape and not in contact with one another.

13. The electronic device according to claim **12**, wherein

the value of M is changeable by user operation.

14. A control method for an electronic device, the method comprising:

an acquisition step of acquiring a captured image; and

a control step of performing control such that a plurality of captured images acquired in the acquisition step are arranged and displayed in order of image capturing in a plurality of image display regions, wherein

in a case where a delimiting image, which indicates a delimitation in order of image capturing, is included in the images acquired in the acquisition step, control is performed in the control step so as to display a display item, which indicates delimitation, in a region outside the plurality of image display regions, without displaying the delimiting image in the plurality of image display regions.

15. A non-transitory computer readable medium that stores a program, wherein the program causes a computer to execute a control method for an electronic device, the method comprising:

an acquisition step of acquiring a captured image; and

a control step of performing control such that a plurality of captured images acquired in the acquisition step are arranged and displayed in order of image capturing in a plurality of image display regions, wherein

in a case where a delimiting image, which indicates a delimitation in order of image capturing, is included in the images acquired in the acquisition step, control is performed in the control step so as to display a display item, which indicates delimitation, in a region outside the plurality of image display regions, without displaying the delimiting image in the plurality of image display regions.

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