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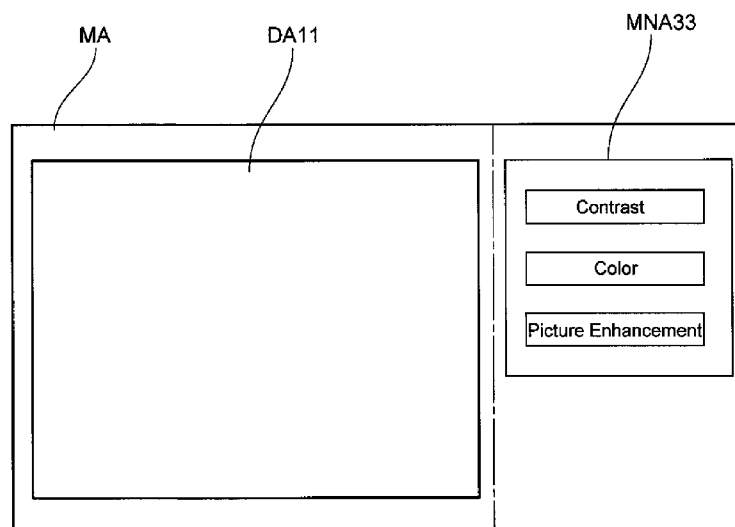
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(54) **Title:** ENDOSCOPE PROCESSOR, SIGNAL PROCESSING METHOD OF ENDOSCOPE PROCESSOR, AND CONTROL PROGRAM

[Fig. 10]



(57) **Abstract:** An endoscope processor includes a receiver configured to receive a selection control signal which indicates a selected menu out of a plurality of menus; and a display controller configured to display the selected menu that is indicated by the selection control signal, which is received by the receiver, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.

Description

Title of Invention: ENDOSCOPE PROCESSOR, SIGNAL PROCESSING METHOD OF ENDOSCOPE PROCESSOR, AND CONTROL PROGRAM

Technical Field

[0001] The present invention relates to an endoscope processor, a signal processing method of an endoscope processor, and a control program.

Background Art

[0002] In recent years, endoscope systems have become in active use in medical diagnostics. A fundamental configuration of an endoscope system includes an endoscope for obtaining a photographed image of an observed target site of an examinee (herein referred to as “observation image”), and a signal processor (herein referred to as “endoscope processor”) which carries out signal processing on the observation image obtained by the endoscope. The endoscope processor displays the image-processed observation image on a monitor (display). Furthermore, the endoscope processor displays a menu display on the monitor upon receiving a command from the user to change a function setting.

[0003] However, if a menu display is displayed together with the observation image in a single display area at which the observation image is allowed to be displayed (i.e., in one “observation image displayable area”), there is a possibility of part of the observation image being obstructed by the menu display even though the user is trying to focus his/her attention on the observation image (including the obstructed part thereof). Accordingly, the view of the observation image, which includes information to which the attention of the user is focused on (attentional information), is obstructed, thereby possibly impeding diagnosis.

[0004] In order to resolve this problem, an endoscope system has been proposed in, e.g., Patent Literature 1, in which the observation image is moved so that the overlapping (superimposing) thereof with the menu display is reduced to a minimum in order to reduce, as much as possible, the inconvenience of the observation image and the menu display overlapping.

Citation List

Patent Literature

[0005] Patent Literature 1: Japanese Unexamined Patent Publication No. 2010-000183

Summary of Invention

Technical Problem

[0006] However, in the above-mentioned endoscope system of the related art, part of the moved observation image is moved outside the observation-image displayable area, or due to circumstances involving the layout within the observation-image displayable area, part of the observation image is unavoidably overlapped with the menu display. Accordingly, part of the observation image that has been moved outside the observation-image displayable area or part of the observation image that has overlapped with the menu display is not displayed and, in effect, disappears (no longer visible). In particular, if the user is trying to focus his/her attention on such a part of the observation image that is not displayed (no longer visible), this deficiency will have a significant adverse effect on diagnosis.

[0007] The present invention has been devised with consideration of the above-mentioned problems of the related art, and provides an endoscope processor, a signal processing method of an endoscope processor and a control program which can simultaneously (concurrently) display attentional information (e.g., the observation image) together with the menu display without the attentional information being lost (being no longer visible).

Solution to Problem

[0008] According to an aspect of the present invention, an endoscope processor is provided, including a receiver configured to receive a selection control signal which indicates a selected menu out of a plurality of menus; and a display controller configured to display the selected menu that is indicated by the selection control signal, which is received by the receiver, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.

[0009] It is desirable for the endoscope processor to further include a memory configured to store a candidate group of menu display areas. The display controller selects, from out of the candidate group of menu display areas, a menu display area that conforms to a judgment condition of fitting within the confines of the remaining screen area. The display controller displays the selected menu in the menu display area that is selected by the display controller.

[0010] In the case where a plurality of the menu display areas that conform to the judgment condition exist, it is desirable for the display controller to display images of usable menu display areas on the monitor screen area for a user to select out of the plurality of menu display areas.

[0011] It is desirable for the display controller to store the usable menu display area that is selected by the user, using the images displayed on the monitor screen area, in the memory as a user-customized area.

- [0012] In the case where the display-information type that is subject to adjustment is a first type of information, it is desirable for the display controller to display the selected menu on the remaining screen area excluding a first information display area which is set within the monitor screen area with respect to the first type of information. In the case where the display-information type that is subject to adjustment is a second type of information, it is desirable for the display controller to display the selected menu on the remaining screen area excluding a second information display area which is set within the monitor screen area with respect to the second type of information.
- [0013] It is desirable for the first type of information to include an observation image that is photographed using an endoscope which is connected to the endoscope processor. The menu corresponding to the first type of information includes, as a processing item, at least one of a contrast adjustment process, a color adjustment process, and a picture enhancement process. The second type of information can include character information. The menu corresponding to the second type of information includes, as a processing item, at least one of a patient-information editing process and a comment editing process.
- [0014] In an embodiment, a signal processing method of an endoscope processor is provided, including receiving a selection control signal which indicates a selected menu out of a plurality of menus; and displaying the selected menu, which is indicated by the received the selection control signal, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.
- [0015] In an embodiment, a control program for an endoscope processor is provided, wherein the control program implements a process in the endoscope processor, the process including receiving a selection control signal which indicates a selected menu out of a plurality of menus; and displaying the selected menu, which is indicated by the received the selection control signal, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.

Advantageous Effects of Invention

- [0016] According to the present invention, an endoscope processor, a signal processing method of an endoscope processor and a control program are achieved, which can simultaneously (concurrently) display attentional information (e.g., the observation image) together with the menu display without the attentional information being lost (being no longer visible).

Brief Description of Drawings

- [0017] [fig.1] is a block diagram showing a configuration of an endoscope system according to

a first embodiment.

[fig.2]shows the entire configuration of an endoscope, of the endoscope system.

[fig.3]is an explanatory diagram illustrating menu information.

[fig.4]is an explanatory diagram of an information displayable area and an information display area.

[fig.5]is another explanatory diagram of an information displayable area and an information display area.

[fig.6]is an explanatory diagram of a candidate group of menu display areas.

[fig.7]shows a flowchart of an example of processes carried out by a display controller.

[fig.8]is an explanatory diagram of a menu display selection process via the display controller.

[fig.9]is another explanatory diagram of a menu display selection process via the display controller.

[fig.10]is another explanatory diagram of a menu display selection process via the display controller.

[fig.11]is another explanatory diagram of a menu display selection process via the display controller.

[fig.12]is another explanatory diagram of a menu display selection process via the display controller.

[fig.13]is another explanatory diagram of a menu display selection process via the display controller.

[fig.14]is another explanatory diagram of a menu display selection process via the display controller.

Description of Embodiments

[0018] The following is a detailed description of embodiments of an endoscope processor, a signal processing method of an endoscope processor, and a control program according to the present invention with reference to the accompanied drawings. However, the endoscope processor, the signal processing method of the endoscope processor, and the control program of the present invention are not limited to the illustrated embodiments.

[0019] (EMBODIMENT 1)

(Outline of Endoscope System)

FIG. 1 is a block diagram showing a configuration of an endoscope system 10 according to a first embodiment. As shown in FIG. 1, the endoscope system 10 includes an endoscope 20, an endoscope processor 30, an image monitor (display) 40, a database 50, a USB memory 60, and a keyboard (inputter) 70.

[0020] The endoscope 20 obtains an observation image of an examinee, and outputs the observation image to the endoscope processor 30. The database 50 and the USB memory

60 stores “patient medical information” (patient file). The “patient medical information” can include, e.g., the patient’s name, ID, age, gender, and comments concerning the patient’s medical condition(s). The keyboard 70 outputs a control signal to the endoscope processor 30 in accordance with user input.

[0021] The endoscope processor 30 controls the display of information, e.g., the display of the observation image, the patient medical information, and a menu display. Further details of the endoscope processor 30 will be discussed hereinafter.

[0022] (Example Configuration of Endoscope)

FIG. 2 shows an entire configuration of the endoscope 20 of the endoscope processor 30. As shown in FIG. 2, the endoscope 20 is provided with a grip control body 21 for the user (operator) to grip onto, and a flexible insertion portion 22 which extends from the grip control body 21. The insertion portion 22 is provided with a distal-end rigid section 22A, a bendable section 22B and a flexible section 22C, in that order from the distal end. The bendable section 22B is bendable in accordance with a rotational operation of a bending-control lever 23, which is provided on the grip control body 21. A universal tube 24 is provided on a side of the grip control body 21 to extend therefrom. A connector 25 is provided on the distal end of the universal tube 24. Although not shown in the drawings, the endoscope 20 is provided with a built-in light-guide fiber; this light-guide fiber extends from the insertion portion 22 (the distal-end rigid section 22A, the bendable section 22B and the flexible section 22C), the grip control body 21, and the universal tube 24 until extending into a light-guide sleeve 26 which projects from the connector 25. Upon connector terminals 25A of the connector 25 being connected to connector terminals (not shown) of the endoscope processor 30, the light-guide fiber becomes optically connected to a built-in light-source lamp (not shown in the drawings) provided in the endoscope processor 30. Furthermore, illumination light that is emitted from the above-mentioned light-source lamp is guided into the light-guide fiber and is externally emitted by a predetermined light distribution via an illumination lens (not shown in the drawings), which is provided at the distal-end face of the distal-end rigid section 22A of the insertion portion 22.

[0023] Although not shown in the drawings, the endoscope 20 is provided with an image sensor, positioned within the distal-end rigid section 22A of the insertion portion 22, which obtains observation-image signals of an observation (examined) target site (e.g., a lesion within a patient’s body). The observation-image signals obtained by this image sensor is transmitted via a signal-transmission cable (not shown in the drawings) and is output to the endoscope processor 30.

[0024] (Configuration Example of Endoscope Processor)

As shown in FIG. 1, the endoscope processor 30 is provided with an image processor 31, an information retriever (retriever circuit/ processor) 32, a receiver (receiver

circuit/ processor) 33, a display area setter (setter circuit/ processor) 34, a display controller 35, and a memory 36.

- [0025] The image processor 31 carries out predetermined image processing on the observation-image signals received from the endoscope 20, and produces an observation image.
- [0026] The information retriever 32 retrieves the aforementioned patient medical information. The information retriever 32 can access the database 50 via a network (e.g., either via a fixed-line or wireless local area network (LAN) or via the internet) to retrieve patient medical information, or can retrieve patient medical information from the USB memory 60 when the USB memory 60 is connected to the endoscope processor 30.
- [0027] The memory 36 stores a plurality of processing items (functions) for each display-information type (two types of which are shown in FIG. 3), which indicate the associated processing items to which adjustments are performed. In the endoscope processor 30 of the present embodiment, the observation image is designated as a first type of information, and the character information is designated as a second type of information. As shown in FIG. 3, the processing items utilized to adjust the first type of information (observation image) are categorized in a first menu M1, and the processing items utilized to adjust the second type of information (character information) are categorized in a second menu M2. The first menu M1 includes, as processing items, e.g., a contrast adjustment process, a color adjustment process, and a picture enhancement process, etc. Furthermore, the second menu M2 includes, as processing items, a patient-information editing process, and a comment editing process, etc.
- [0028] Furthermore, the memory 36 stores setting information for an “information displayable area” for each display-information type. Furthermore, the memory 36 stores setting information for an “information display area” for each display-information type. Furthermore, the memory 36 stores menu-display area setting information (e.g., size and shape) for each menu type (in other words, for each of the first menu M1 and the second menu M2).
- [0029] FIGS. 4 and 5 are explanatory diagrams of an information displayable area and an information display area. In FIGS. 4 and 5, “MA” designates the entire area of the screen of the image monitor 40 (hereinafter “entire screen area”). For convenience sake, the entire screen area MA can be divided into an image displayable area DA21 and a character displayable area DA22. Furthermore, the observation image is displayed in a predetermined information display area (e.g., an information-display area of a predetermined size having a center thereof which aligns with the center of the image displayable area DA21) within the image displayable area DA21. In FIG. 4, a normal sized observation image is displayed in an information display area DA11 for normal-

sized usage. In FIG. 5, a reduced sized observation image is displayed in an information display area DA11' for reduced-sized usage. Furthermore, in the character displayable area DA22, character information (e.g., patient medical information) is displayed in a predetermined information display area. In FIGS. 4 and 5, the character information is displayed in an information display area DA12.

[0030] Furthermore, the memory 36 stores a candidate group of menu display areas for each menu (i.e., for each of the first menu M1 and the second menu M2). For example, the memory 36 stores a table, as shown in FIG. 6, which maps respective candidate addresses with respective candidate menu display area start positions (e.g., a combination of the smallest X coordinate and smallest Y coordinate of each menu display area), and with information of the information display area that overlaps (superimposes with) respective candidate menu display areas (corresponding to “Overlapping Area when Menu Displayed” in FIG. 6), corresponding to the first menu M1. For example, in the table corresponding to first menu M1, in a candidate having the address “0x00000n”, the start position of the menu display area is coordinate X (x_{11} , y_{11}), and overlaps with information display areas DA11 and DA12 while not overlapping with information display area DA11'. Similarly, the memory 36 also stores a table corresponding to second menu M2, and has the same format as the table that corresponds to first menu M1 shown in FIG. 6. However, the specific coordinates even at coordinate X corresponding to the same address “0x00000n” are normally different. For example, in the table corresponding to first menu M1, the coordinates are X(x_{11} , y_{11}), whereas the coordinates are X(x_{21} , y_{21}) in the table corresponding to the second menu M2.

[0031] Returning to the explanation of FIG. 1, upon the receiver 33 receiving a “menu selection control signal” which indicates a menu type (hereinafter a “selected menu type”) selected out of a plurality of menu types (e.g., the first menu M1 and the second menu M2) by the user using the keyboard 70, the receiver 33 outputs the menu selection control signal to the display controller 35. For example, if the user wants to adjust the observation image, the user uses the keyboard 70 to select the first menu M1, and the menu selection control signal that indicates the first menu M1 is output to the receiver 33 from the keyboard 70. The receiver 33 receives this menu selection control signal and outputs this menu selection control signal to the display controller 35.

[0032] Furthermore, upon the receiver 33 receiving an “area control signal” that indicates setting information of an “information display area” that is set by the user using the keyboard 70, this area control signal is output to the display area setter 34. For example, the area control signal is a signal which sets the information display area DA11 for displaying the above-mentioned normal-sized observation image and sets the information display area DA11' for displaying the above-mentioned reduced-sized ob-

servation image.

- [0033] Upon the display area setter 34 receiving the area control signal from the receiver 33, the display area setter 34 stores the display-information type and the setting information for the information display area (whether normal sized or reduced sized, etc.) indicated by the area control signal to the memory 36.
- [0034] The display controller 35 changes the menu display area of the selection menu in the screen area of the image monitor (display) 40 in accordance with the display-information type (i.e., the display-information type that is subject to a selection menu adjustment) corresponding to the selection menu indicated by the menu selection control signal, which is received by the receiver 33. For example, the display controller 35 specifies (identifies) the “information-display area” that is set to the display-information type that is subject to a selection menu adjustment by referring to the memory 36, and displays the selection menu at a screen area of the image monitor 40 other than at the specified information-display area. Specifically, if the display information type that is subject to adjustment is the first type of information (i.e., the observation image), the first menu M1 is displayed on the remaining screen area excluding the information display area DA11 from the entire screen area MA of the image monitor 40.
- [0035] More specifically, when the display controller 35 receives a menu selection control signal from the receiver 33, first of all, information concerning each information-display area that is stored in the memory 36 is retrieved. Subsequently, the display controller 35 retrieves information concerning each menu display area (shape and size) that is stored in the memory 36. Thereafter, the display controller 35 selects a menu display area that conforms to a “judgment condition” of “fitting within the confines of the screen area of the image monitor 40 excluding the information display area which has been set as display information that is subject to a selection menu adjustment” from out of a candidate group of menu display areas that are stored in the memory 36. Thereafter, the display controller 35 displays the selection menu in the selected menu display area.
- [0036] At this stage, if there is only one menu display area that satisfies the above-mentioned judgment condition, the display controller 35 only needs to display the selection menu in this menu display area. Whereas, if there are a plurality of menu display areas that satisfy the above-mentioned judgment condition, the display controller 35 can perform the following control operations. Namely, as a first example, the display controller 35 determines whether or not the above-mentioned judgment condition is satisfied in the respective candidate menu display areas, of the candidate group of menu display areas stored in the memory 36, in ascending order of the addresses until determining the first candidate menu display area that satisfies the

above-mentioned judgment condition, and this first candidate menu display area is selected as the menu display area to be used. This first example is a method which places emphasis on (prioritizes) processing speed. Alternatively, as a second example, the display controller 35 displays images of usable menu display areas on the image monitor 40 for the user to select out of the plurality of menu display areas that satisfy the above-mentioned judgment condition. In this second example, the display controller 35 displays the selection menu in the menu display area (to be used) that the user selected upon viewing the screen of the image monitor 40. Furthermore, the display controller 35 may store the menu display area (to be used) selected by the user in the memory 36 as a “user-customized area” (see FIG. 6). This second example is a method which places emphasis on (prioritizes) user convenience. As an example of images of usable menu display areas for the user to select out of the plurality of menu display areas that satisfy the above-mentioned judgment condition, a plurality of small images of modes by which the user can recognize the positional relationship between the menu display area and the information display area can be prepared for each menu display area, and a list of these small images, i.e., thumbnail images, can be displayed.

[0037] (Operational Example of Endoscope Processor)

The following is a discussion of an operational example of the endoscope processor 30 having the above-described configuration. In particular, the following explanations will concern an example of operational processes carried out by the display controller 35. FIG. 7 shows a flowchart of an example of processes carried out by the display controller 35. The flowchart shown in FIG.7 starts control upon, e.g., a patient ID being inputted and a photographing operation commencing using the endoscope 20.

[0038] At step S11, the display controller 35 displays the observation image at an information-display area (e.g., the information display area DA11 shown in FIG. 4) corresponding to the observation image.

[0039] At step S12, the display controller 35 displays patient medical information corresponding to the input patient ID at an information-display area (e.g., the information display area DA12 shown in FIG. 4) corresponding to the patient medical information.

[0040] At step S13, the display controller 35 determines whether or not a menu selection control signal has been received. This determining process is repeated until the menu selection control signal has been received (step S13: NO).

[0041] Upon the display controller 35 receiving a menu selection control signal (step S13: YES), the display controller 35 determines at step S14 whether or not the display-information type (which is to be subject to adjustment via the selection menu) that is indicated by the menu control signal corresponds to the first type of information. The observation image is designated as the first type of information and the patient medical information, constituting character information, is designated as the second type of in-

formation.

[0042] In the case where the display-information type that is to be subject to adjustment via the selection menu is the first type of information (observation image) (step S14: YES), the display controller 35 performs the menu display control at step S15 in accordance with the first type of information.

[0043] For example, at step S15, the following processes can be carried out. Namely, as a first procedure, the display controller 35 can select one menu display area candidate that is not included in the information display area DA11, corresponding to the first type of information, from the “overlapping area when menu displayed” items in the table (shown in FIG. 6) corresponding to the first menu M1. Thereafter, as a second procedure, if a menu display were to be carried out at the currently set shape and size with respect to the first type of information with the menu display area candidate that was selected in the first procedure, the display controller 35 determines whether or not a deficiency in the menu display (whether or not part of the first type of information is no longer visible) has occurred. If the display controller 35 determines that no such deficiency has occurred (the entire first type of information is completely visible), the display controller 35 selects the above-mentioned one menu display area candidate. Whereas, if the display controller 35 determines that a deficiency has occurred (part of the first type of information is no longer visible), the display controller 35 returns to the process of the first procedure and selects another menu display area candidate that is not included in the information display area DA11, corresponding to the first type of information, from the “overlapping area when menu displayed” items. At this stage, if, in the first procedure, a menu display area candidate that is not included in the information display area DA11, corresponding to the first type of information, does not exist the “overlapping area when menu displayed” items, the display controller 35 can select, as a third procedure, the menu display area candidate that overlaps by the least amount with the information display area DA11, corresponding to the first type of information.

[0044] Specifically, since the menu display area candidate having the address “0x000000” in the table (shown in FIG. 6) corresponding to the first menu M1 overlaps with the information display area DA11, if this menu display area candidate were to be displayed, for example, as shown in FIG. 8, a menu display area MNA31 would (undesirably) overlap with the information display area DA11, corresponding to the first type of information. Therefore, the menu display area candidate having the address “0x000000” would not be selected in the first procedure. Similarly, since the menu display area candidate having the address “0x00000n” in the table (shown in FIG. 6) corresponding to the first menu M1 overlaps with the information display area DA11, if this menu display area candidate were to be displayed, for example, as shown in FIG. 9, a menu

display area MNA32 would (undesirably) overlap with the information display area DA11, corresponding to the first type of information. Therefore, the menu display area candidate having the address “0x00000n” would also not be selected in the first procedure. However, since the overlapping portion is small, it is possible for this menu display area candidate to be selected in the third procedure.

[0045] Whereas, since the menu display area candidate having the address “0x000001” in the table (shown in FIG. 6) corresponding to the first menu M1 does not overlap with the information display area DA11, if this menu display area candidate were to be displayed, for example, as shown in FIG. 10, a menu display area MNA33 would not overlap with the information display area DA11, nor would there any deficiencies exist in the menu display. Therefore, the menu display area candidate having the address “0x000001” is selected in the first procedure or in the second procedure. Since the menu display area candidate having the address “0x00000n” in the table (shown in FIG. 6) corresponding to the first menu M1 does not overlap with the information display area DA11’, if this menu display area candidate were to be displayed, for example, as shown in FIG. 11, a menu display area MNA32 would not overlap with the information display area DA11’, corresponding to the first type of information. Therefore, in the case where the information display area that corresponding to the first type of information is reduced in size, the menu display area candidate having the address “0x00000n” is selected in the first procedure or in the second procedure.

[0046] Whereas, in the case where the display-information type that is to be subject to adjustment via the selection menu is not the first type of information (observation image) (step S14: NO), i.e., is the second type of information (character information), the display controller 35 performs, at step S16, a menu display control in accordance with the second type of information.

[0047] For example, at step S16, the same processes as those of the first through third procedures can be carried out. Namely, as a first procedure, the display controller 35 can select one menu display area candidate that is not included in the information display area DA12, corresponding to the second type of information, from the “overlapping area when menu displayed” items in the table (shown in FIG. 6) corresponding to the first menu M2. Thereafter, as a second procedure, if a menu display were to be carried out at the currently set shape and size with respect to the second type of information with the menu display area candidate that was selected in the first procedure, the display controller 35 determines whether or not a deficiency in the menu display (whether or not part of the second type of information is no longer visible) has occurred. If the display controller 35 determines that no such deficiency has occurred (the entire second type of information is completely visible), the display controller 35 selects the above-mentioned one menu display area candidate. Whereas,

if the display controller 35 determines that a deficiency has occurred (part of the first type of information is no longer visible), the display controller 35 returns to the process of the first procedure and selects another menu display area candidate that is not included in the information display area DA12, corresponding to the second type of information, from the “overlapping area when menu displayed” items. At this stage, if, in the first procedure, a menu display area candidate that is not included in the information display area DA12, corresponding to the second type of information, does not exist the “overlapping area when menu displayed” items, the display controller 35 can select, as a third procedure, the menu display area candidate that overlaps by the least amount with the information display area DA12, corresponding to the first type of information.

[0048] A specific example of the first through third procedures in step S16 will be discussed hereinbelow. For the sake of convenience, explanations will be given on the premise that the table corresponding to the second menu M2 is the same as the table (shown in FIG. 6) corresponding to the first menu M1, having same content with respect to the addresses and overlapping areas when the menu is displayed. However, the specific coordinates of the menu display starting position coordinates in the table corresponding to the second menu M2 are different to those in the table corresponding to the first menu M1. Specifically, since the menu display area candidate at the address “0x000001” in the table corresponding to the second menu M2 overlaps with the information display area DA12, if this menu display area candidate were to be displayed, for example, as shown in FIG. 12, a menu display area MNA34 would (undesirably) overlap with the information display area DA12, corresponding to the second type of information. Therefore, the menu display area candidate having the address “0x000001” would not be selected in the first procedure. Similarly, since the menu display area candidate having the address “0x00000n” in the table (shown in FIG. 6) corresponding to the second menu M2 overlaps with the information display area DA12, if this menu display area candidate were to be displayed, for example, as shown in FIG. 13, a menu display area MNA35 would partially overlap with the information display area DA12, corresponding to the second type of information. Therefore, the menu display area candidate having the address “0x00000n” in the table corresponding to the second menu M2 would also not be selected in the first procedure. However, since the overlapping portion with the information display area DA12 is small, it is possible for this menu display area candidate having the address “0x00000n” in the table corresponding to the second menu M2 to be selected in the third procedure. Whereas, since the menu display area candidate having the address “0x000000” in the table (shown in FIG. 6) corresponding to the second menu M2 does not overlap with the information display area DA12, if this menu display area candidate were to be

displayed, for example, as shown in FIG. 14, a menu display area MNA36 would not overlap with the information display area DA12, corresponding to the second type of information, nor would there any deficiencies exist in the menu display. Therefore, the menu display area candidate having the address “0x000000” would be selected in the first procedure or in the second procedure.

[0049] Hence, according to the above-described first embodiment of the present invention, in the endoscope processor 30, the display controller 35 displays the selection menu, indicated by the selection control signal received by the receiver 33, in the remaining screen area excluding the information display area set in the screen area of the image monitor 40 with respect to the type of display-information type that is subject to a selection menu adjustment. More specifically, the display controller 35 selects a menu display area that conforms to a “judgment condition” of “fitting within the confines of the screen area of the image monitor 40 excluding the information display area which has been set as display information that is subject to a selection menu adjustment” from out of a candidate group of menu display areas that are stored in the memory 36. Thereafter, the display controller 35 displays the selection menu in the selected menu display area.

[0050] Due to the endoscope processor 30 having such a configuration, for example, in the case where a process is being carried out that affects the observation image, i.e., in the case where the affected observation image includes attentional information, the selection menu can be displayed while avoiding the display area of the observation image, and in the case where a process is being carried out that affects the patient medical information (character information), the selection menu can be displayed while avoiding the display area of the patient medical information. In other words, the attentional information and the menu display can be concurrently displayed without the attentional information being lost (without being obstructed by the menu display). Accordingly, the influence that a process included in the selection menu has on the attentional information can be confirmed on a real time basis.

[0051] Furthermore, if there are a plurality of menu display areas that satisfy the above-mentioned judgment condition, the display controller 35 can display the screen of the menu display area to be used, which has been selected by the user out of the plurality of menu display areas (e.g., out of a plurality of thumbnail images), onto the image monitor 40. Furthermore, the display controller 35 can store the screen of the menu display area to be used, which has been selected by the user out of the plurality of menu display areas (e.g., out of a plurality of thumbnail images) and displayed on the image monitor 40, in the memory 36 as a user-customized area.

[0052] According to this configuration of the endoscope processor 30, a menu display that matches the users preference can be achieved.

[0053] (Modified Embodiments)

In the above descriptions, an embodiment in which the positions of the information display areas DA11 and DA11' in the image displayable area DA21 and the position of the information display area DA12 in the character displayable area DA22 are predetermined fixed positions has been described, however, the present invention is not limited thereto; the positions of the information display areas DA11 and DA11', and the position of the information display area DA12 may be variable (adjustable). Furthermore, in the above descriptions, the image displayable area DA21 and the character displayable area DA22 have been described as fixed, however, the present is not limited thereto; the image displayable area DA21 and the character displayable area DA22 may be variable (adjustable). Furthermore, in the above-description, the size and shape of the menu display area has been described as being fixed, however, the present invention is not limited thereto; the size and shape of the menu display may be variable (adjustable).

[0054] (Additional Embodiments)

[1] In the first embodiment, three processing items such as a contrast adjustment process, a color adjustment process, and a picture enhancement process are included in the description as an example of a menu corresponding to the first type of information, however, the present invention is not limited thereto; it is permissible for at least one of these three processing items to be included or for another processing item for adjusting the observation image to be included. Similarly, it is also permissible for at least one of a patient-information editing process and a comment editing process to be included, or another processing item for adjusting the character information to be included as a processing item in the menu corresponding to the second type of information.

[0055] [2] In the first embodiment, two types of information, i.e., a first type of information and a second type of information, are given as an example, however, the present invention is not limited thereto; three or more types of information may also be applied to the present invention.

[0056] [3] In the first embodiment, the endoscope processor 30 is described as being provided with the memory 36, however, the present invention is not limited thereto; the memory 36 may be provided elsewhere other than in the endoscope processor 30.

[0057] [4] In the endoscope processor 30 of the first embodiment, there is no particular limitation with regard to the hardware configuration thereof, and can be configured to include a CPU (Central Processing Unit), a DSP (Digital Signal Processor), a FPGA (Field Programmable Gate Array), a circuit arrangement for predetermined processes, and a combination thereof. Furthermore, the processes performed by the endoscope processor 30 are performed by the endoscope processor 30 reading and running a program that is stored in memory.

Obvious changes may be made in the specific embodiments of the present invention described herein, such modifications being within the spirit and scope of the invention claimed. It is indicated that all matter contained herein is illustrative and does not limit the scope of the present invention.

Reference Signs List

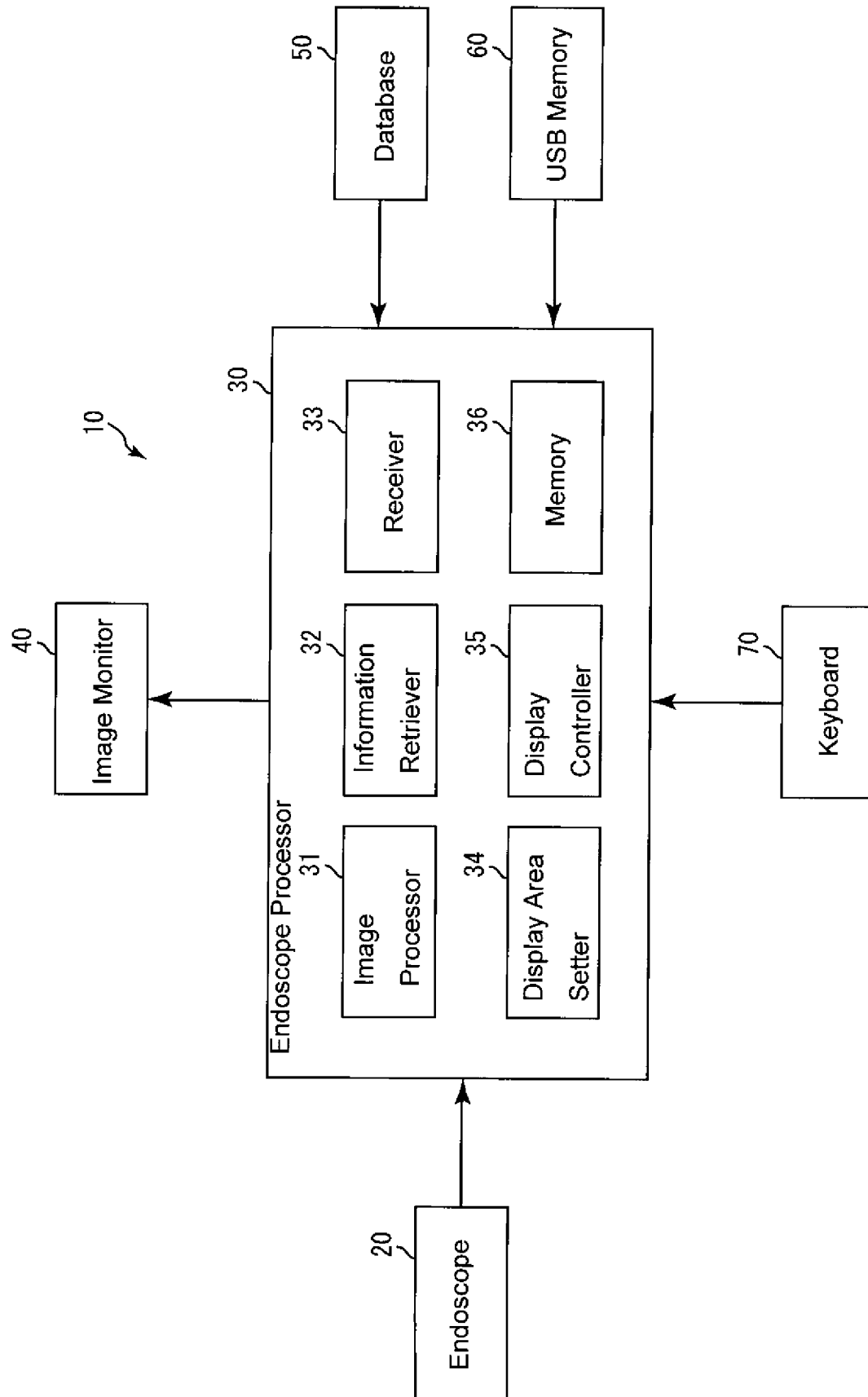
- [0058] 10 Endoscope system
 20 Endoscope
 21 Grip control body
 22 Insertion portion
 22A Distal-end rigid section
 22B Bendable section
 22C Flexible section
 23 Bending-control lever
 24 Universal tube
 25 Connector
 25A Connector terminals
 26 Light-guide sleeve
 30 Endoscope processor
 31 Image processor
 32 Information retriever
 33 Receiver
 34 Display area setter
 35 Display controller
 36 Memory
 40 Image monitor
 50 Database
 60 USB memory
 70 Keyboard

Claims

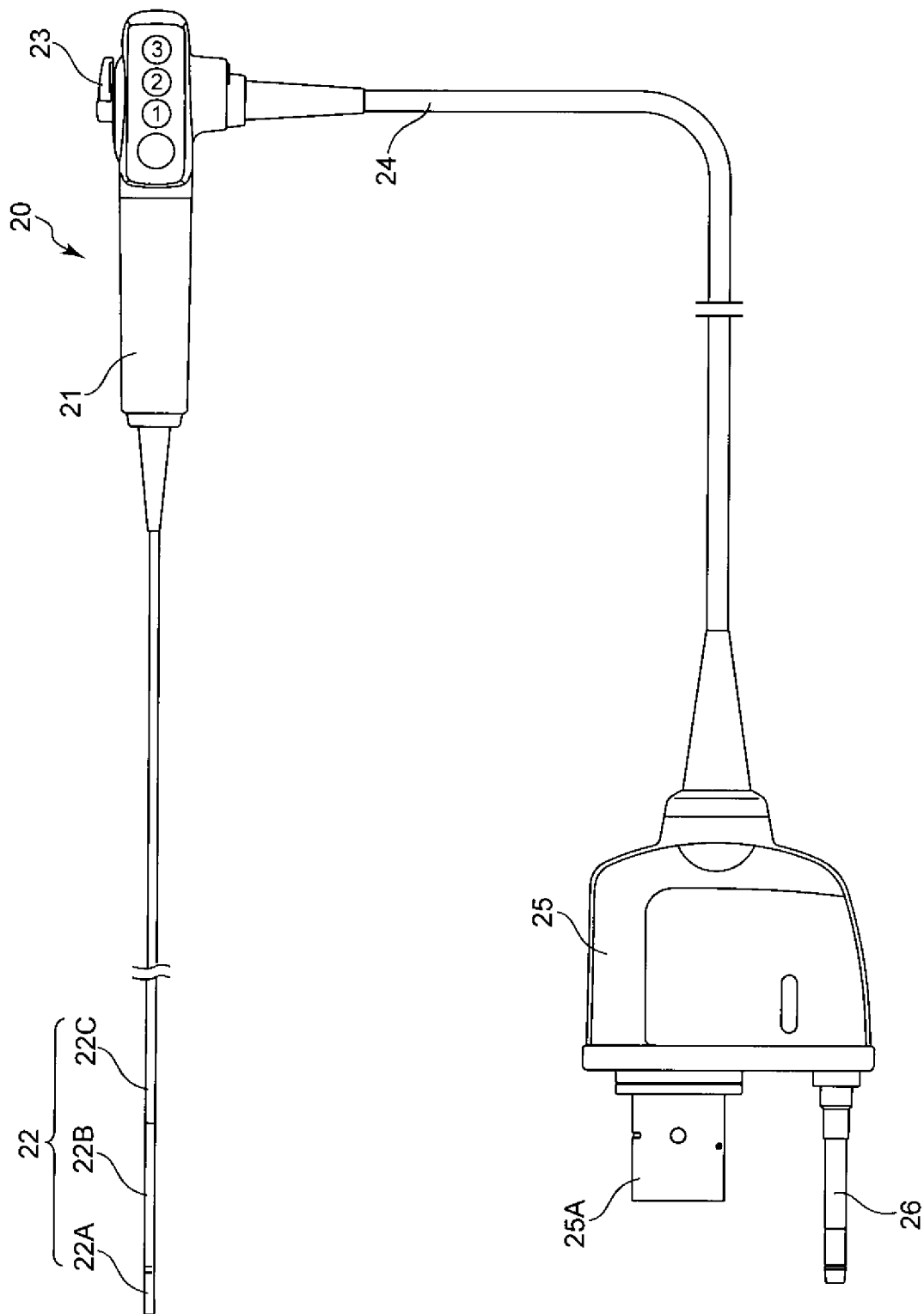
- [Claim 1] An endoscope processor comprising:
a receiver configured to receive a selection control signal which indicates a selected menu out of a plurality of menus; and
a display controller configured to display said selected menu that is indicated by said selection control signal, which is received by said receiver, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.
- [Claim 2] The endoscope processor according to claim 1, further comprising:
a memory configured to store a candidate group of menu display areas, wherein said display controller selects, from out of said candidate group of menu display areas, a menu display area that conforms to a judgment condition of fitting within the confines of said remaining screen area, and
wherein said display controller displays said selected menu in the menu display area that is selected by said display controller.
- [Claim 3] The endoscope processor according to claim 2, wherein, in the case where a plurality of said menu display areas that conform to said judgment condition exist, said display controller displays images of usable menu display areas on said monitor screen area for a user to select out of said plurality of menu display areas.
- [Claim 4] The endoscope processor according to claim 3, wherein said display controller stores the usable menu display area that is selected by the user, using said images displayed on said monitor screen area, in said memory as a user-customized area.
- [Claim 5] The endoscope processor according to claim 1, wherein, in the case where said display-information type that is subject to adjustment is a first type of information, said display controller displays said selected menu on said remaining screen area excluding a first information display area which is set within said monitor screen area with respect to said first type of information, and
wherein, in the case where said display-information type that is subject to adjustment is a second type of information, said display controller displays said selected menu on said remaining screen area excluding a second information display area which is set within said monitor screen area with respect to said second type of information.

- [Claim 6] The endoscope processor according to claim 5, wherein said first type of information comprises an observation image that is photographed using an endoscope which is connected to said endoscope processor, wherein the menu corresponding to said first type of information includes, as a processing item, at least one of a contrast adjustment process, a color adjustment process, and a picture enhancement process,
wherein said second type of information comprises character information, and
wherein the menu corresponding to said second type of information includes, as a processing item, at least one of a patient-information editing process and a comment editing process.
- [Claim 7] A signal processing method of an endoscope processor, comprising:
receiving a selection control signal which indicates a selected menu out of a plurality of menus; and
displaying said selected menu, which is indicated by the received said selection control signal, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.
- [Claim 8] A control program for an endoscope processor, wherein said control program implements a process in said endoscope processor, said process comprising:
receiving a selection control signal which indicates a selected menu out of a plurality of menus; and
displaying said selected menu, which is indicated by the received said selection control signal, on a remaining screen area excluding an information display area which is set within a monitor screen area with respect to a type of display-information that is subject to a selection menu adjustment.

[Fig. 1]

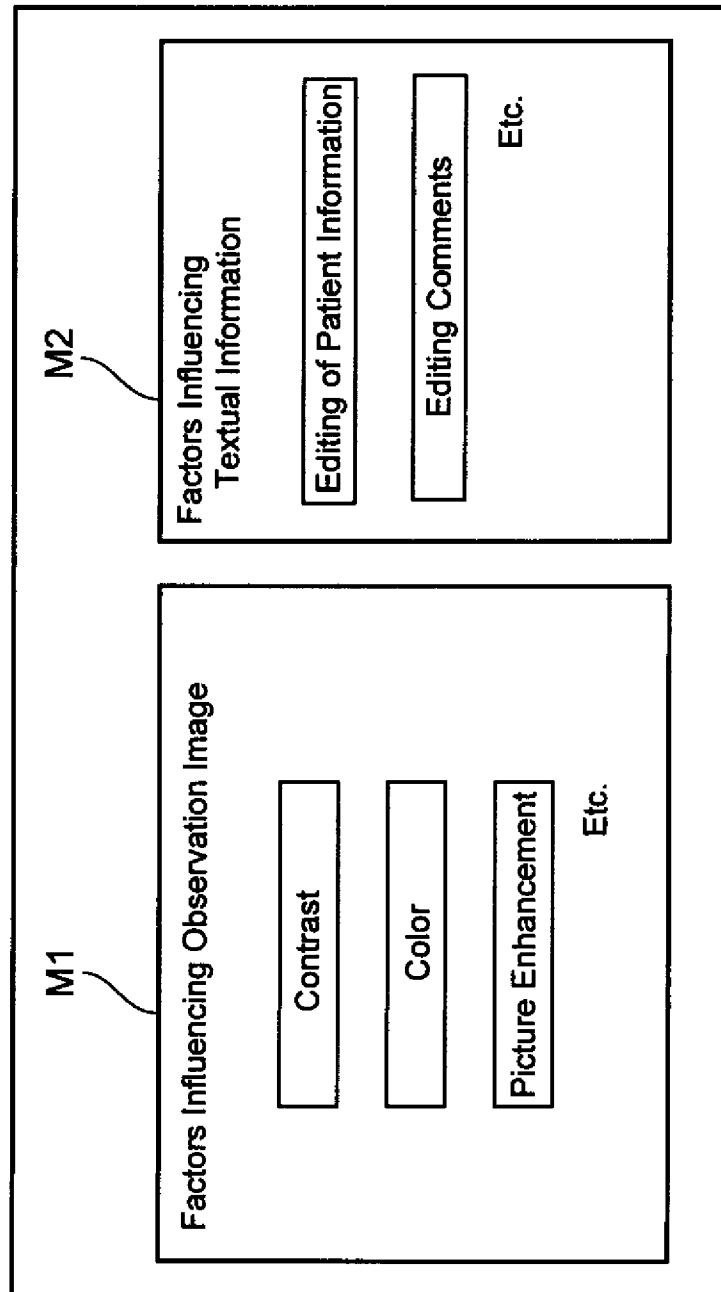


[Fig. 2]

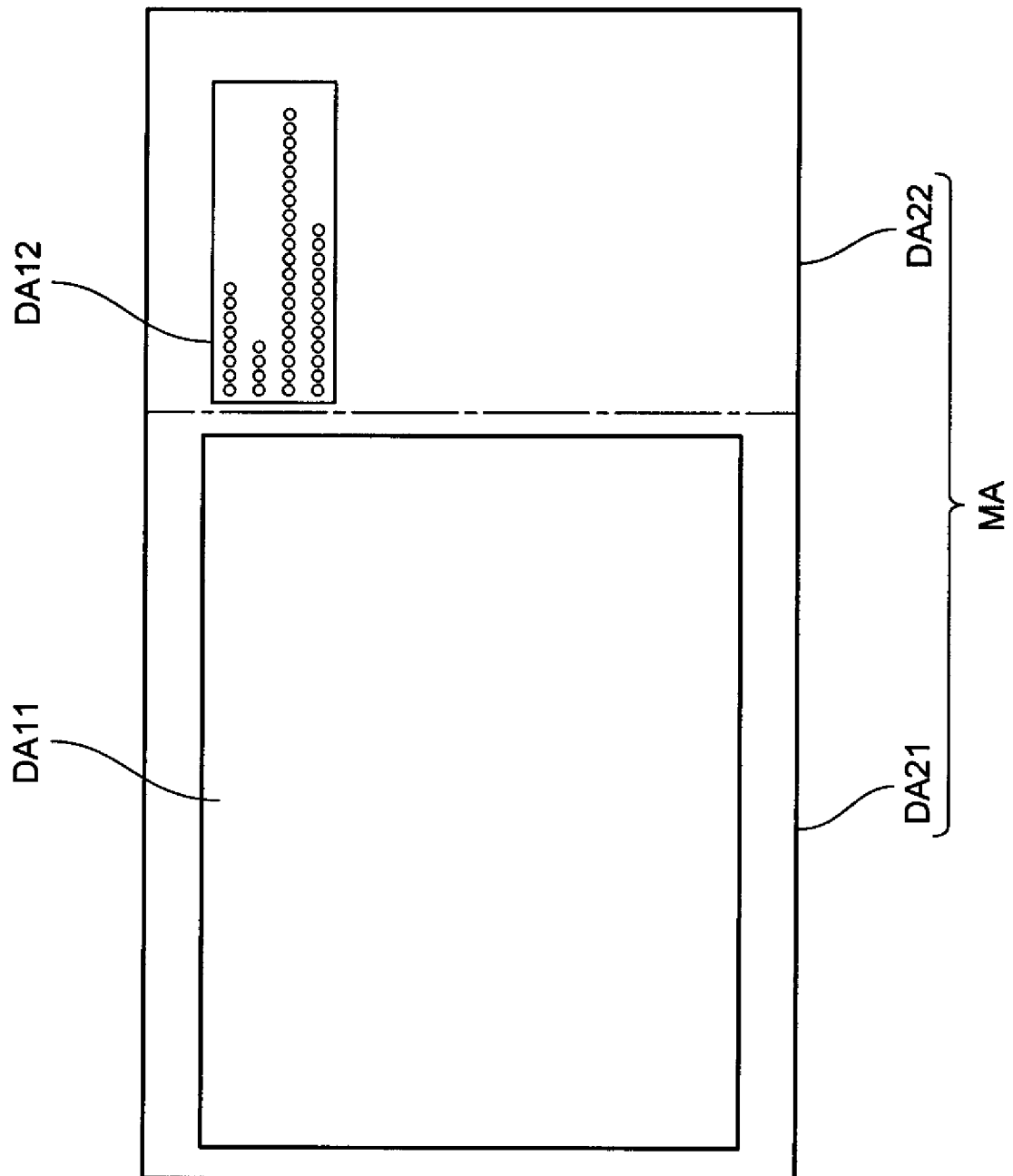


[Fig. 3]

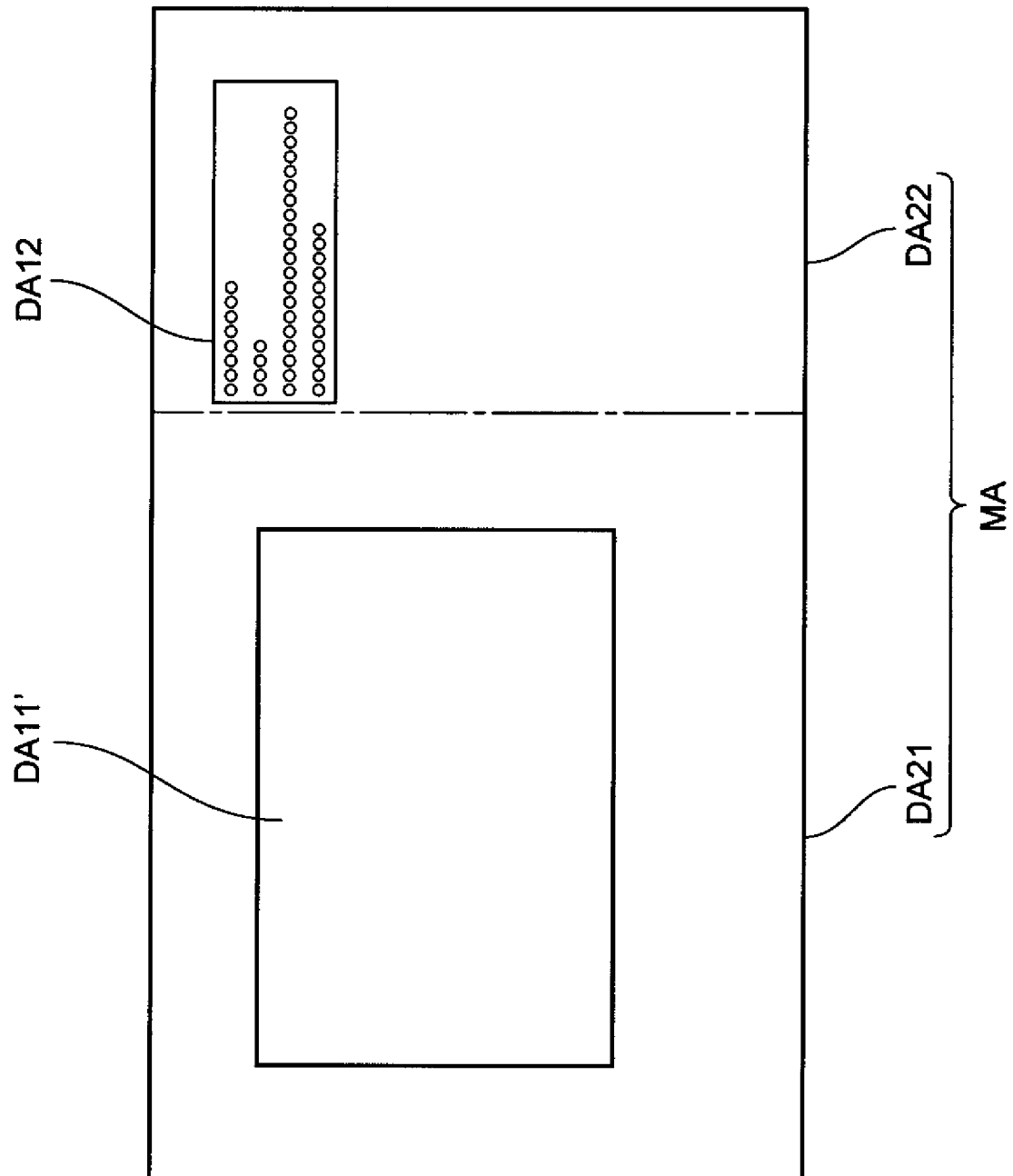
36



[Fig. 4]



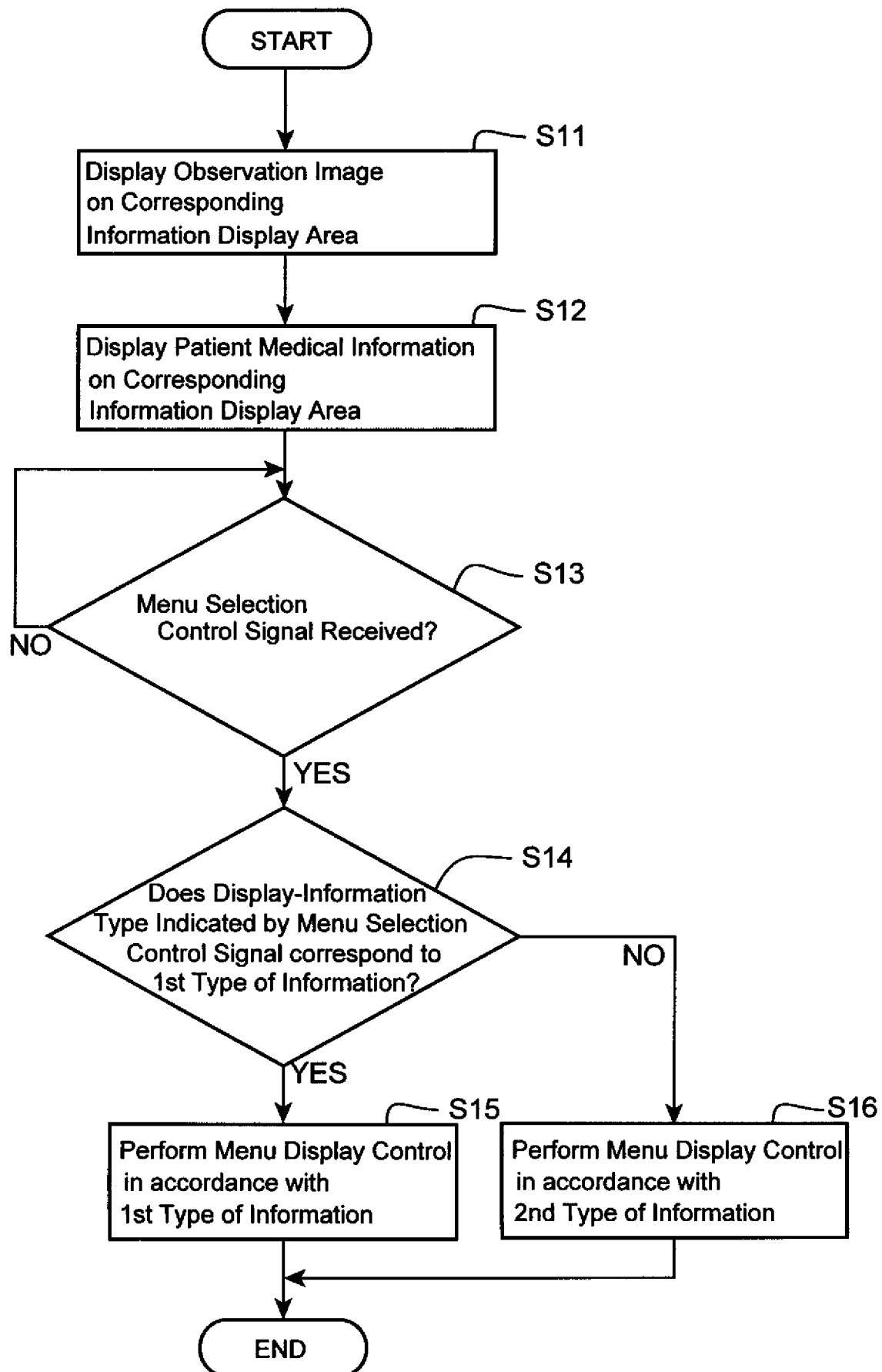
[Fig. 5]



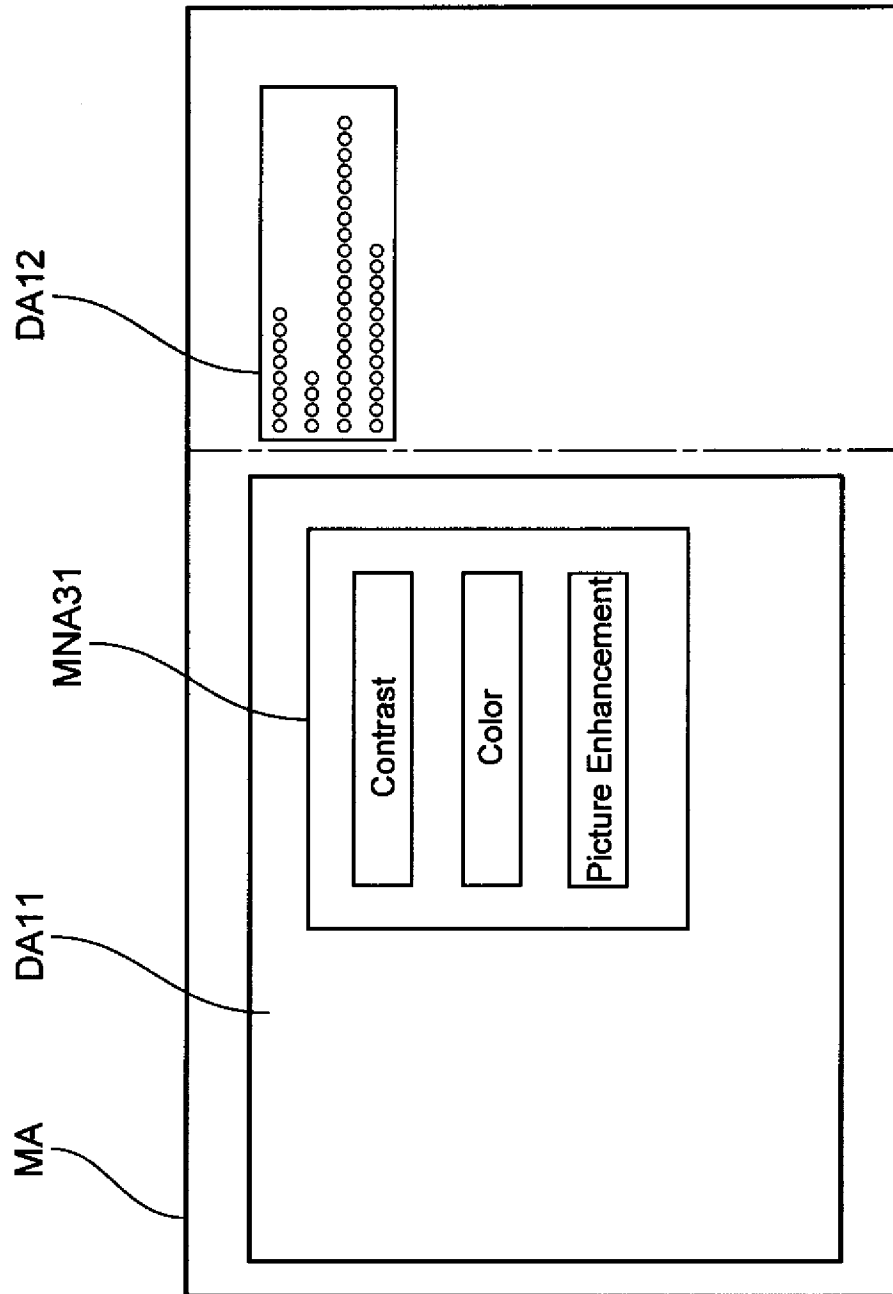
[Fig. 6]

address	Menu Display Starting Position Coordinates	Overlapping Area when Menu Displayed
0x000000	Coordinate A	Information Display Area DA11
0x000001	Coordinate B	Information Display Area DA12
...	...	...
0x00000n	Coordinate X	Information Display Areas DA11 and DA12 (Information Display Area DA11' does not overlap)
...	...	...
0x000nnn	User Customized Coordinate A	

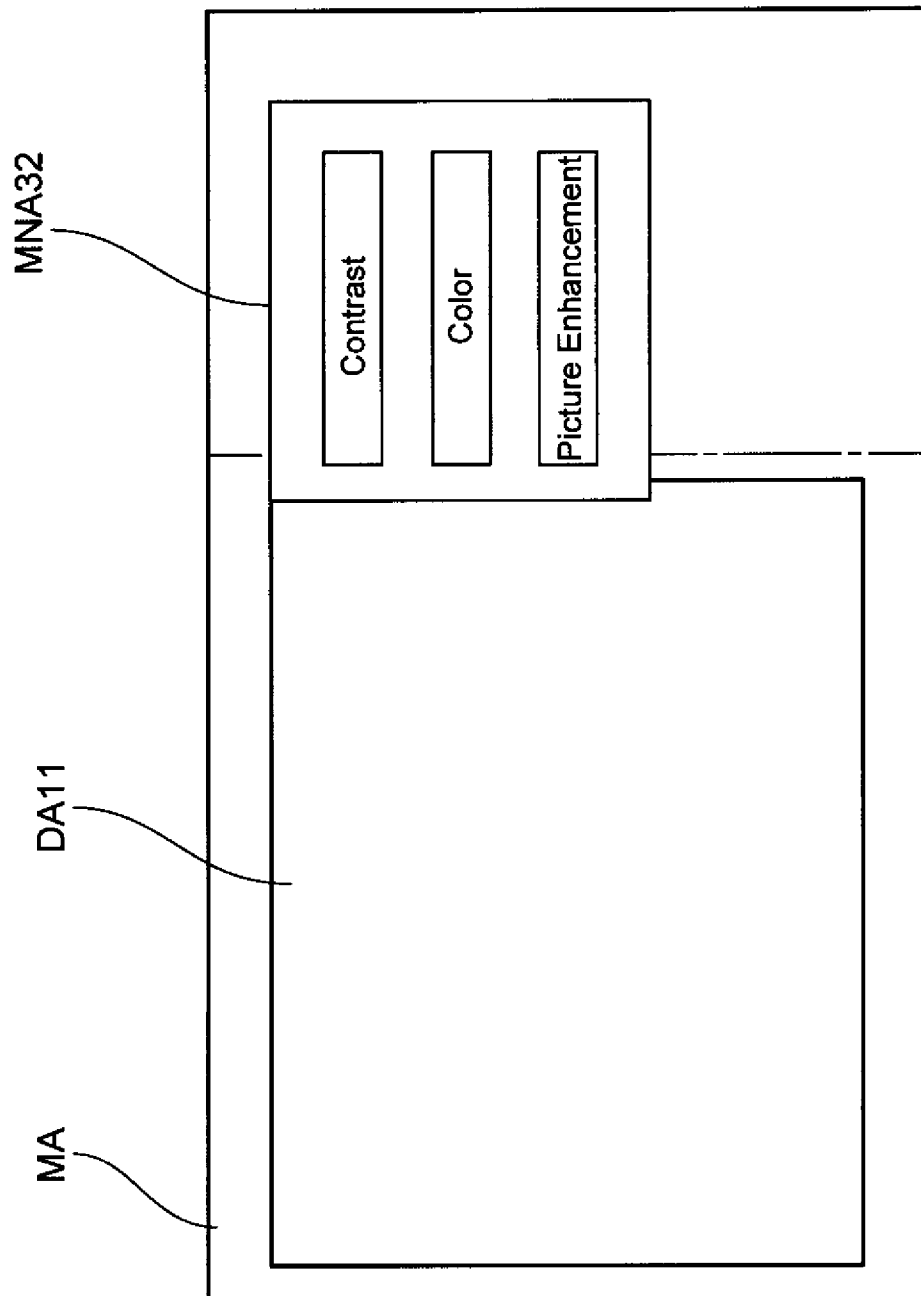
[Fig. 7]



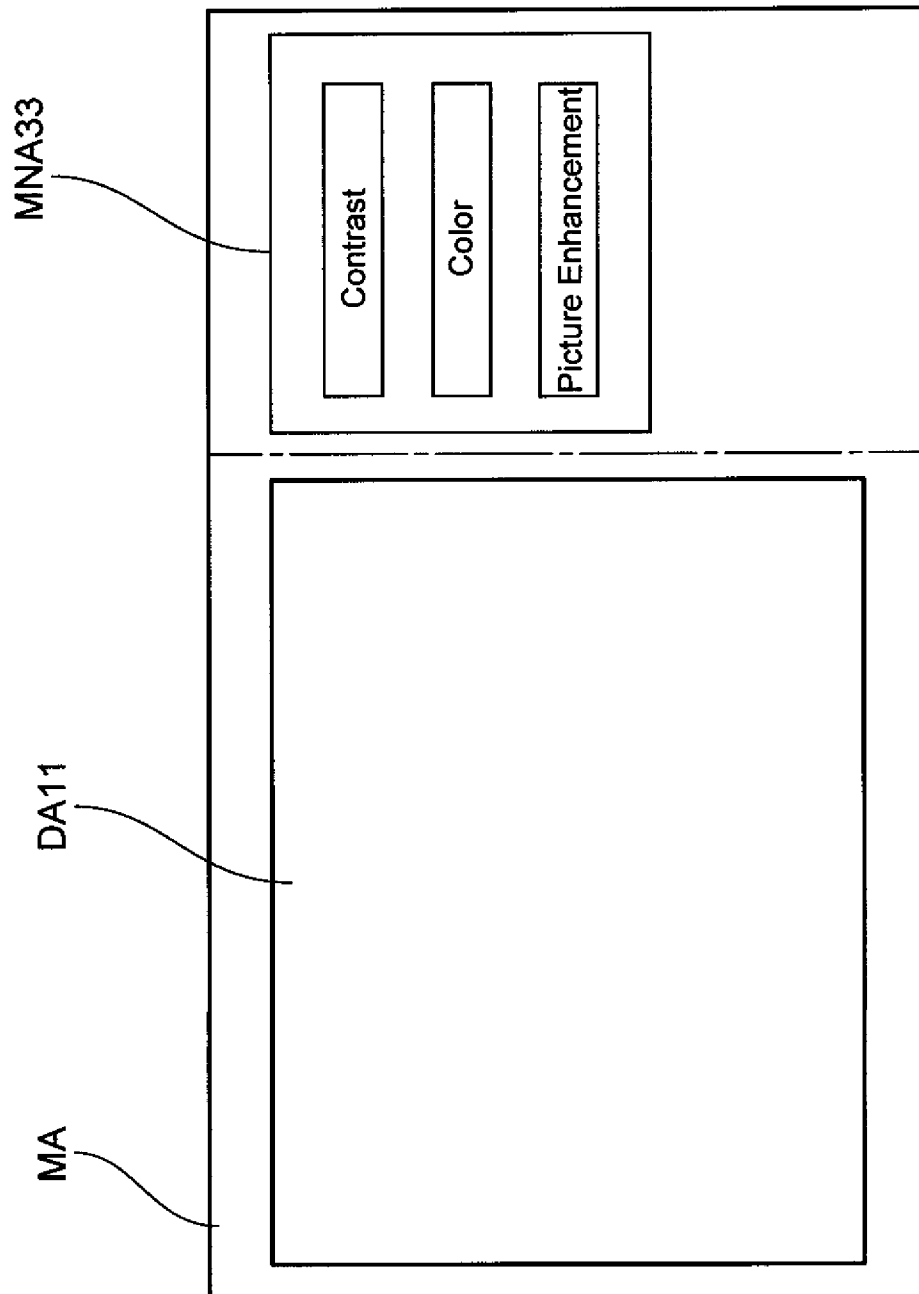
[Fig. 8]



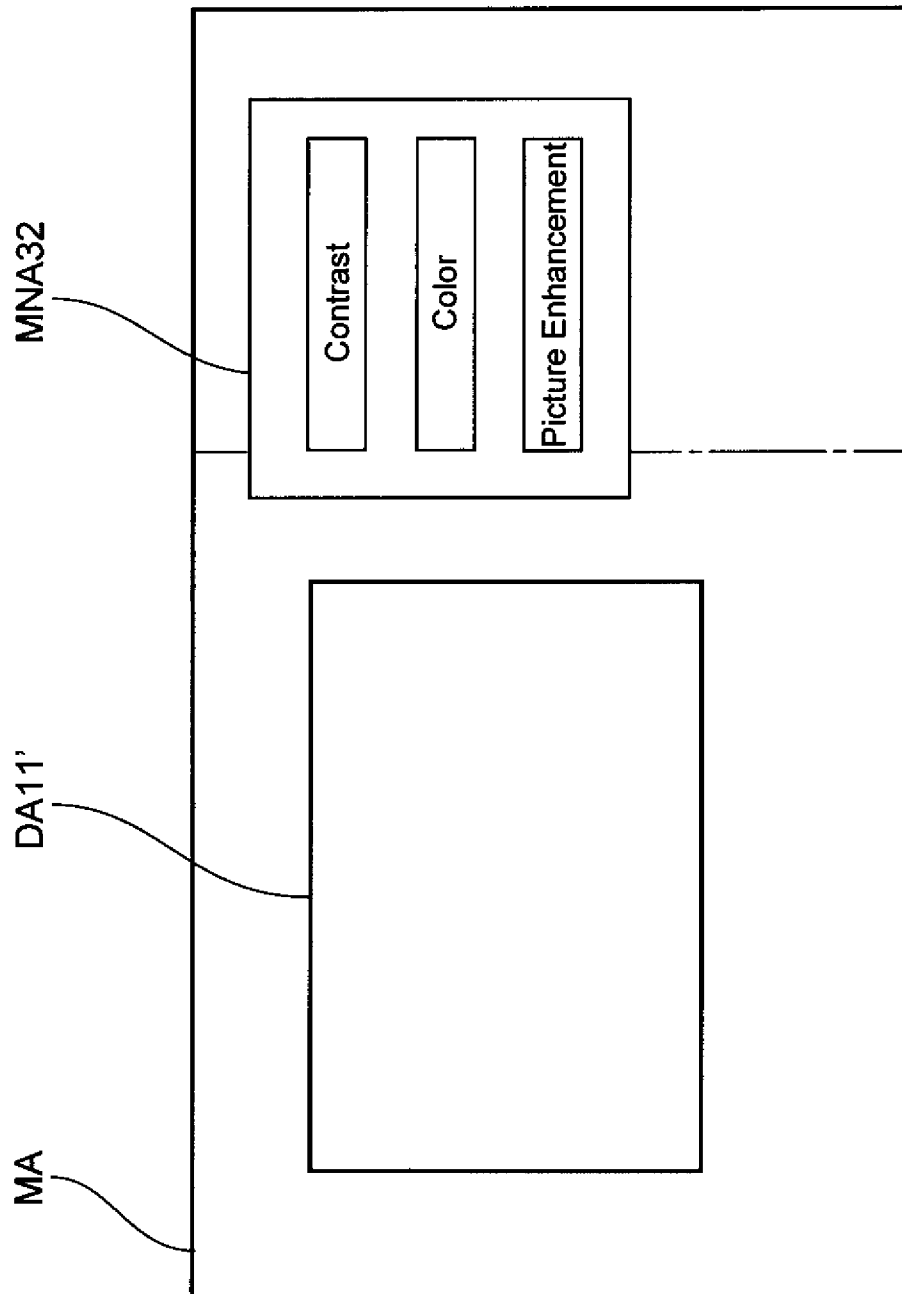
[Fig. 9]



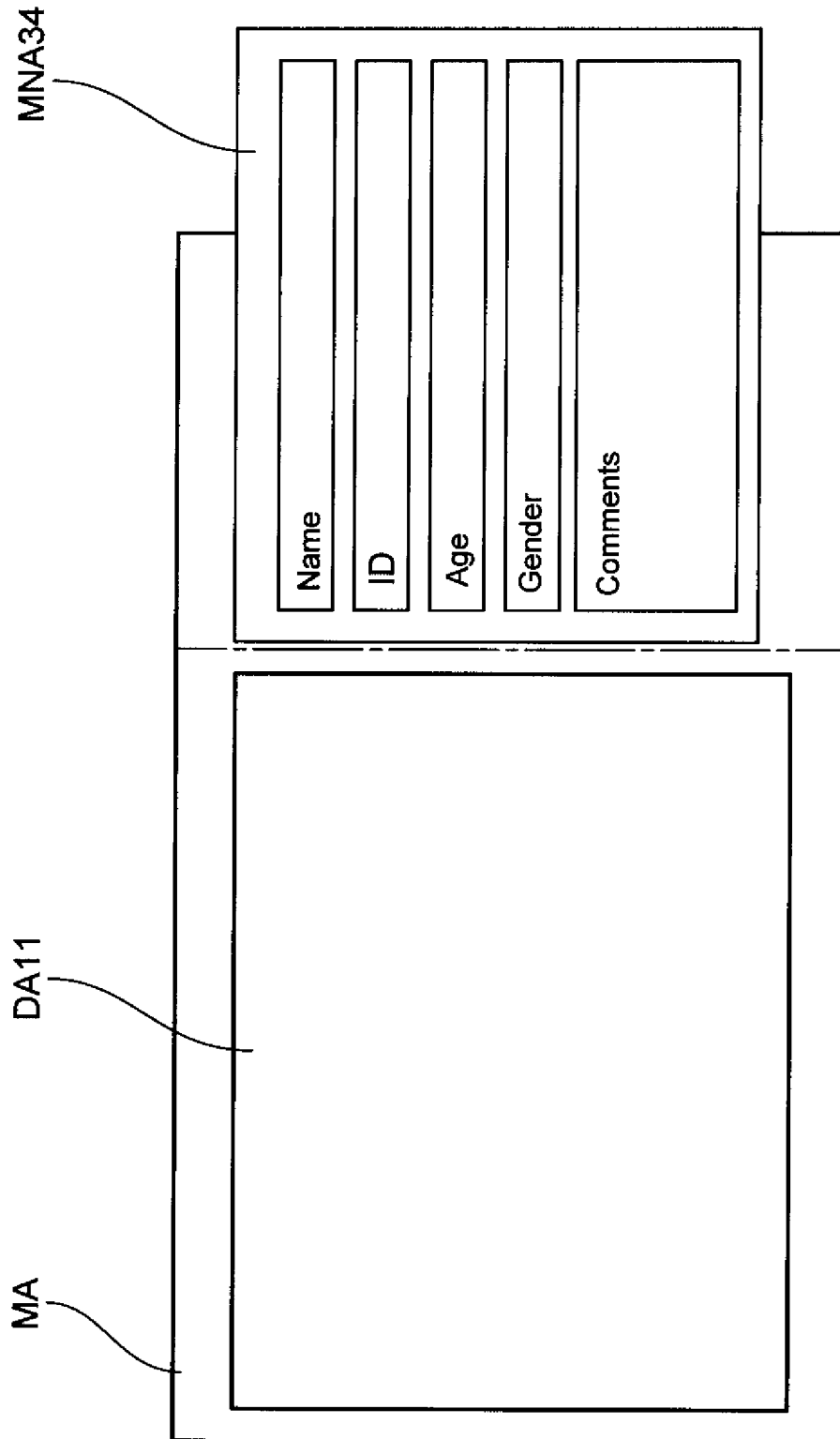
[Fig. 10]



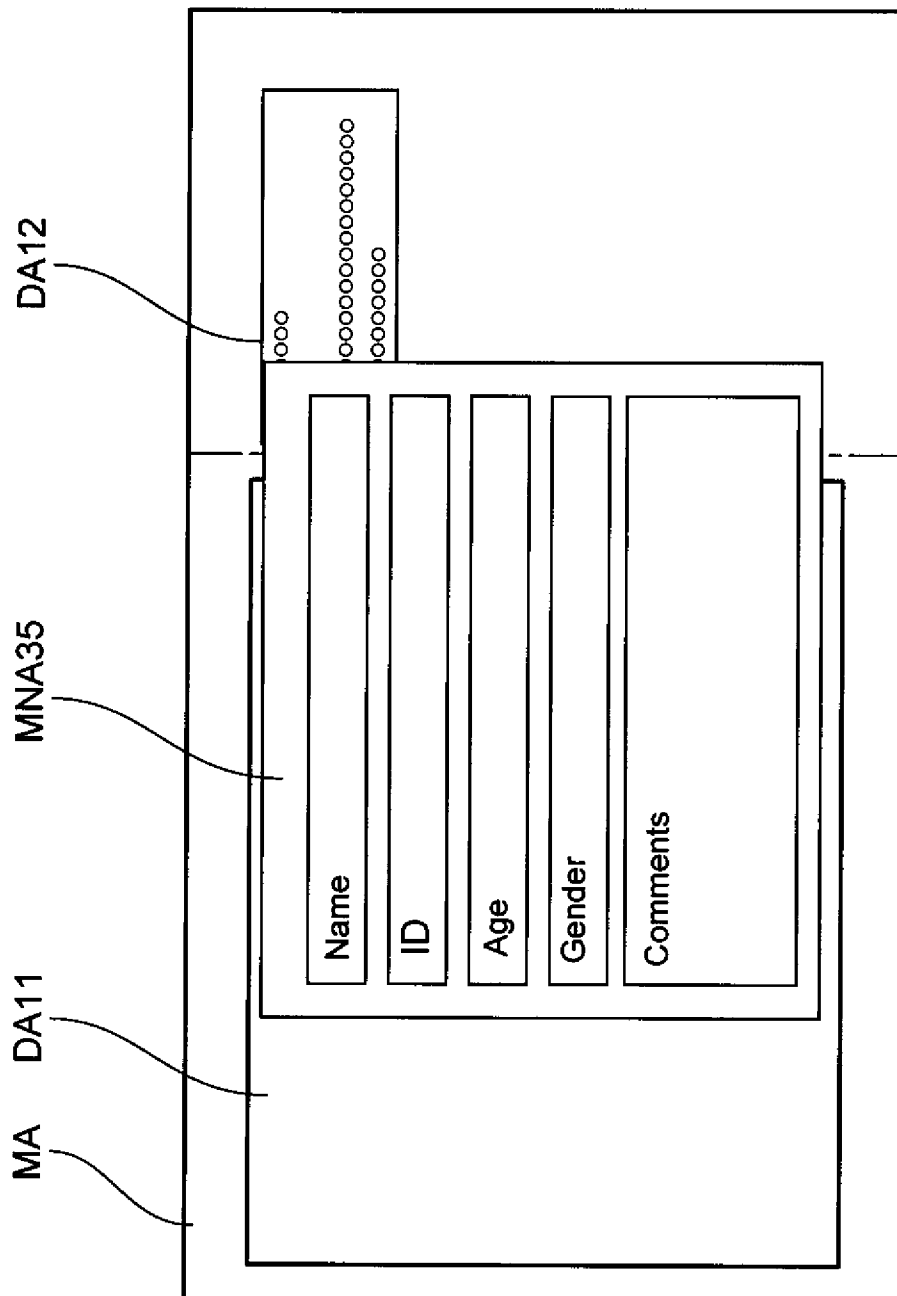
[Fig. 11]



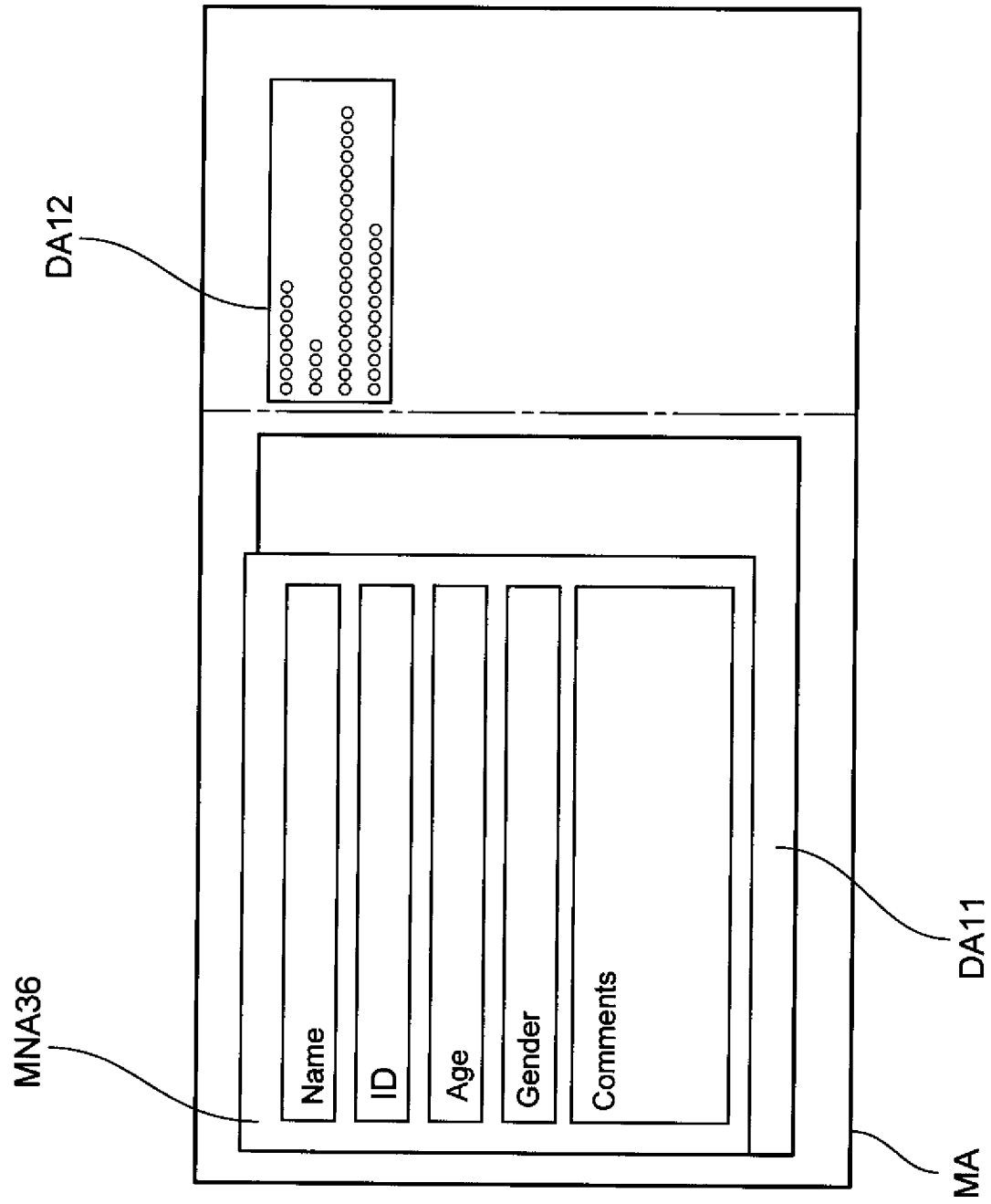
[Fig. 12]



[Fig. 13]



[Fig. 14]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/081409

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. A61B1/04 (2006.01) i, G02B23/24 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. A61B1/04, G02B23/24

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

Published examined utility model applications of Japan 1922-1996
 Published unexamined utility model applications of Japan 1971-2016
 Registered utility model specifications of Japan 1996-2016
 Published registered utility model applications of Japan 1994-2016

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	WO 2014/049641 A1 (TERUMO KABUSHIKI KAISHA) 2014.04.03, [0076]; Figure 6 (No Family)	1, 7-8 5-6 2-4
X Y A	JP 2006-20874 A (OLYMPUS CORP.) 2006.01.26, 【0051】 ~ 【0054】 ; Figures 17, 19 (No Family)	1, 7-8 5-6 2-4
A	EP 2135544 A1 (FUJIFILM CORPORATION) 2009.12.23, Full text; all drawings & US 2009/0315985 A1 & JP 2010-183 A	1-8



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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 “E” earlier application or patent but published on or after the international filing date
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 “O” document referring to an oral disclosure, use, exhibition or other means
 “P” document published prior to the international filing date but later than the priority date claimed

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

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

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

“&” document member of the same patent family

Date of the actual completion of the international search

25.11.2016

Date of mailing of the international search report

13.12.2016

Name and mailing address of the ISA/JP

Japan Patent Office

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