US 20150019974A1

(19) **United States**

(12) **Patent Application Publication**

DOI et al.

(10) **Pub. No.: US 2015/0019974 A1**

(43) **Pub. Date: Jan. 15, 2015**

(54) **INFORMATION PROCESSING DEVICE, INFORMATION PROCESSING METHOD, AND PROGRAM**

(71) Applicant: **Sony Corporation**, Minato-ku (JP)

(72) Inventors: **Shouichi DOI**, Kanagawa (JP); **Yoshiki TAKEOKA**, Tokyo (JP); **Masayuki TAKADA**, Tokyo (JP)

(73) Assignee: **Sony Corporation**, Minato-ku (JP)

(21) Appl. No.: **14/273,735**

(22) Filed: **May 9, 2014**

(30) **Foreign Application Priority Data**

Jul. 10, 2013 (JP) 2013-144449

Publication Classification

(51) **Int. Cl.**

G06F 3/16 (2006.01)

G06F 3/0484 (2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/167*** (2013.01); ***G06F 3/04847*** (2013.01)

USPC **715/728**

(57) **ABSTRACT**

There is provided an information processing device including a processor configured to realize an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display, a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region, a voice input acquisition function of acquiring a voice input for the image, and a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

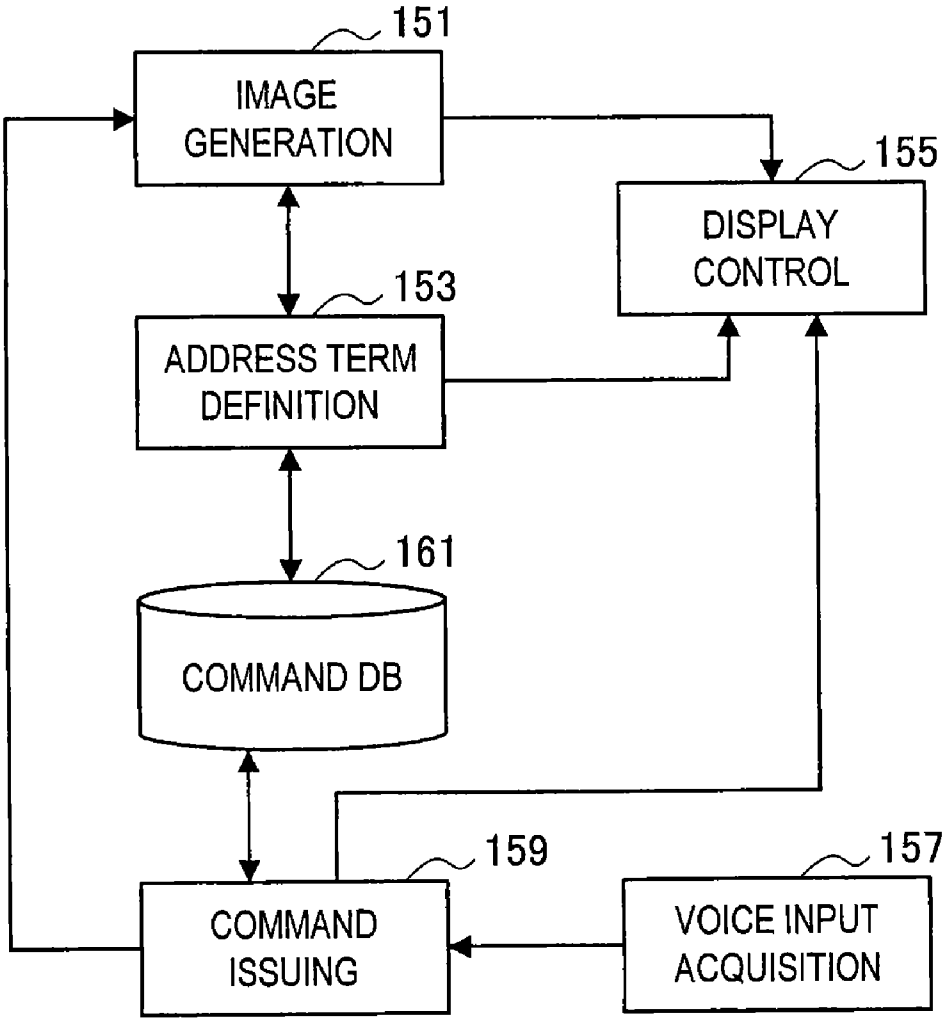


FIG. 1

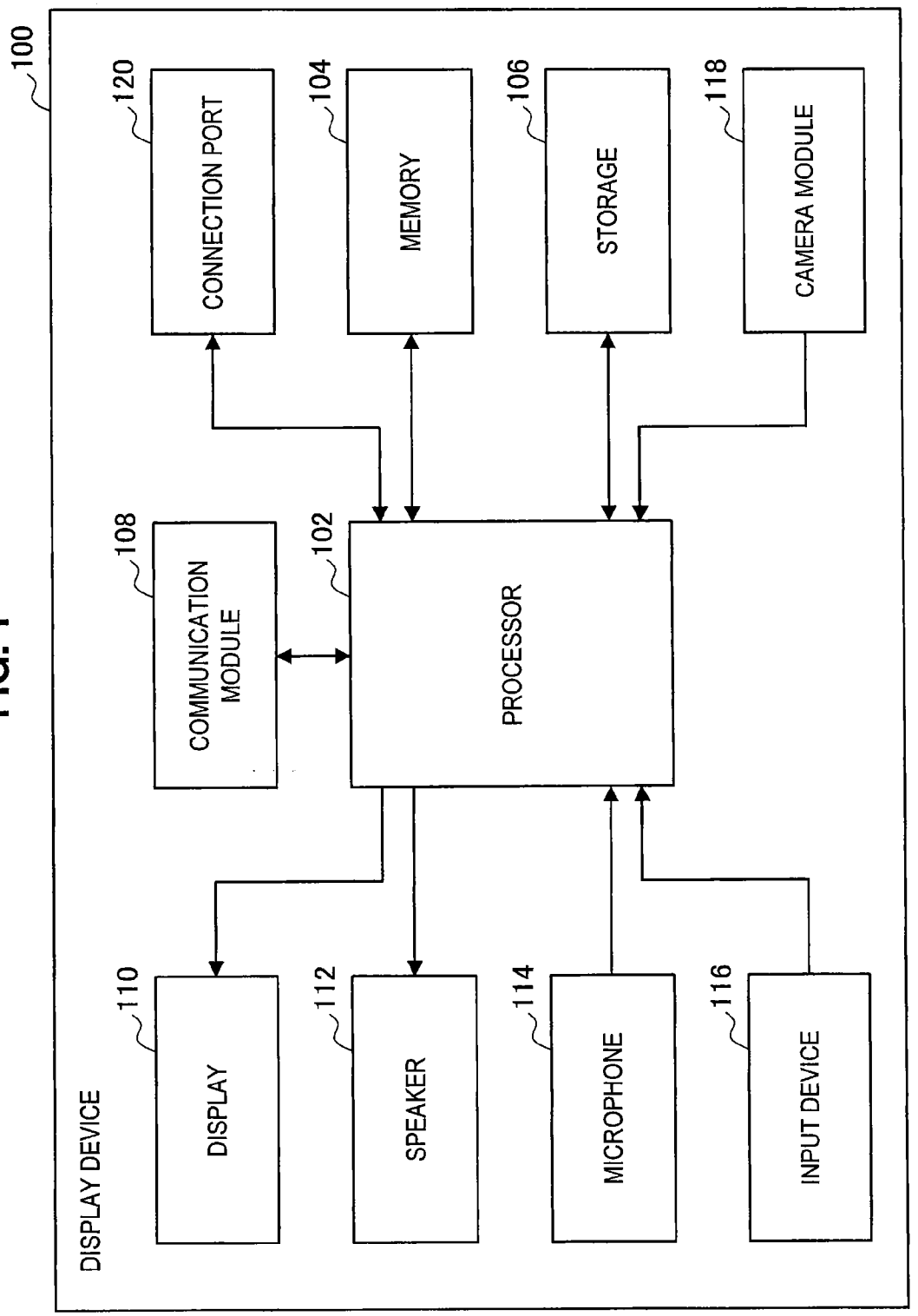

100
DISPLAY DEVICE
120
CONNECTION PORT
104
MEMORY
106
STORAGE
118
CAMERA MODULE
108
COMMUNICATION MODULE
102
PROCESSOR
110
DISPLAY
112
SPEAKER
114
MICROPHONE
116
INPUT DEVICE

FIG. 2

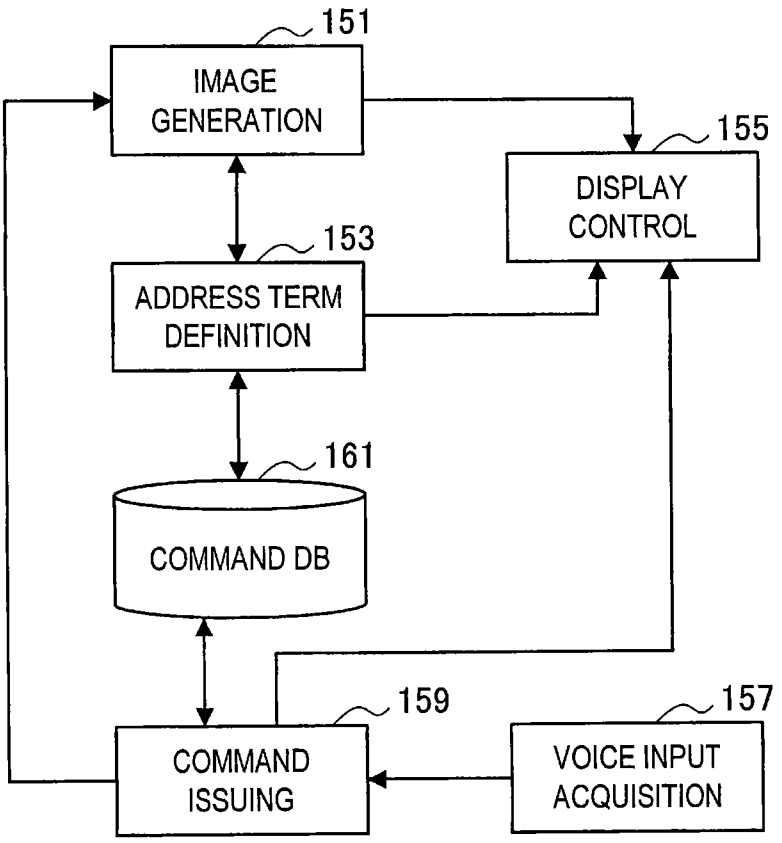

151
IMAGE GENERATION
155
DISPLAY CONTROL
153
ADDRESS TERM DEFINITION
161
COMMAND DB
159
COMMAND ISSUING
157
VOICE INPUT ACQUISITION

FIG. 3

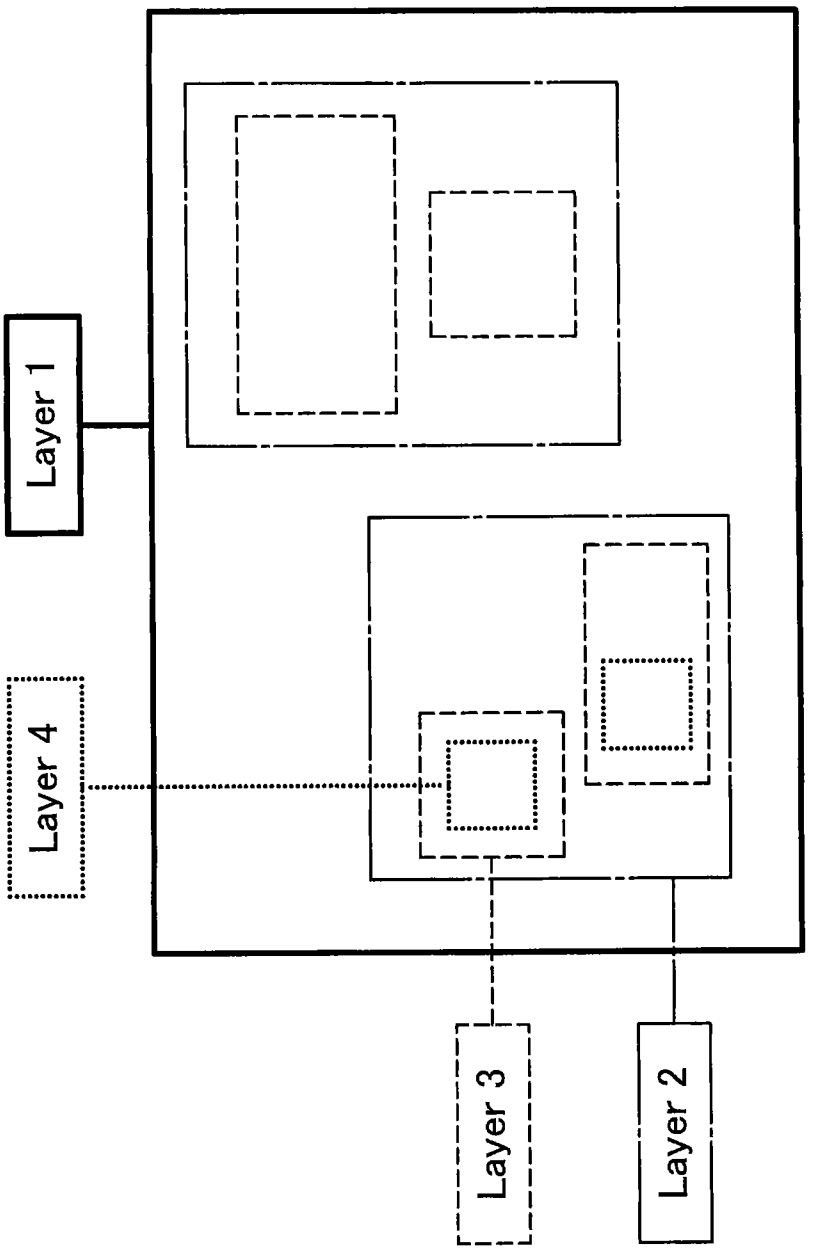


FIG. 4

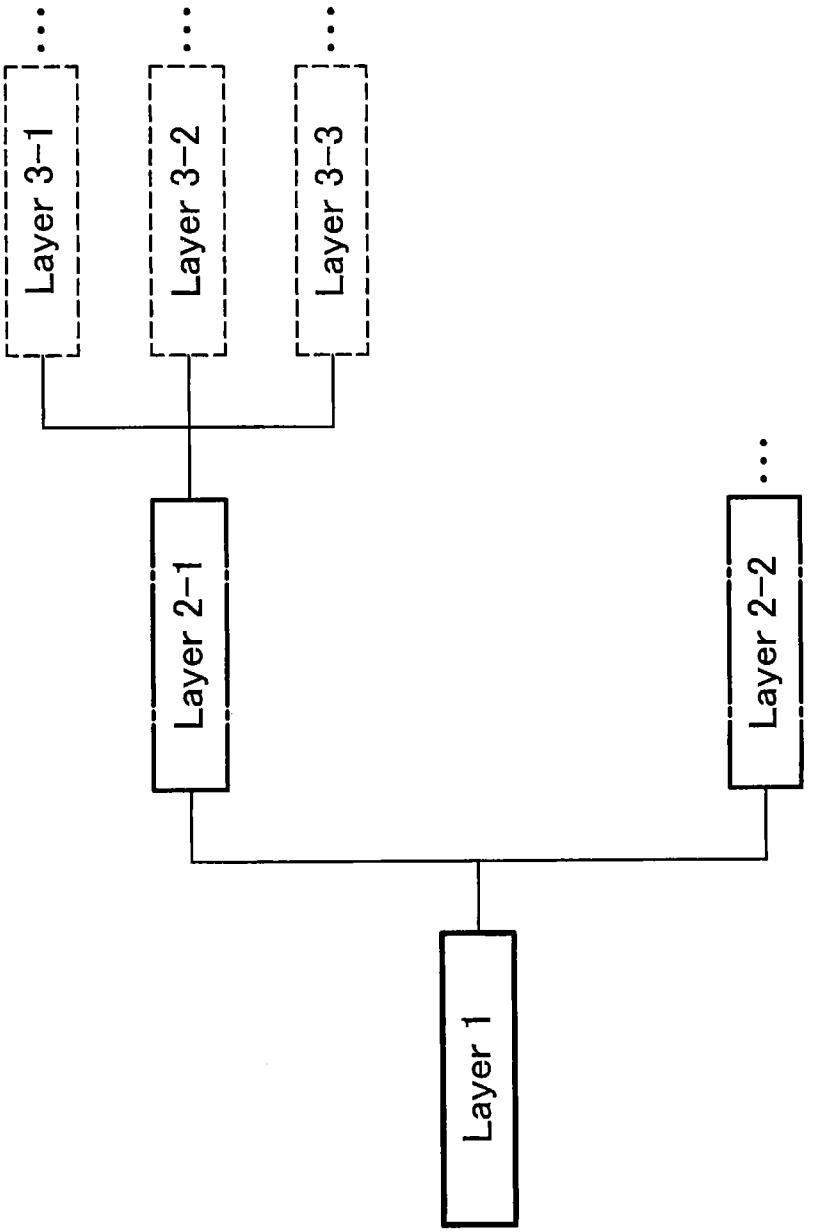
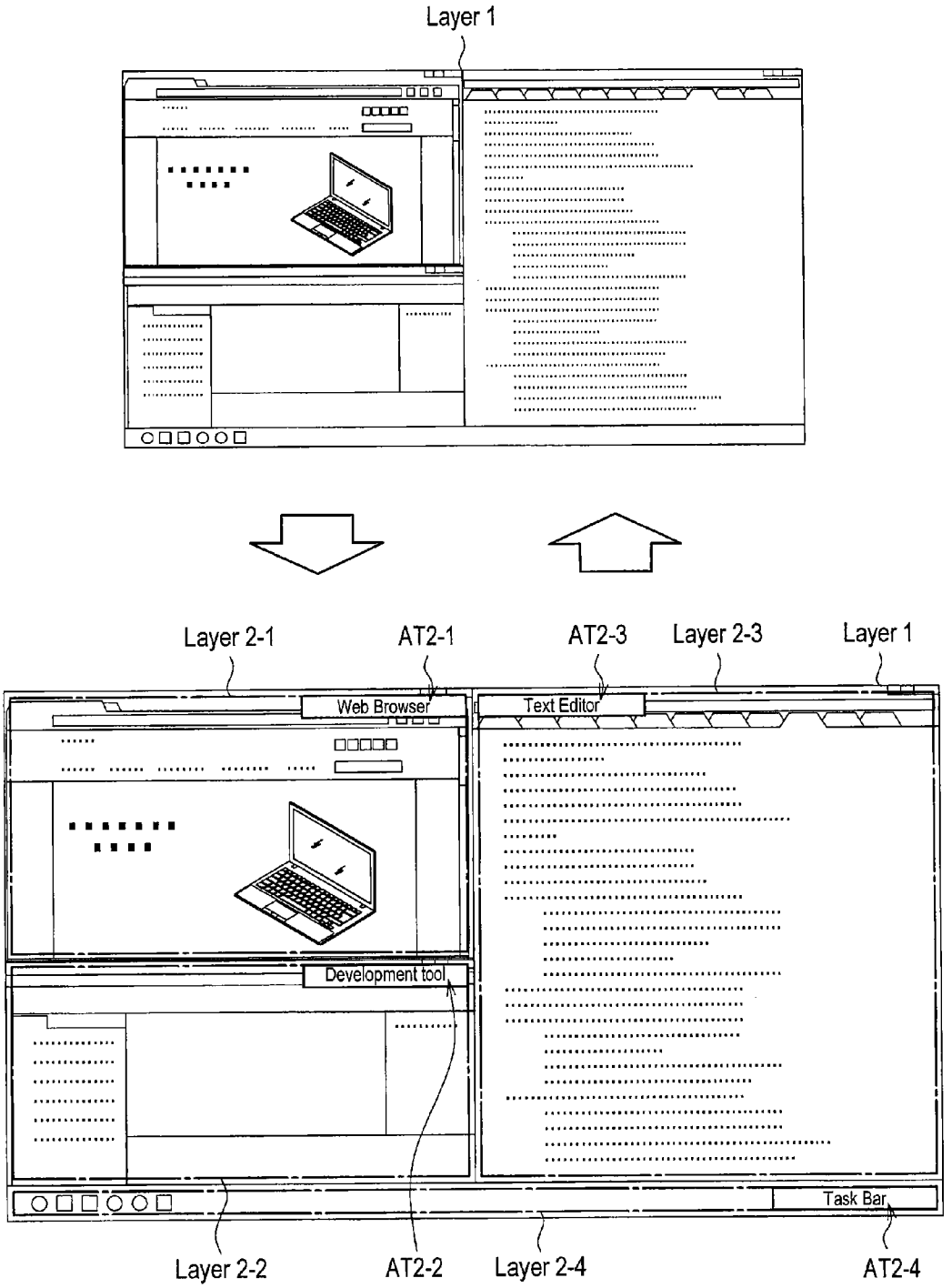


FIG. 5


Layer 1
Layer 2-1
AT2-1
AT2-3
Layer 2-3
Layer 1
Web Browser
Text Editor
Development tool
Task Bar
Layer 2-2
AT2-2
Layer 2-4
AT2-4

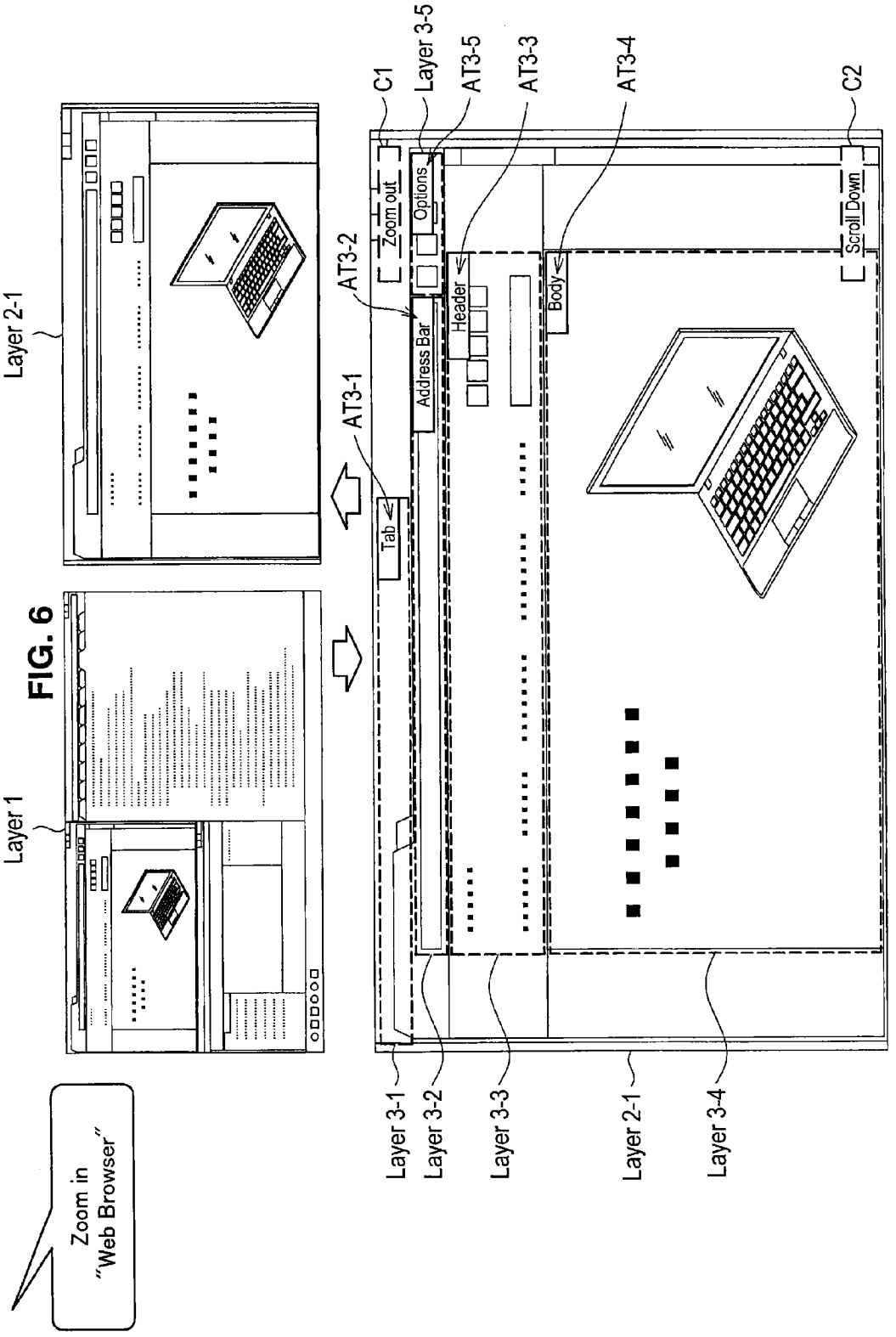

Zoom in
"Web Browser"
Layer 1
Layer 2-1
Layer 3-1
Layer 3-2
Layer 3-3
Layer 2-1
Layer 3-4
Layer 3-5
C1
C2
AT3-1
AT3-2
AT3-3
AT3-4
AT3-5
Tab
Address Bar
Zoom out
Options
Header
Body
Scroll Down

FIG. 6

FIG. 7

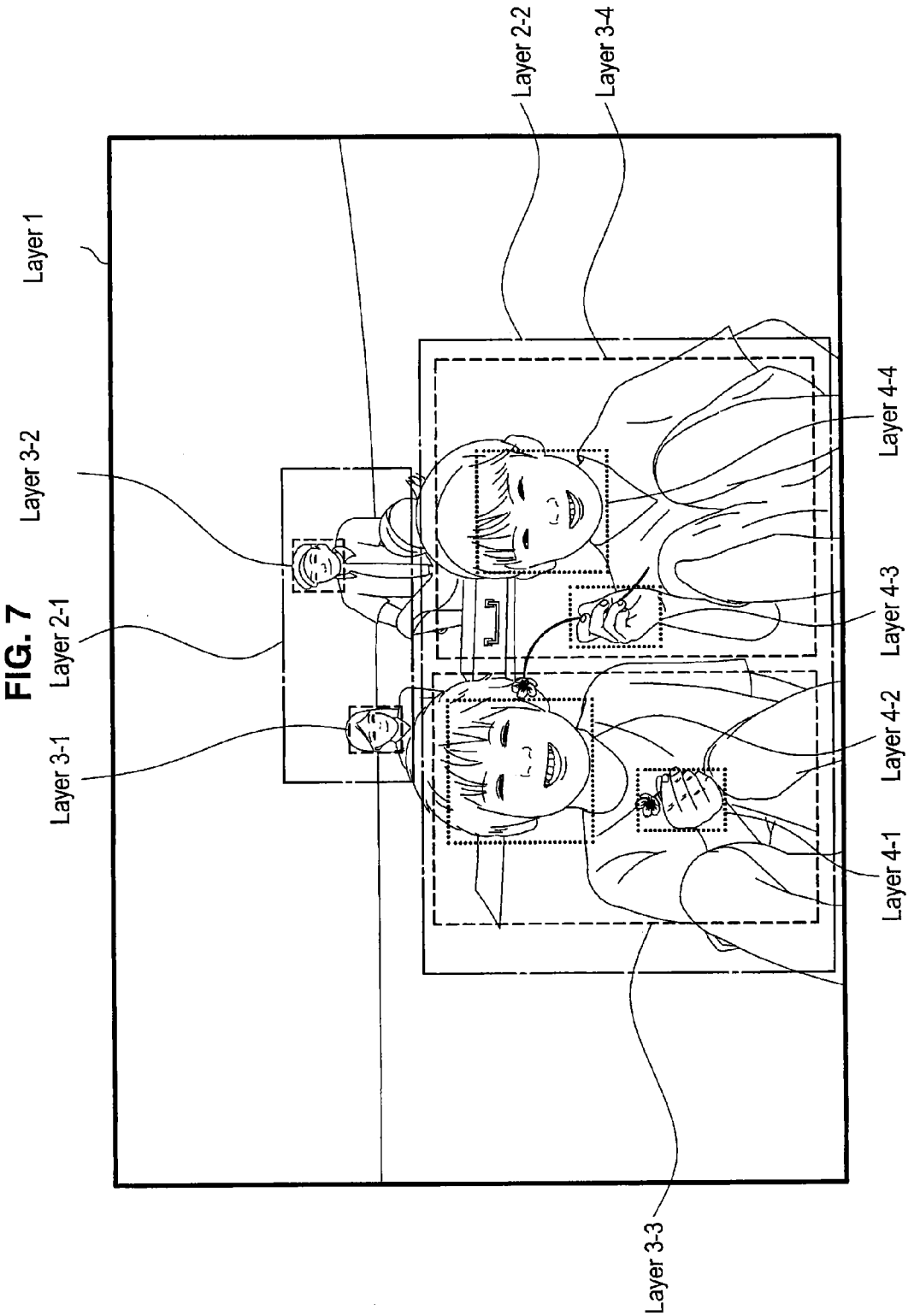

Layer 1
Layer 2-2
Layer 3-4
Layer 3-2
Layer 4-4
Layer 2-1
Layer 4-3
Layer 3-1
Layer 4-2
Layer 4-1
Layer 3-3

FIG. 8

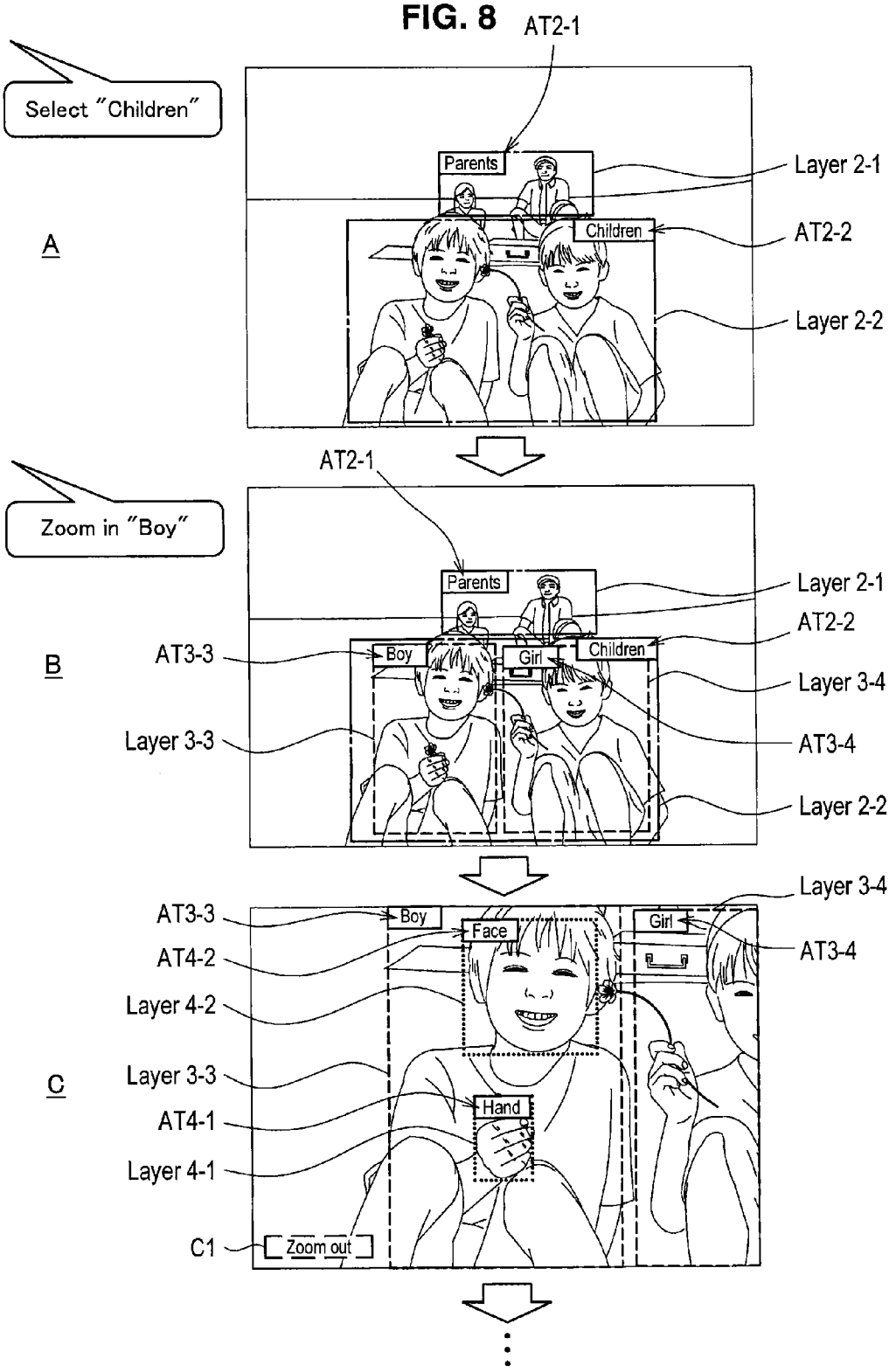

Select "Children"
A
AT2-1
Parents
Children
Layer 2-1
AT2-2
Layer 2-2
Zoom in "Boy"
B
AT2-1
Parents
Children
Boy
Girl
AT3-3
Layer 3-3
Layer 2-1
AT2-2
Layer 3-4
AT3-4
Layer 2-2
C
AT3-3
AT4-2
Layer 4-2
Layer 3-3
AT4-1
Layer 4-1
C1
Zoom out
Boy
Face
Hand
Girl
Layer 3-4
AT3-4

FIG. 9

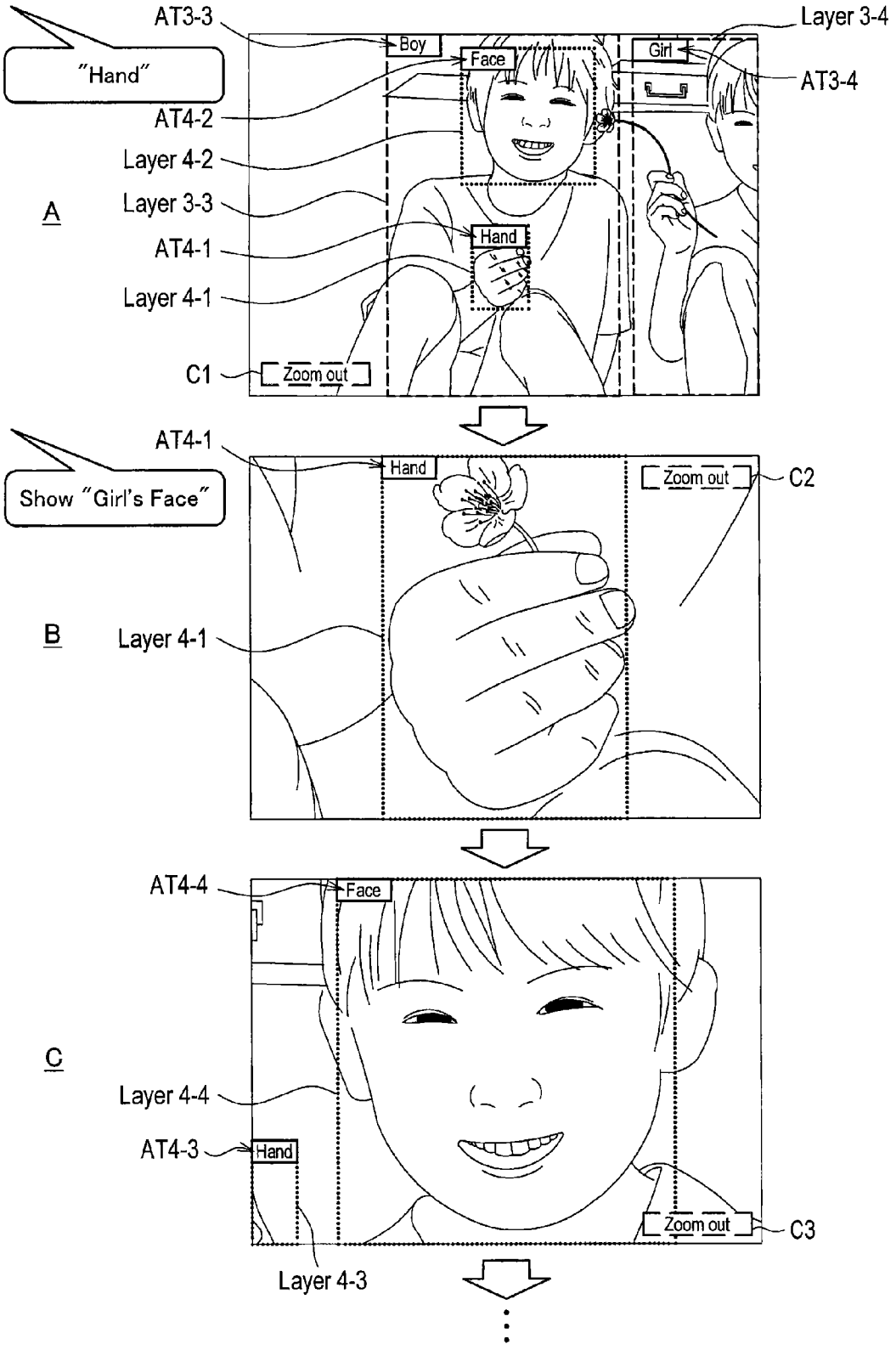

AT3-3
"Hand"
Boy
Face
Girl
Layer 3-4
AT3-4
AT4-2
Layer 4-2
A
Layer 3-3
Hand
AT4-1
Layer 4-1
C1
Zoom out
AT4-1
Show "Girl's Face"
Hand
Zoom out
C2
B
Layer 4-1
AT4-4
Face
C
Layer 4-4
AT4-3
Hand
Zoom out
C3
Layer 4-3

FIG. 10

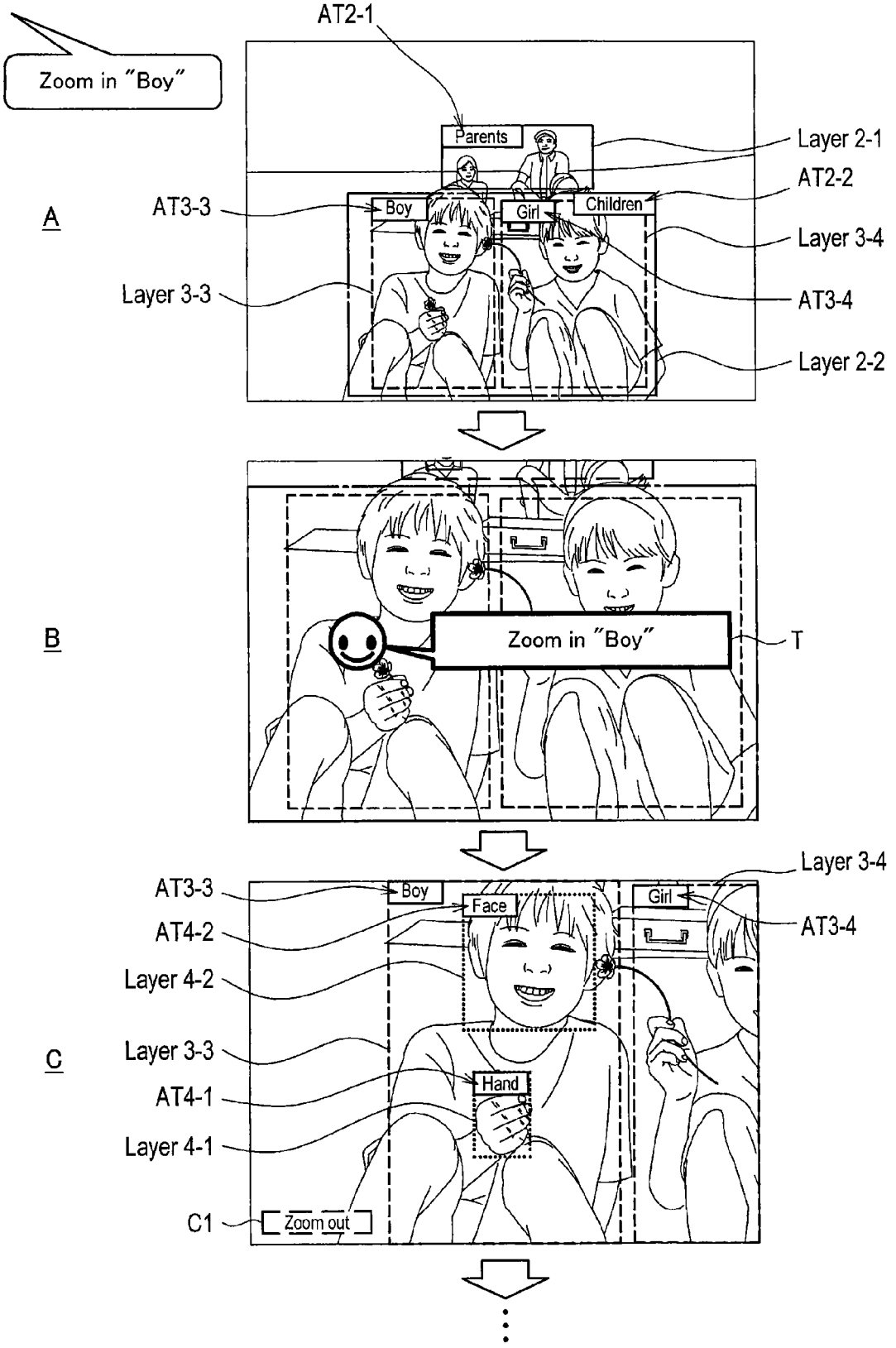

Zoom in "Boy"
AT2-1
Parents
Layer 2-1
AT2-2
A
AT3-3
Boy
Girl
Children
Layer 3-4
Layer 3-3
AT3-4
Layer 2-2
B
Zoom in "Boy"
T
Layer 3-4
AT3-3
Boy
Face
Girl
AT3-4
AT4-2
Layer 4-2
C
Layer 3-3
Hand
AT4-1
Layer 4-1
C1
Zoom out

FIG. 11

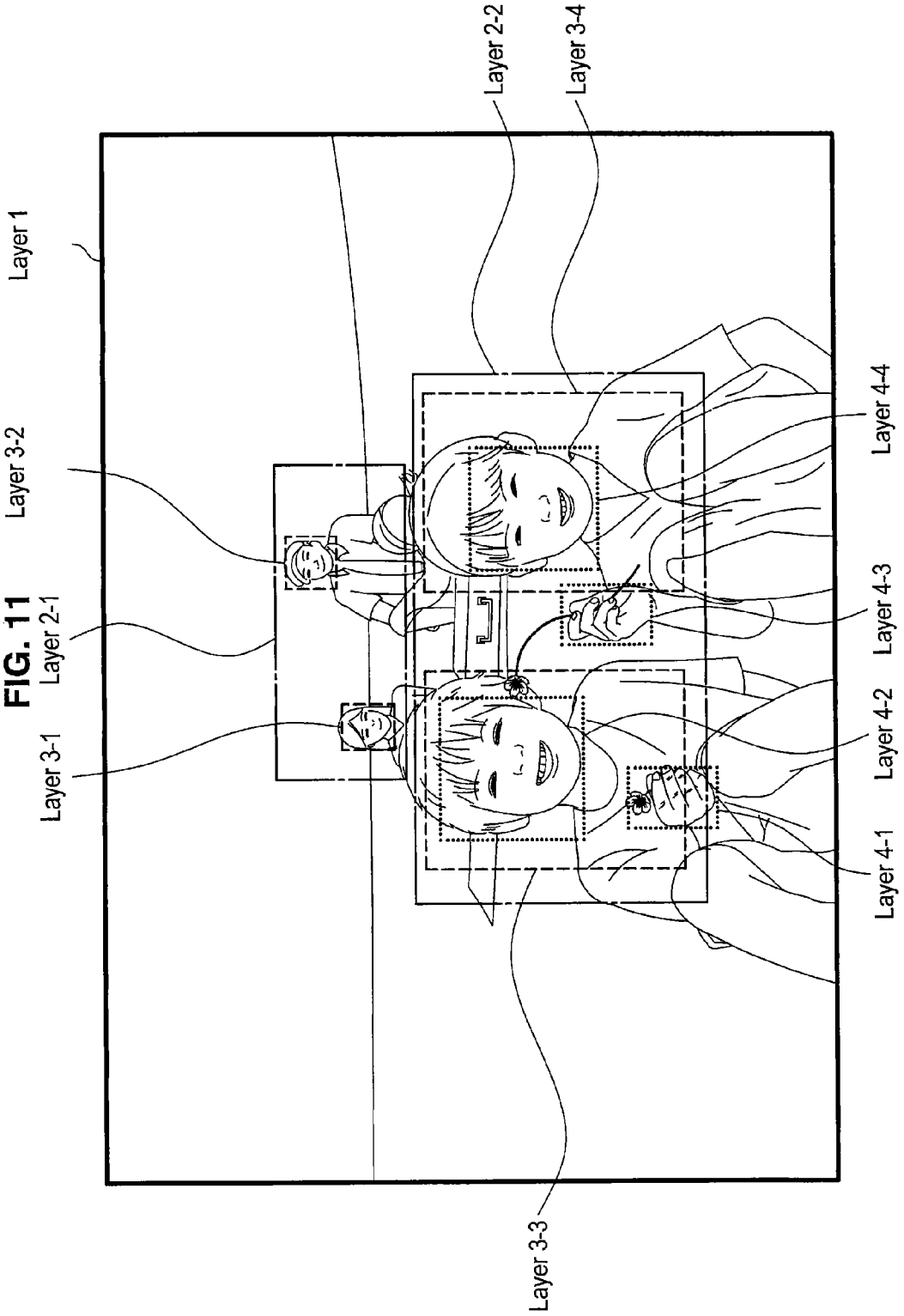

Layer 1
Layer 2-2
Layer 3-4
Layer 3-2
Layer 4-4
Layer 2-1
Layer 4-3
Layer 3-1
Layer 4-2
Layer 4-1
Layer 3-3

FIG. 12

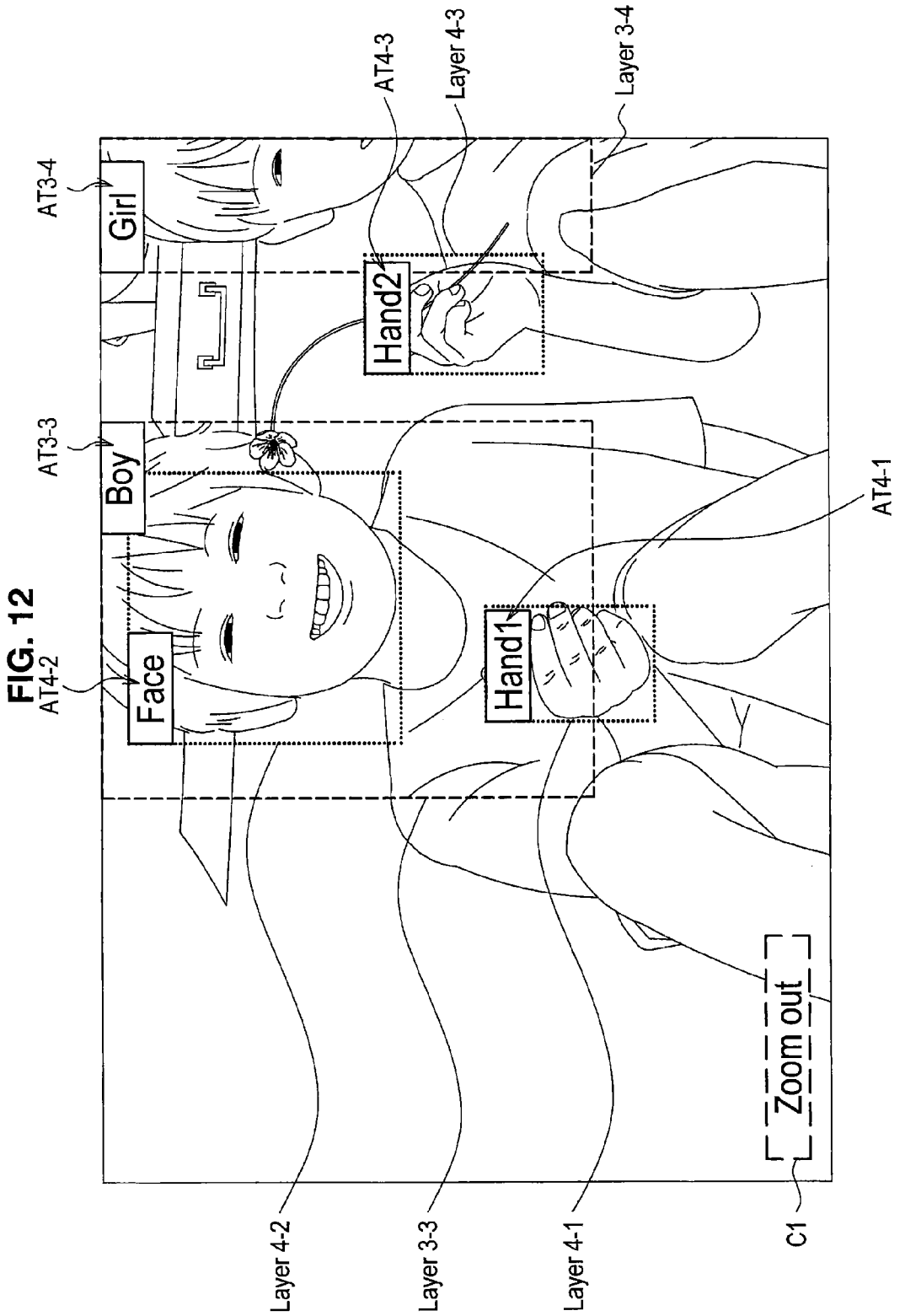
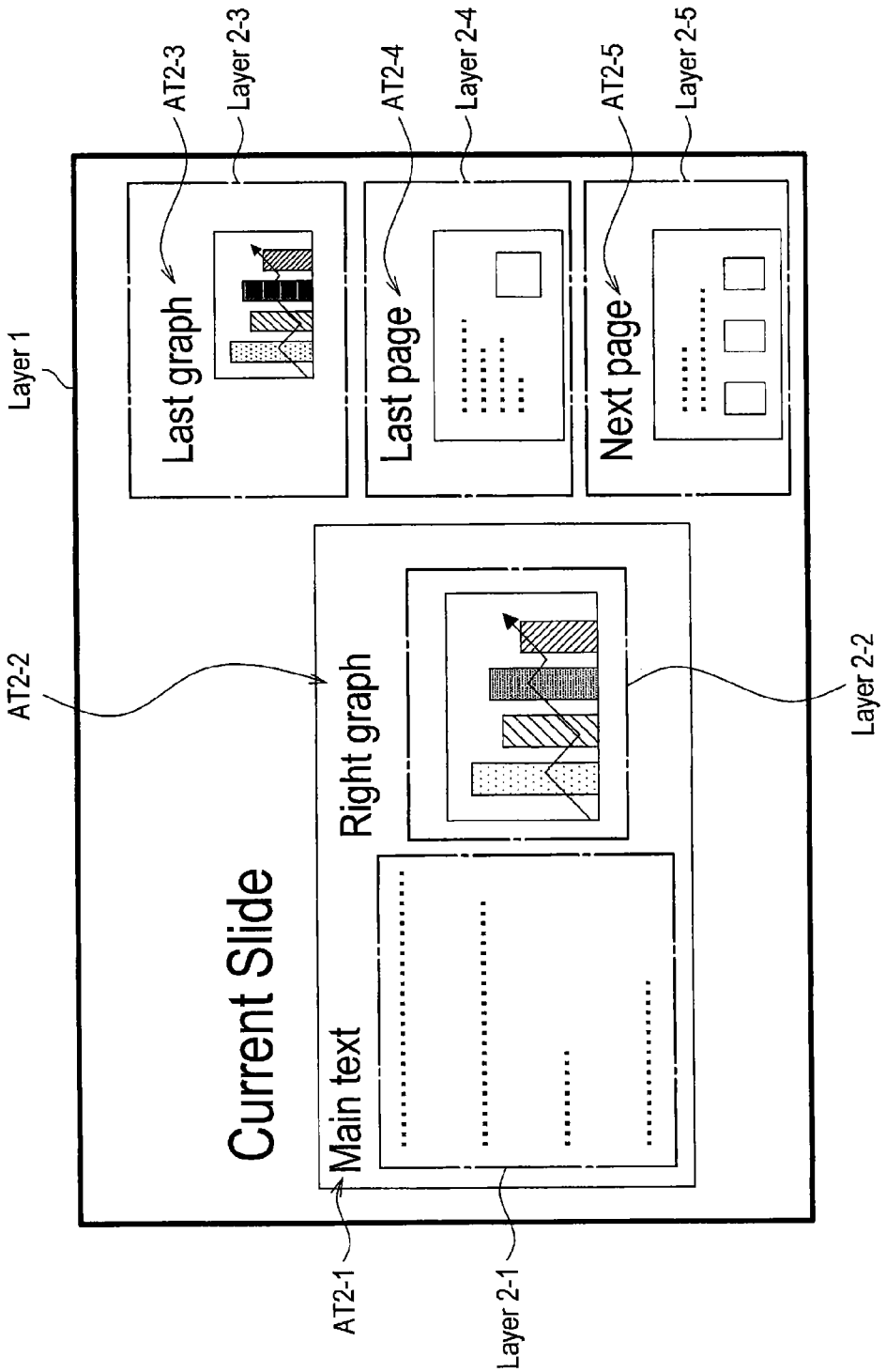

AT3-4
Girl
AT4-3
Layer 4-3
Layer 3-4
Hand2
AT3-3
Boy
AT4-1
AT4-2
Face
Hand1
Zoom out
Layer 4-2
Layer 3-3
Layer 4-1
C1

FIG. 13


Layer 1
AT2-3
Layer 2-3
AT2-4
Layer 2-4
AT2-5
Layer 2-5
Last graph
Last page
Next page
AT2-2
Right graph
Layer 2-2
Current Slide
Main text
AT2-1
Layer 2-1

INFORMATION PROCESSING DEVICE, INFORMATION PROCESSING METHOD, AND PROGRAM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Japanese Priority Patent Application JP 2013-144449 filed Jul. 10, 2013, the entire contents of which are incorporated herein by reference.

BACKGROUND

[0002] The present disclosure relates to an information processing device, an information processing method, and a program.

[0003] Of user interfaces of computers, natural user interfaces (NUIs) realizing manipulations in more natural and more intuitive operations for users have recently been popularized widely. Well-known natural user interfaces are NUIs in which voices spoken by users, gestures made by users, or the like are used as input manipulations. Such input manipulations are individually used in many cases. However, for example, JP 2012-103840A discloses a technology for combining and using an input manipulation by a voice and an input manipulation by a gesture.

SUMMARY

[0004] However, for example, when a plurality of UI components are intended to be selectively manipulated by an NUI, it is difficult for a user to understand which symbol (for example, an address term by a voice) is set in order to specify a manipulation target UI component in some cases. Although the technology disclosed in JP 2012-103840A described above contributes to an improvement in a user experience on an NUI, the technology may not necessarily be said to sufficiently deal with the above-mentioned point.

[0005] Accordingly, it is desirable to provide a novel and improved information processing device, a novel and improved information processing method, and a novel and improved program capable of notifying a user of a symbol for specifying a manipulation target on an NUI so that the user can easily understand the symbol.

[0006] According to an embodiment of the present disclosure, there is provided an information processing device including a processor configured to realize an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display, a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region, a voice input acquisition function of acquiring a voice input for the image, and a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

[0007] According to another embodiment of the present disclosure, there is provided an information processing method including, by a processor defining an address term for at least a partial region of an image to be displayed on a display, displaying the image on the display and temporarily displaying the address term on the display in association with the region, acquiring a voice input for the image, and issuing a command relevant to the region when the address term is included in the voice input.

[0008] According to still another embodiment of the present disclosure, there is provided a program causing a computer to realize an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display, a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region, a voice input acquisition function of acquiring a voice input for the image, and a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

[0009] As described above, according to an embodiment of the present disclosure, it is possible to notify a user of a symbol for specifying a manipulation target on an NUI so that the user can easily understand the symbol.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a block diagram illustrating an overall configuration of a display device according to an embodiment of the present disclosure;

[0011] FIG. **2** is a diagram illustrating an overall functional configuration realized in the display device according to an embodiment of the present disclosure;

[0012] FIG. **3** is a diagram for describing a layered structure of regions in an image defined in a first embodiment of the present disclosure;

[0013] FIG. **4** is a diagram for describing the layered structure of the regions in the image defined in the first embodiment of the present disclosure;

[0014] FIG. **5** is a diagram illustrating a display example of address terms in the first embodiment of the present disclosure;

[0015] FIG. **6** is a diagram illustrating a display example of the address terms in the first embodiment of the present disclosure;

[0016] FIG. **7** is a diagram for describing a layered structure of regions in an image defined in a second embodiment of the present disclosure;

[0017] FIGS. **8**A to **8**C are diagrams illustrating a display example of address terms in the second embodiment of the present disclosure;

[0018] FIGS. **9**A to **9**C are diagrams illustrating a display example of the address terms in the second embodiment of the present disclosure;

[0019] FIGS. **10**A to **10**C are diagrams illustrating a first modification example of the second embodiment of the present disclosure;

[0020] FIG. **11** is a diagram illustrating a second modification example of the second embodiment of the present disclosure;

[0021] FIG. **12** is a diagram illustrating the second modification example of the second embodiment of the present disclosure; and

[0022] FIG. **13** is a diagram illustrating a display example of an address term in a third embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0023] Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the appended drawings. Note that, in this specification and the appended drawings, structural elements that have substan-

tially the same function and structure are denoted with the same reference numerals, and repeated explanation of these structural elements is omitted.

[0024] The description will be made in the following order.

[0025] 1. System Configuration

[0026] 1-1. Hardware Configuration

[0027] 1-2. Functional Configuration

[0028] 1-3. Layered Structure of Regions

[0029] 1-4. Display Example of Address Term

[0030] 2. Second Embodiment

[0031] 2-1. Layered Structure of Regions

[0032] 2-2. Display Example of Address Term

[0033] 2-3. Modification Examples

[0034] 3. Third Embodiment

[0035] 4. Supplement

1. System Configuration

(1-1. Hardware Configuration)

[0036] FIG. **1** is a block diagram illustrating an overall configuration of a display device according to an embodiment of the present disclosure. Referring to FIG. **1**, a display device **100** includes a processor **102**, a memory **104**, a storage **106**, a communication module **108**, a display **110**, a speaker **112**, a microphone **114**, an input device **116**, a camera module **118**, and a connection port **120**.

[0037] The display device **100** may be any of the various devices that display an image on a display **110** according to a user's desire. For example, the display device **100** may be a television, a personal computer (PC), a tablet terminal, a smartphone, a portable media player, or a portable game device including the display **110**. For example, the display device **100** may be a PC, a set-top box, a recorder, or a game device connected to the separately configured displayed **110** and controlling the display **110**. Hereinafter, the constituent elements of the display device **100** will be further described.

[0038] The processor **102** is realized by, for example, a central processing unit (CPU), a digital signal processor (DSP), or an application specific integrated circuit (ASIC) and operates according to programs stored in the memory **104** to realize various functions. The processor **102** acquires various inputs by controlling each unit of the display device **100** and provides various outputs. The detailed functions realized by the processor **102** will be described below.

[0039] The memory **104** is realized by, for example, by a semiconductor memory used as a random access memory (RAM) or a read-only memory (ROM). The memory **104** stores, for example, programs causing the processor **102** to operate. For example, the programs may be read from the storage **106** and may be temporarily loaded on the memory **104** or the programs may be permanently stored in the memory **104**. Alternatively, the programs may be received by the communication module **108** and may be loaded temporarily on the memory **104**. Also, the memory **104** temporarily or permanently stores various kinds of data generated through processes of the processor **102**.

[0040] The storage **106** is realized by, for example, a storage device such as a magnetic disk such as a hard disk drive (HDD), an optical disc, or a magneto-optical disc or a flash memory. The storage **106** permanently stores, for example, programs causing the processor **102** to operate or various kinds of data generated through processes of the processor **102**. The storage **106** may be configured to include a removable medium or may be included in the display device **100**.

[0041] The communication module **108** is realized by any of the various communication circuits performing wired or wireless network communication under the control of the processor **102**. When wireless communication is performed, the communication module **108** may include an antenna. For example, the communication module **108** performs network communication in conformity with a communication standard of the Internet, a local area network (LAN), Bluetooth (registered trademark), or the like.

[0042] The display device **100** includes the display **110** and the speaker **112** as output units. The display **110** is realized by, for example, a liquid crystal display (LCD) or an organic electro-luminescence (EL) display. As described above, the display **110** may be integrated with the display device **100** or may be a separate display. The display **110** displays various kinds of information as images under the control of the processor **102**. An example of an image displayed on the display **110** will be described below. The speaker **112** outputs various kinds of information as voices under the control of the processor **102**.

[0043] For example, the microphone **114** acquires diverse kinds of voices, such as voices spoken by a user, produced in the vicinity of the display device **100**, and supplies the voices as voice data to the processor **102**. Here, in the embodiment, the microphone **114** is used as a voice input unit on the NUI. That is, the voice data provided by the microphone **114** is analyzed by the processor **102** and various commands are executed based on the voices or the like spoken by the user and extracted from the voice data.

[0044] The input device **116** is another input unit used in the display device **100**. The input device **116** may include, for example, a keyboard, a button, or a mouse. The input device **116** may include a touch sensor arranged at a position corresponding to the display **110** so that a touch panel is configured by the display **110** and the touch sensor. When the display device **100** can be sufficiently manipulated by a voice input using the microphone **114**, the separate input device **116** may not be installed.

[0045] The camera module **118** is realized by, for example, an image sensor such as a charge coupled device (CCD) or a complementary metal oxide semiconductor (CMOS), an optical system such as a lens controlling formation of a subject image in the image sensor, and a driving circuit driving the image sensor and the optical system. The camera module **118** supplies a still image or a moving image generated by capturing the subject image by the image sensor as image data to the processor **102**. The still image or the moving image generated by the camera module **118** may be displayed as, for example, a through image or a recorded image on the display **110**.

[0046] The connection port **120** is a port directly connecting an external device to the display device **100** and is realized by, for example, a Universal Serial Bus (USB) port, an IEEE 1394 port, or a High-Definition Multimedia Interface (HDMI) (registered trademark) port. In the illustrated example, the storage **106**, the display **110**, the speaker **112**, the microphone **114**, and the input device **116** are connected to the processor **102** internally (for example, by a bus or the like), but such constituent elements may be separate from the display device **100**. In this case, for example, a display device (an external display or the like), an input device (a keyboard, a mouse, or the like), or a storage device (an external HDD or the like) can be connected to the connection port **120**. Devices

connected to the connection port **120** are not limited to these examples, but various devices other than the above-described devices may be connected.

(1-2. Functional Configuration)

[0047] FIG. **2** is a diagram illustrating an overall functional configuration realized in the display device according to an embodiment of the present disclosure. Referring to FIG. **2**, in the display device **100**, an image generation function **151**, an address term definition function **153**, a display control function **155**, a voice input acquisition function **157**, and a command issuing function **159** can be realized.

[0048] Such functions are realized, for example, when the processor **102** of the display device **100** operates according to programs stored in the memory **104**. Any of the foregoing functions refers to a command DB **161**. The command DB **161** may be stored in the storage **106** of the display device **100** and a part or the entirety of the command DB **161** may be read to the memory **104**, as necessary.

(Image Generation Function)

[0049] The image generation function **151** generates an image to be displayed on the display **110** of the display device **100**. For example, the image may include a content image such as a photo or a video or an image of a document (including, for example, web pages described by the hypertext markup language (http)) described in various formats. The image may include a graphical user interface (GUI) image used to manipulate the display device **100**. For example, data for displaying such an image may be read from the storage **106** or may be acquired from a server or the like on a network via the communication module **108**. The image generated by the image generation function **151** is displayed on the display **110** by the display control function **155**.

[0050] For example, the image generation function **151** can generate an image including a plurality of sub-images. The sub-images may be, for example, content images, document images, or GUI images and may include images displayed on the display **110** by arranging such images in predetermined regions. In this case, the image generation function **151** can expand and display any of the sub-images on the entire region (full screen) of the display **110**, for example, in response to a command issued by the command issuing function **159**.

[0051] For example, the image generation function **151** can generate an image in which a subject image is defined. The image may be, for example, a content image such as a photo or a video and the subject region in the image is recognized through an image recognition process or a setting manipulation of the user. In this case, the image generation function **151** can expand and display an image using any of the subject regions as a criterion, for example, in response to a command issued by the command issuing function **159**. For example, such an image may be displayed in the entire region (full screen) of the display **110** or may be one of the foregoing sub-images.

(Address Term Definition Function)

[0052] The address term definition function **153** defines an address term regarding at least a partial region of an image generated by the image generation function **151** and displayed on the display **110** by the display control function **155**. As described above, in the embodiment, an image displayed on the display **110** can include a region defined as, for example, a sub-image or a subject region in the image. The address term definition function **153** defines an address term for each of the regions so that display of an image on the display **110** can be easily manipulated by a voice input, as will be described below. The address term definition function **153** supplies the defined address term to the display control function **155** to display the address term on the display **110** and stores information regarding the address term in the command DB **161**.

[0053] For example, the address term definition function **153** defines an address term for each of the display regions of the plurality of sub-images included in the image displayed on the display **110**. In this case, for example, the address term definition function **153** may define an address term based on set information of an application function providing each sub-image (for example, address terms such as "web browser" or "media player" can be defined). For example, the address term definition function **153** may define an address term based on a title, text, or the like included in each sub-image (for example, address terms such as "news," "memo," and "movie" can be defined). Here, for example, when an overlapping address term is defined in such an example, the address term definition function **153** may uniquely define the address term by using, for example, a sequence number (for example, address terms such as "web browser 1" and "web browser 2" can be defined). Further, for example, the address term definition function **153** may define an address term based on the location of each sub-image in an image (for example, address terms such as "top left" and "bottom right" can be defined).

[0054] Here, for example, when a content image, a document image, or the like (hereinafter also referred to as an application image) which is the foregoing sub-image is expanded and displayed on the entire region of the display **110** in response to a command issued by the command issuing function **159**, for example, the address term definition function **153** may define an address term for the region of a GUI component (for example, which can be a button, a tab, an icon, or the like) included in an application image. In this case, for example, the address term definition function **153** may define an address term based on information regarding the GUI component defined in a program providing an application image (for example, an address term such as "header," "tab," or "address bar" can be defined).

[0055] For example, the address term definition function **153** defines an address term for each of a plurality of subject regions included in an image displayed on the display **110**. In this case, for example, the address term definition function **153** may define an address term based on a result of newly performed image analysis or information added as metadata to an image. Here, for example, when a subject can be identified by the result of the image analysis or the name of a subject is recorded as metadata, the address term definition function **153** may define an address term of a subject region based on the name of the subject (for example, an address term such as "parents," "children," "hands," or "faces" can be defined. Otherwise, for example, the address term definition function **153** may define an address term based on the position of each subject region in an image (for example, an address term such as "top left" or "bottom right" can be defined).

[0056] For example, the address term definition function **153** defines an address term for a manipulation on an image displayed on the display **110**. The "manipulation on an image" mentioned here can be distinguished from manipula-

tions of other examples in the manipulation is a manipulation performed without designation of a specific region in an image. The address term defined here can be an address term for the entire region of the image displayed on the display **110**. In this case, for example, the address term definition function **153** may define an address term based on the name of a manipulation command stored in advance in the command DB **161** (for example, an address term such as "zoom out" or "scroll down" can be defined).

(Display Control Function)

[0057] The display control function **155** displays an image generated by the image generation function **151** on the display **110** and temporarily displays address terms defined by the address term definition function **153** on the display **110** in association with regions corresponding to the address terms in the image. For example, the display control function **155** displays the address term as text at locations somewhere in the corresponding regions. The display control function **155** may display frame borders or the like indicating the regions corresponding to the address terms and may display the address terms and the frame borders or the like in association therewith.

[0058] As described above, the address terms (and the frame borders or the like) by the display control function **155** are temporarily displayed. For example, the display control function **155** may start the display of an image newly generated by the image generation function **151** on the display **110** and then display the address terms (and the frame borders or the like) on the display **110** only for a predetermined time. After the predetermined time passes, only the image generated by the image generation function **151** can be displayed on the display **110**.

[0059] Thus, when the address terms defined by the address term definition function **153** are temporarily displayed on the display **110** in association with the regions corresponding to these address terms, the user can easily recognize by which address term the user may specify a manipulation target when manipulating the display device **100** using a voice input, as will be described below. Also, the address terms (and the frame borders or the like) are temporarily displayed. For example, by hiding the address terms after a predetermined time passes, it is possible to ensure visibility of an image displayed on the display **110**.

[0060] For example, the display control function **155** can resume the display of the address terms (and the frame borders or the like) according to a command issued by the command issuing function **159**. In this case, the display control function **155** may continue to display the address terms (and the frame borders or the like), for example, until a separate command is issued from the command issuing function **159**.

(Command DB)

[0061] The command DB **161** stores the information regarding the address terms defined by the address term definition function **153**, as described above. The information regarding the address term can include, for example, the address term itself and information for specifying a region specified by the address term in an image. For example, when an address term is set to correspond to a display region of a sub-image, identification information (for example, which can be a process ID, a window ID, or the like) of an application function providing the sub-image can be stored along with the address term. For example, when an address term is set to correspond to the region of a GUI component included in an application image, identification information (for example, which can be an ID given to a button, a tab, or the like) of the GUI component can be stored along with the address term. For example, when an address term is set to correspond to a subject region, identification information (for example, which can be coordinate information in an image) of the subject region can be stored along with the address term.

[0062] The command DB **161** stores the names of manipulation commands defined in advance. For example, as described above, the names of the manipulation commands are referred to when the address term definition function **153** sets the address term for a manipulation on an image displayed on the display **110** and are also referred to when the command issuing function **159** to be described below analyzes a voice input from the user. The manipulation commands include manipulation commands performed without designating specific regions in an image, as described above, and also include manipulation commands performed by designating specific regions in an image (for example, which can be manipulation commands such as "zoom in" and "select"). The command issuing function **159** specifies a kind of command instructed by a voice input by referring to the name of the manipulation command stored in the command DB **161** and also specifies a region of a target by referring to information regarding the names stored in the command DB **161**.

(Voice Input Acquisition Function)

[0063] The voice input acquisition function **157** acquires a voice input for an image displayed on the display **110**. More specifically, when an image is displayed on the display **110** by the display control function **155**, the voice input acquisition function **157** acquires the voice input of the user acquired via the microphone **114**. As described above, since the microphone **114** acquires diverse kinds of voices produced near the display device **100**, the voice input acquisition function **157** may perform a process of extracting a predetermined voice such as a speech of the user from acquired voice data. Alternatively, apart from the voice input acquisition function **157**, a preprocessing unit (not illustrated) performing the foregoing process may be provided.

(Command Issuing Function)

[0064] When the voice input acquired by the voice input acquisition function **157** includes an address term defined by the address term definition function **153**, the command issuing function **159** issues a command relevant to the region corresponding to the address term. More specifically, based on text extracted through voice recognition from the acquired voice input, the command issuing function **159** retrieves the address term and the name of the manipulation command included in the text with reference to the command DB **161**. When the corresponding address term and the name of the manipulation command are found, the command issuing function **159** issues the manipulation command corresponding to the name included in the text with respect to the region corresponding to the address term included in the text. The command can be issued to, for example, the image generation function **151** or the display control function **155**.

[0065] For example, when an image displayed on the display **110** includes a plurality of sub-images, the command

issuing function **159** issues a command for expanding and displaying any of the sub-images on the entire region (full screen) of the display **110** to the image generation function **151**. At this time, which sub-image is expanded and displayed can be determined based on the address term included in the voice input with reference to the command DB **161**.

[0066] For example, when an image displayed on the display **110** includes a plurality of subject regions, the command issuing function **159** issues a command for expanding and displaying the image using any of the subject regions as a criterion to the image generation function **151**. At this time, which subject region is used as the criterion to expand and display the image can be determined based on the address term included in the voice input with reference to the command DB **161**.

1-3. Layered Structure of Regions

[0067] FIGS. **3** and **4** are diagrams for describing a layered structure of regions in an image defined in a first embodiment of the present disclosure. In the embodiment, regions in an image for which address terms are defined by the address term definition function **153** can be set according to a layered structure to be described below.

[0068] In an example illustrated in FIG. **3**, four layers, Layer **1** to Layer **4**, have superordinate and subordinate relations. That is, a region of Layer **1** is a superordinate-layer region of a region of Layer **2**, a region of Layer **2** is a superordinate-layer region of a region of Layer **3**, and a region of Layer **3** is a superordinate-layer region of a region of Layer **4**. In the embodiment, a subordinate layer region is included in a superordinate layer region. In the illustrated example, all of the subordinate layer regions are included in a superordinate layer region. In another example, however, at least some of the subordinate layer regions may be included in a superordinate layer region.

[0069] In the embodiment, such a layered structure is used to select a region in an image for which an address term is displayed. In the case of the example illustrated in FIG. **3**, for example, when address terms are displayed for all of the regions from Layer **1** to Layer **4** on the display **110** along with an image, there is a probability of visibility of the image being damaged even in temporary display. Accordingly, when a superordinate layer region is displayed on the display **110**, the display control function **155** can display address terms of subordinate layer regions included in the displayed superordinate layer region on the display **110**.

[0070] That is, for example, when a region (superordinate layer region) of Layer **1** is displayed on the display **110**, the display control function **155** displays the address terms of regions (subordinate layer regions) of Layer **2** included in the region of Layer **1** on the display **110**. For example, when any region (superordinate layer region) of the two regions of Layer **2** is displayed on the display **110** in the illustrated example, the display control function **155** displays the address terms of regions (subordinate layer regions) of Layer **3** included in the displayed region of Layer **2** on the display **110**.

[0071] For example, the layered structure described above may be defined as a parent-child relation or a link relation as in the example illustrated in FIG. **4**. The illustrated example shows a case in which two regions (layer **2-1** and Layer **2-2**) of Layer **2** are included in a region (only one region is set and corresponds to the entire image, for example) of Layer **1**, three regions (Layer **3-1**, Layer **3-2**, and Layer **3-3**) of Layer **3** are included in Layer **2-1**, and so on. Such a relation is specified when the address term definition function **153** defines an address term for each region. Thereafter, the address term can be used by the display control function **155** or the command issuing function **159**. A specific use example of the layered structure of the regions will be described below.

(1-4. Display Example of Address Term)

[0072] FIGS. **5** and **6** are diagrams illustrating display examples of address terms according to the first embodiment of the present disclosure. In the embodiment, for example, as illustrated in the example of FIG. **5**, an address term is defined for each of the display regions of a plurality of sub-images included in an image displayed on the display **110**. In the illustrated example, a region of Layer **1** is set to correspond to the entire image displayed on the display **110**, and regions of Layer **2** are defined for display regions of sub-images included in the image. The address term definition function **153** can define an address term to correspond to each of the display regions of a web browser (Layer **2-1**), a development tool (Layer **2-2**), a text editor (Layer **2-3**), and a task bar (Layer **2-4**). In this example, the display device **100** can be, for example, a PC.

[0073] At this time, the display control function **155** displays the image (the region of Layer **1**) on the display **110** and temporarily displays an address term defined for a region corresponding to each sub-image and a frame border indicating a region corresponding the address term on the display **110**. In the drawing, the address term AT**2-1** corresponding to the region of Layer **2-1** (web browser), the address term AT**2-2** corresponding to the region of Layer **2-2** (development tool), the address term AT**2-3** corresponding to the region of Layer **2-3** (text editor), and the address term AT**2-4** corresponding to the region of Layer **2-4** (task bar) are temporarily displayed on the display **110** by the display control function **155**.

[0074] Thereafter, when display of the image (the region of Layer **1**) starts and a predetermined time passes, the display control function **155** ends the display of the frame borders of the address terms AT**2-1** to AT**2-4** and the display returns to display of only the image (the region of Layer **1**). The user can perform a manipulation on the regions corresponding to the address terms AT**2-1** to AT**2-4** during or after the display of the address terms AT**2-1** to AT**2-4** by giving a voice input including the address terms AT**2-1** to AT**2-4** to the display device **100**. For example, when the user says "Zoom in 'web browser,'" a zoom-in manipulation can be performed on a display region of a web browser corresponding to the region of Layer **2-1**, as will be described below, by the command issuing function **159** to which this voice input is supplied by the voice input acquisition function **157**. For example, when the user says "Hide Task Bar," display of a task bar corresponding to the region of Layer **2-4** can be hidden.

[0075] In the example illustrated in FIG. **6**, a change of the display is shown when the user says "Zoom in 'web browser'" in the first example illustrated in FIG. **5**. In this case, the command issuing function **159** finds the address term of a manipulation command "Zoom in" and the address term "web browser" (corresponding to the address term AT**2-1** displayed in the example of FIG. **5**) based on text extracted through voice recognition from the voice input of the foregoing speech with reference to the command DB **161**. Thus, the command issuing function **159** issues a command to give a request for expanding and displaying the sub-image (corre-

sponding to the region of Layer **2-1**) of the web browser in the entire region of the image displayed on the display **110** to the image generation function **151**. In response to this command, the image generation function **151** changes the image displayed on the display **110** from the image for displaying the region of Layer **1** to an image for expanding and displaying the entire region of Layer **2-1**.

[0076] At this time, the display control function **155** displays a new image (the region of Layer **2-1**) on the display **110** and temporarily displays the address term defined for the region of the GUI component included in the image and the frame border indicating the region corresponding to this address term on the display **110**. In the drawing, an address term AT**3-1** corresponding to the region of Layer **3-1** (tab), an address term AT**3-2** corresponding to the region of Layer **3-2** (address bar), an address term AT**3-3** corresponding to the region of Layer **3-3** (header), an address term AT**3-4** corresponding to the region of Layer **3-4** (body), and an address term AT**3-5** corresponding to the region of Layer **3-5** (options) are temporarily displayed on the display **110** by the display control function **155**.

[0077] In the illustrated example, for example, the address terms AT**3-1** to AT**3-5** temporarily displayed when the new image (the region of Layer **2-1**) is displayed on the display **110** may be newly defined by the address term definition function **153**. Alternatively, for example, when the region of Layer **2-1** is displayed as the sub-image in the image of the region of Layer **1**, the address terms AT**3-1** to AT**3-5** may be defined by the address term definition function **153** and may be stored along with data of the layered structure illustrated in FIG. **4** in the command DB **161** or the like.

[0078] The display control function **155** temporarily displays address terms C**1** (corresponding to a manipulation of zoom out) and C**2** (corresponding to a manipulation of scroll down) in the manipulation on the image displayed on the display **110** along with the foregoing address terms AT**3-1** to AT**3-5** on the display **110**. Since the image of the web browser is displayed in the entirety of the new image (the region of Layer **2-1**) displayed on the display **110**, for example, a manipulation such as zoom out or scroll down can be performed without designating a specific region in the image. Thus, the address term definition function **153** extracts the names of manipulation commands executable for the image of the web browser among the address terms of the manipulation commands stored in advance in the command DB **161**, the address term definition function **153** defines address terms corresponding to the extracted names of the manipulation commands. As a result, the display control function **155** temporarily displays the address terms C**1** and C**2** on the display **110**. For example, positions at which the address terms C**1** and C**2** are displayed can be near ends or near corners of the display **110** so that view of displayed images is not obstructed.

[0079] Thereafter, when the display of the image (the region of Layer **2-1**) starts and a predetermined time passes, the display control function **155** ends the display of the address terms AT**3-1** to AT**3-5** and the frame borders, and the display of the address terms C**1** and C**2** and the display returns to display of only the image (the region of layer **2-1**). Even after the display of the address terms AT**3-1** to AT**3-5** and the address terms C**1** and C**2**, the user can perform a manipulation on the regions corresponding to the address terms AT**3-1** to AT**3-5** or the address terms C**1** and C**2** by giving a voice input including the address terms AT**3-1** to AT**3-5** or the address terms C**1** and C**2** to the display device **100**.

[0080] When the user gives a predetermined voice input (for example, "Show Commands") to the display device **100**, the command issuing function **159** issues a command to give a request for displaying the address terms AT**3-1** to AT**3-5** and the frame borders and displaying the address terms C**1** and C**2** again on the display **110** to the display control function **155**. In response to this command, the display control function **155** displays the foregoing address terms and the frame borders again on the display **110**. The address terms and the frame borders displayed at this time may disappear at a predetermined time after start of the display of the address terms and the frame borders, as in the initial display of the address terms and the frame borders, or may be set not to disappear automatically in consideration of intentional calling of the user. In this case, when the user gives another predetermined voice input (for example, "Hide Commands") to the display device **100**, the display control function **155** can end the display of the address terms and the frame borders.

2. Second Embodiment

[0081] Next, a second embodiment of the present disclosure will be described.

[0082] Since a configuration in the second embodiment is almost the same as that in the foregoing first embodiment except for configuration examples of regions and display examples of address terms to be described below, detailed description other than that of the configuration examples and the display examples will be omitted.

(2-1. Layered Structure of Regions)

[0083] FIG. **7** is a diagram for describing a layered structure of regions in an image defined in the second embodiment of the present disclosure. In the embodiment, the entire image of a photo displayed on the display **110** is a region of Layer **1**. Two regions (Layer **2-1** and Layer **2-2**) of Layer **2** included in the region of Layer **1** are defined. The two regions (Layer **2-1** and Layer **2-2**) of Layer **2** include two regions (Layer **3-1** and Layer **3-2**) and two regions (Layer **3-3** and Layer **3-4**) of Layer **3**, respectively. Of the four regions (Layer **3-1** to Layer **3-4**) of Layer **3**, the two regions (Layer **3-3** and Layer **3-4**) further include two regions (Layer **4-1** and Layer **4-2**) and two regions (Layer **4-3** and Layer **4-4**) of Layer **4**, respectively.

[0084] The region of each layer equivalent to or subordinate to Layer **2** can include, for example, a subject region specified based on a result of image analysis. In this case, all of the regions may not necessarily be defined based on the result of the image analysis. For example, a region of a superordinate layer (for example, a region of Layer **2**) may be a region set later as a region for grouping regions (for example, the regions of Layer **3** and Layer **4**) of subordinate layers corresponding to a subject region specified based on the result of the image analysis. Alternatively, the subject region may be specified based on a set manipulation of the user in addition to or instead of the image analysis. For example, the subject region may include a region determined when the user approves or corrects candidate regions suggested based on the result of the image analysis. For example, such a region may be defined in advance by metadata incidental on image data of a photo or may be newly defined based on a result obtained by performing image analysis at the time of display of an image.

(2-2. Display Example of Address Term)

[0085] FIGS. **8**A and **9**C are diagrams illustrating display examples of address terms according to the second embodiment of the present disclosure. In the embodiment, for example, as illustrated in the example of FIG. **7**, an address term is defined for each of a plurality of subject regions included in an image displayed on the display **110**. In the illustrated example, the region of Layer **1** is set to correspond to the entire image of a photo displayed on the display **110** (or the image of the photo may not necessarily be displayed on the entire display **110**, that is, the image of the photo may be displayed as one of the sub-images in the foregoing first embodiment) and regions equivalent to or subordinate to Layer **2** are defined for the subject regions included in the image.

[0086] First, as illustrated in FIG. **8**A, when an image (the region of Layer **1**) is displayed on the display **110**, the display control function **155** temporarily displays an address term defined for the region corresponding to each of the regions of Layer **2** and a frame border indicating the region corresponding to the address term on the display **110**. In the drawing, an address term AT**2-1** corresponding to the region of Layer **2-1** and an address term AT**2-2** corresponding to the region of Layer **2-2** are temporarily displayed on the display **110** by the display control function **155**.

[0087] Here, the address term definition function **153** defines address terms displayed as the address terms AT**2-1** and AT**2-2**, for example, based on the names of subjects specified by image analysis or an input from the user. For example, when metadata incidental to the image data of the photo records the fact that subjects included in the region of Layer **2-1** are parents and subjects included in the region of Layer **2-2** are children, the address term generation function can define address terms for the region of Layer **2-1** and the region of Layer **2-2** as "parents" and "children," respectively.

[0088] Thereafter, when the display of the image (the region of Layer **1**) starts and a predetermined time passes, the display control function **155** ends the display of the address terms AT**2-1** to AT**2-2** and the frame borders and the display returns to the display of a simple image (the region of Layer **1**). The user can perform a manipulation on the regions corresponding to the address terms AT**2-1** and AT**2-2** during or after the display of the address terms AT**2-1** and AT**2-2** by giving a voice input including the address terms AT**2-1** and AT**2-2** to the display device **100**. In the illustrated example, before the display of the address terms and the frame borders end, the user gives a voice input "Select 'Children'" to the display device **100**.

[0089] At this time, the command issuing function **159** finds the name of a manipulation command, "Select," and an address term (corresponding to the address term AT**2-2** displayed in the example of FIG. **8**A) of the region, "Children," based on text extracted through voice recognition from the voice input with reference to the command DB **161**. Thus, the command issuing function **159** issues a command to give a request for allowing that the region of Layer **2-2** to enter a selection state to the image generation function **151**. In response to this command, the image generation function **151** generates an image for displaying the region of Layer **2-2** in the selection state in the image displayed on the display **110** and the display control function **155** displays this image on the display **110**, as illustrated in FIG. **8**B. The region of Layer **2-2** can be expressed in the selection state, for example, by darkly displaying a region other than the region of Layer **2-2** or displaying the region of Layer **2-2** in connection with the frame border (the expressions are not necessarily shown in FIG. **8**B).

[0090] Here, as illustrated in FIG. **8**B, the display control function **155** displays a new image (an image in which the region of Layer **2-2** is in the selection state) on the display **110** and temporarily displays address terms defined for more subordinate layer regions included in the region of Layer **2-2** in the selection state, that is, the regions of Layer **3-3** and Layer **3-4**, and frame borders indicating the regions corresponding to the address terms along with the address term and the frame border defined for each of the regions of Layer **2** on the display **110**. In the drawing, address terms AT**3-3** and AT**3-4** are further temporarily displayed on the display **110** in addition to the address terms AT**2-1** and AT**2-2** by the display control function **155**.

[0091] Thereafter, when the display of the image (the image in which the region of Layer **2-2** is in the selection state) starts and a predetermined time passes, the display control function **155** ends the display of the foregoing address terms and frame borders and the display returns to the display of the simple image (the image in which the region of Layer **2-2** is in the selection state). The user can perform a manipulation on the regions corresponding to the address terms during and after the display of the address terms and the frame borders by giving a voice input including the address terms to the display device **100**. In the illustrated example, before the display of the address terms and the frame borders ends, the user gives a voice input "Zoom in 'Boy'" to the display device **100**.

[0092] At this time, the command issuing function **159** finds the name of a manipulation command, "Zoom in," and an address term of the region, "Boy," based on text extracted through voice recognition from the voice input with reference to the command DB **161**. Thus, the command issuing function **159** issues a command to give a request for expanding and displaying the image using the region of Layer **3-3** as a criterion to the image generation function **151**. In response to this command, the image generation function **151** generates an image expanded using the region of Layer **3-3** as the criterion and the display control function **155** displays this image on the display **110**, as illustrated in FIG. **8**C. In the foregoing state of FIG. **8**B, by temporarily displaying the address terms (AT**3-3** and AT**3-4**) of some of the regions of Layer **3** on the display **110** in addition to the address terms (AT**2-1** and AT**2-2**) of the regions of Layer **2**, the expansion and display of the image using the region of Layer **3-3** as the criterion can be realized right away (the regions of Layer **2** are skipped) from the state in which the image of the region of Layer **1** is displayed.

[0093] Here, as illustrated in FIG. **8**C, the display control function **155** displays a new image (the image expanded using the region of Layer **3-3** as the criterion) on the display **110** and temporarily displays address terms defined for more subordinate layer regions included in the region of Layer **3-3** used as the criterion of the expansion, that is, the regions of Layer **4-1** and Layer **4-2**, and frame borders indicating the regions corresponding to the address terms along with the address term and the frame border defined for the region of Layer **3-3** on the display **110**.

[0094] In the illustrated example, since the image is expanded and displayed using the region of Layer **3-3** as the criterion and the region of Layer **3-3** is not necessarily displayed on the entire display **110** (in many cases, an aspect

ratio of the subject region does not match an aspect ratio of the display **110**), it can be useful to display the address terms and the regions defined for the region of Layer **3-3** even after the image is expanded and displayed.

[0095] As illustrated in FIG. **8**C, when a region (the region of Layer **3-4**) other than the region of Layer **3** (the layer to which the image serving as the criterion of the expansion belongs) is included in a display range of the new image (the image expanded using the region of Layer **3-3** as the criterion), an address term and a region defined for the region of Layer **3-4** may also be temporarily displayed on the display **110** by the display control function **155**.

[0096] In the step shown in FIG. **8**C, the display control function **155** temporarily displays an address term C**1** (corresponding to a manipulation of zoom out) for a manipulation on the image displayed on the display **110** along with the foregoing address term on the display **110**. Since the original image is expanded and displayed in the new image (the image expanded using the region of Layer **3-3** as the criterion) displayed on the display **110**, for example, the manipulation of zoom out can be performed without designating a specific region in the image. Thus, the address term definition function **153** extracts the names of manipulation commands executable on the image among the names of the manipulation commands stored in advance in the command DB **161** and defines address terms corresponding to the extracted names of the manipulation commands. As a result, the display control function **155** temporarily displays the address term C**1** on the display **110**.

[0097] Thereafter, when the display of the image (the image expanded using the region of Layer **3-3** as the criterion) starts and a predetermined time passes, the display control function **155** ends the display of the foregoing address terms and frame borders and the display returns to the display of the simple image (the image expanded using the region of Layer **3-3** as the criterion). The user can perform a manipulation on the regions corresponding to the address terms during or after the display of the address terms by giving a voice input including the address terms to the display device **100**. In the illustrated example, as illustrated in FIG. **9**A, the user gives a voice input "Hand" to the display device **100** before the display of the address terms and the frame borders ends.

[0098] At this time, the command issuing function **159** finds the name of the region "Hand" based on text extracted through voice recognition from the voice input with reference to the command DB **161**. The command issuing function **159** estimates a manipulation command for a region (region of Layer **4-1**) specified as a manipulation target with reference to the command DB **161**. For example, when "zoom in" and "selection" are defined as manipulation commands executable for general regions in the command DB **161**, the command issuing function **159** can recognize that selection of the region of Layer **4-1** is meaningless due to the fact that Layer **4** is the lowest layer and there are no more subordinate layer regions and can estimate that the manipulation command is "zoom in" based on this recognition. Thus, the command issuing function **159** issues a command to give a request for expanding and displaying an image using the region of Layer **4-1** as a criterion to the image generation function **151**. In response to this command, the image generation function **151** displays an image expanded using the region of Layer **4-1** as the criterion on the display **110**, as illustrated in FIG. **9**B.

[0099] Here, in the step shown in FIG. **9**B, the display control function **155** displays no address term of a new region on the display **110** since Layer **4** is the lowest layer, as described above. On the other hand, as in the image displayed up to FIG. **9**A, a zoom out manipulation can be performed even in the image displayed in FIG. **9**B. Therefore, the display control function **155** temporarily displays an address term C**2** corresponding to the zoom out manipulation on the display **110**. For example, according to a relation with a subject region of an image being displayed, the display position (the top right corner of the image) of the address term C**2** may be set to a position different from the display position (the bottom left corner of the image) of the address term C**1** up to FIG. **9**A.

[0100] Thereafter, when the display of the image (the image expanded using the region of Layer **4-3** as the criterion) starts and a predetermined time passes, the display control function **155** ends the display of the address term AT**4-1** and the corresponding frame border and the display returns to the display of the sample image (the image expanded using the region of Layer **4-1** as the criterion). The user can perform a manipulation on the regions corresponding to the address terms during or after the display of the address terms by giving a voice input including the address terms to the display device **100**. In the illustrated example, as illustrated in FIG. **9**B, the user gives a voice input "Show 'Girl's Face'" to the display device **100** before the display of the address terms and the frame borders ends.

[0101] At this time, the command issuing function **159** extracts the name of the manipulation command, "Show," and the address term of the region, "Girl's Face," based on text extracted through voice recognition from the voice input with reference to the command DB **161**. However, in the image display at the time of FIG. **9**B, there is no region of the address term, "Girl's Face." Thus, the command issuing function **159** retrieves information regarding the address term stored in the command DB **161** in association with the layered structure of the regions. For example, the command issuing function **159** analyzes the text "Girl's Face," and first retrieves "Girl" and subsequently retrieves "Face." This is because there is a probability of an address term for a more subordinate layer region, for example, "Face," being redundantly defined in other subordinate layer regions included in mutually different superordinate layer regions.

[0102] In the illustrated example, as described above, the command issuing function **159** first finds the address term "Girl" defined for the region of Layer **3-4** as the result obtained by retrieving the address term "Girl" from the command DB **161**. Then, the command issuing function **159** finds the address term "Face" defined for the region of Layer **4-4** as the result obtained by retrieving the address term "Face" in subordinate layer regions included in the region of Layer **3-4** from the command DB **161**. Based on the above retrieval results, the command issuing function **159** issues a command to give a request for expanding and displaying the image using the region of Layer **4-4** as a criterion to the image generation function **151**. In response to this command, the image generation function **151** expands and displays the image expanded using the region of Layer **4-4** as the criterion, as illustrated in FIG. **9**C. Throughout the foregoing steps of FIGS. **8**A to **9**B, a manipulation intended by the user can be realized even for the voice input including the address term which is not displayed at that time on the display **110** but which the user remembers as being previously displayed, since the address terms of the regions previously defined and displayed are stored in the command DB **161**.

2-3. MODIFICATION EXAMPLES

First Modification Example

[0103] FIGS. **10**A to **10**C are diagrams illustrating a first modification example of the second embodiment of the present disclosure. In FIGS. **10**A to **10**C, when the speech "Zoom in 'Boy'" of the user described above with reference to FIGS. **8**B and **8**C is acquired as a voice input, a change in display of the display **110** at the time of the expansion of display of an image using the region of Layer **3-3** as a criterion is shown together with display during transition (FIG. **10**B).

[0104] In FIG. **10**B, text T including an address term included in the voice input and recognized by the display device **100** (the command issuing function **159**) during the step of transition of the image displayed on the display **110** from the image of the region of Layer **1** to the image expanded and displayed using the region of Layer **3-3** as the criterion is displayed by the image generation function **151**. Alternatively, the text T may be text indicating a command issued by the command issuing function **159** of the display device **100**. When such a display is made on the display **110**, the user can recognize that the display device **100** operates according to an intention of the user. For example, when the display device **100** does not correctly recognize a user's voice input and a command unintended by the user is performed, the user can understand what has happened based on such a display.

Second Modification Example

[0105] FIGS. **11** and **12** are diagrams illustrating a second modification example of the second embodiment of the present disclosure. In the embodiment, as described with reference to FIG. **7**, the layered structure of the regions including the subject regions has been set for a photo displayed on the display **110**. In the example illustrated in FIG. **7**, all of the subordinate layer regions are included in the superordinate layer region, but are not included in this modification example.

[0106] For example, as illustrated in FIG. **11**, only a part of a subordinate layer region may be included in a superordinate layer region in some cases. In the example illustrated in FIG. **11**, only a part of the region of Layer **4-1** is included in the region of Layer **3-3** which is a superordinate layer region and the other part thereof is outside of the region of Layer **3-3**. Likewise, only a part of the region of Layer **4-3** is included in the region of Layer **3-4** which is a superordinate layer region and the other part thereof is outside of the region of Layer **3-4**. Like another region of Layer **3** or Layer **4**, a subordinate layer region which is entirely included in a superordinate layer region can be present.

[0107] FIG. **12** illustrates an example of the expansion and display of an image when a region is set as in the example of FIG. **11**. In the modification example, since the entire subordinate layer region is not necessarily included in the superordinate layer region, a relation recognized between the superordinate layer region and the subordinate layer region can be relatively slight. Accordingly, for example, even when an image is expanded and displayed using the region of Layer **3-3** as a criterion, not only address terms (AT**4-1** and AT**4-2**) of the subordinate layer regions (Layer **4-1** and Layer **4-2**) included in Layer **3-3** but also an address term (AT**4-3**) of the subordinate layer region (Layer **4-3**) included in Layer **3-4** can be displayed.

[0108] Here, since both of the address terms AT**4-1** and AT**4-3** originally overlap as "Hand," the address term definition function **153** adds sequence numbers to distinguish the address terms from each other, so that the address term AT**4-1** becomes "Hand1" and the address term AT**4-3** becomes "Hand2." When only one of the address terms AT**4-1** and AT**4-3** is displayed on the display **110**, the address term definition function **153** may omit a load of the sequence numbers.

[0109] The above-described display is possible irrespective of whether only a part of a subordinate layer region is included in a superordinate layer region or the entire subordinate layer region is included in a superordinate layer region. That is, regions in an image can be configured as in the example illustrated in FIG. **7** and can also be configured as in the example illustrated in FIG. **11**. For example, when an image is expanded and displayed using the region of Layer **3-3** which is a subordinate layer region of the region of Layer **2-2** as the criterion, the address terms of Layers **4-1** and Layer **4-2** which are subordinate layer regions of the region of Layer **3-3** are temporarily displayed. In addition, the region of Layer **3-4** included in a display range of the image and the address terms of Layer **4-3** and Layer **4-4** which are subordinate layer regions of the region of Layer **3-4** can also be temporarily displayed. However, when the address term of the region of Layer **4-1** or Layer **4-2** and the address term of the region of Layer **4-3** or Layer **4-4** overlap, the address terms are distinguished from each other by adding sequence numbers, as described above, or the overlapping can be resolved by not displaying the overlapping address term of the region of Layer **4-3** or Layer **4-4**.

3. Third Embodiment

[0110] Next, a third embodiment of the present disclosure will be described. Since a configuration in the third embodiment is almost the same as that in the foregoing first embodiment except for display examples of address terms to be described below, detailed description other than that of the display examples of the address terms will be omitted.

[0111] FIG. **13** is a diagram illustrating a display example of address terms in the third embodiment of the present disclosure. In the embodiment, for example, as illustrated in the example of FIG. **13**, an address term is defined for each of the display regions of a plurality of sub-images included in an image displayed on the display **110**. In the illustrated example, the region of Layer **1** is defined in the entire image displayed on the display **110** and regions of Layer **2** are defined for display regions of the sub-images included in the image. The image displayed on the display **110** is an image displayed in a presentation by a presenter and includes a currently displayed slide (page) and sub-images indicating previously displayed graphs, pages, or the like. The address term definition function **153** can define address terms to correspond to display regions of main text (Layer **2-1**) and a right graph (Layer **2-2**) in a title "Current Slide," and a last graph (Layer **2-3**), a last page (Layer **2-4**), and a next page (Layer **2-5**) displayed separately from "Current Slide."

[0112] At this time, the display control function **155** displays the image (the region of Layer **1**) on the display **110** and temporarily displays an address term defined for a region corresponding to each sub-image and a frame border indicating a region corresponding to the address term on the display **110**. In the drawing, an address term AT**2-1** corresponding to the region of Layer **2-1** (the main text), an address term AT**2-2**

corresponding to the region of Layer **2-2** (the right graph), an address term AT**2-3** corresponding to the region of Layer **2-3** (the last graph), an address term AT**2-4** corresponding to the region of Layer **2-4** (the last page), and an address term AT**2-5** corresponding to the region of Layer **2-5** (the next page) are temporarily displayed on the display **110** by the display control function **155**.

[0113] In the embodiment, a voice input of the user given to the display device **100** can be, for example, "Show 'Last graph'" or "Go to 'Next page.'" In response to the voice input, the command issuing function **159** issues a command to give a request for enlarging and displaying the graph referred to previously again, a command to give a request for proceeding to a next slide (page), or the like to the image generation function **151**. For example, when the image generation function **151** newly displays a slide (page) displayed as "Next page" in the drawing in the region of "Current Slide" based on the command to give a request for proceeding to the next slide (page), the slide (page) displayed as "Current Slide" up to that time is displayed as "Last page" at this time.

[0114] In the embodiment, the address term definition function **153** may define address terms based on a chronological change in display forms of the regions. For example, when the slide (page) displayed as "Current Slide" at that time is displayed to be smaller at a location separate from "Current slide," the address term definition function **153** may define an address term with the same meaning as that of "Last page" for the region corresponding to this slide (page).

4. Supplement

[0115] Embodiments of the present disclosure can include, for example, the information processing device described above (described as the display device), a system, an information processing method executed in the information processing device or the system, a program causing the information processing device to function, and a non-transitory computer-readable storage medium having a program stored therein.

[0116] The preferred embodiments of the present disclosure have been described above in detail with reference to the appended drawings, but embodiments of the present disclosure are not limited to the technical scope of the present disclosure. It should be apparent to those skilled in the art that various modifications or corrections may occur within the technical scope described in the claims and are, of course, understood to pertain to the technical scope of the present disclosure. Additionally, the present technology may also be configured as below.

[0117] (1) An information processing device including:

[0118] a processor configured to realize

[0119] an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display,

[0120] a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region,

[0121] a voice input acquisition function of acquiring a voice input for the image, and

[0122] a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

[0123] (2) The information processing device according to (1),

[0124] wherein the region includes a superordinate layer region and a subordinate layer region, and

[0125] wherein, when the superordinate layer region is displayed on the display, the display control function displays an address term of the subordinate layer region at least a part of which is included in the displayed superordinate layer region.

[0126] (3) The information processing device according to (2), wherein the command issuing function issues a command to expand and display the subordinate layer region.

[0127] (4) The information processing device according to (3),

[0128] wherein the region includes a more subordinate layer region of the subordinate layer region, and

[0129] wherein, when the subordinate layer region is expanded and displayed, the display control function displays an address term of the more subordinate layer region of the subordinate layer region at least a part of which is included in the subordinate layer region.

[0130] (5) The information processing device according to any one of (2) to (4), wherein the command issuing function issues a command to allow the subordinate layer region to enter a selection state.

[0131] (6) The information processing device according to (**5**),

[0132] wherein the region includes a more subordinate layer region of the subordinate layer region, and

[0133] wherein, when the subordinate layer region enters the selection state, the display control function displays an address term of the more subordinate layer region of the subordinate layer region at least a part of which is included in the subordinate layer region.

[0134] (7) The information processing device according to (6), wherein the command issuing function issues a command to expand and display the more subordinate layer region of the subordinate layer region.

[0135] (8) The information processing device according to any one of (2) to (7), wherein the superordinate layer region corresponds to an entire region of the image, and

[0136] wherein the subordinate layer region corresponds to a display region of each of a plurality of sub-images included in the image.

[0137] (9) The information processing device according to (8), wherein the command issuing function issues a command to expand and display, in the entire region of the image, the sub-image corresponding to an address term included in the voice input among the plurality of sub-images.

[0138] (10) The information processing device according to any one of (2) to (7),

[0139] wherein the superordinate layer region corresponds to an application image displayed in an entire region of the image, and

[0140] wherein the subordinate layer region corresponds to a region of a GUI component included in the application image.

[0141] (11) The information processing device according to (2),

[0142] wherein the superordinate layer region corresponds to an entire region of the image, and

[0143] wherein the subordinate layer region corresponds to each of a plurality of subject regions recognized in the image.

[0144] (12) The information processing device according to (11), wherein the command issuing function issues a

command to expand and display the image using, as a criterion, the subject region corresponding to an address term included in the voice input among the plurality of subject regions.

[0145] (13) The information processing device according to any one of (2) to (12), wherein the subordinate layer region is entirely included in the superordinate layer region.

[0146] (14) The information processing device according to any one of (1) to (13), wherein the address term definition function defines the address term based on set information regarding the region.

[0147] (15) The information processing device according to any one of (1) to (14), wherein the address term definition function defines the address term based on a location of the region in the image.

[0148] (16) The information processing device according to any one of (1) to (15), wherein the address term definition function defines the address term based on a chronological change in a display form of the region.

[0149] (17) The information processing device according to any one of (1) to (16), wherein the display control function displays, on the display, an address term included in the voice input.

[0150] (18) The information processing device according to any one of (1) to (17), wherein the display control function displays the issued command on the display.

[0151] (19) An information processing method including, by a processor:

[0152] defining an address term for at least a partial region of an image to be displayed on a display;

[0153] displaying the image on the display and temporarily displaying the address term on the display in association with the region;

[0154] acquiring a voice input for the image; and

[0155] issuing a command relevant to the region when the address term is included in the voice input.

[0156] (20) A program causing a computer to realize:

[0157] an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display;

[0158] a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region;

[0159] a voice input acquisition function of acquiring a voice input for the image; and

[0160] a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

What is claimed is:

1. An information processing device comprising:

a processor configured to realize

an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display,

a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region,

a voice input acquisition function of acquiring a voice input for the image, and

a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

2. The information processing device according to claim **1**,

wherein the region includes a superordinate layer region and a subordinate layer region, and

wherein, when the superordinate layer region is displayed on the display, the display control function displays an address term of the subordinate layer region at least a part of which is included in the displayed superordinate layer region.

3. The information processing device according to claim **2**, wherein the command issuing function issues a command to expand and display the subordinate layer region.

4. The information processing device according to claim **3**,

wherein the region includes a more subordinate layer region of the subordinate layer region, and

wherein, when the subordinate layer region is expanded and displayed, the display control function displays an address term of the more subordinate layer region of the subordinate layer region at least a part of which is included in the subordinate layer region.

5. The information processing device according to claim **2**, wherein the command issuing function issues a command to allow the subordinate layer region to enter a selection state.

6. The information processing device according to claim **5**,

wherein the region includes a more subordinate layer region of the subordinate layer region, and

wherein, when the subordinate layer region enters the selection state, the display control function displays an address term of the more subordinate layer region of the subordinate layer region at least a part of which is included in the subordinate layer region.

7. The information processing device according to claim **6**, wherein the command issuing function issues a command to expand and display the more subordinate layer region of the subordinate layer region.

8. The information processing device according to claim **2**,

wherein the superordinate layer region corresponds to an entire region of the image, and

wherein the subordinate layer region corresponds to a display region of each of a plurality of sub-images included in the image.

9. The information processing device according to claim **8**, wherein the command issuing function issues a command to expand and display, in the entire region of the image, the sub-image corresponding to an address term included in the voice input among the plurality of sub-images.

10. The information processing device according to claim **2**,

wherein the superordinate layer region corresponds to an application image displayed in an entire region of the image, and

wherein the subordinate layer region corresponds to a region of a GUI component included in the application image.

11. The information processing device according to claim **2**,

wherein the superordinate layer region corresponds to an entire region of the image, and

wherein the subordinate layer region corresponds to each of a plurality of subject regions recognized in the image.

12. The information processing device according to claim **11**, wherein the command issuing function issues a command to expand and display the image using, as a criterion, the subject region corresponding to an address term included in the voice input among the plurality of subject regions.

13. The information processing device according to claim **2**, wherein the subordinate layer region is entirely included in the superordinate layer region.

14. The information processing device according to claim **1**, wherein the address term definition function defines the address term based on set information regarding the region.

15. The information processing device according to claim **1**, wherein the address term definition function defines the address term based on a location of the region in the image.

16. The information processing device according to claim **1**, wherein the address term definition function defines the address term based on a chronological change in a display form of the region.

17. The information processing device according to claim **1**, wherein the display control function displays, on the display, an address term included in the voice input.

18. The information processing device according to claim **1**, wherein the display control function displays the issued command on the display.

19. An information processing method comprising, by a processor:

defining an address term for at least a partial region of an image to be displayed on a display;

displaying the image on the display and temporarily displaying the address term on the display in association with the region;

acquiring a voice input for the image; and

issuing a command relevant to the region when the address term is included in the voice input.

20. A program causing a computer to realize:

an address term definition function of defining an address term for at least a partial region of an image to be displayed on a display;

a display control function of displaying the image on the display and temporarily displaying the address term on the display in association with the region;

a voice input acquisition function of acquiring a voice input for the image; and

a command issuing function of issuing a command relevant to the region when the address term is included in the voice input.

* * * * *