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- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
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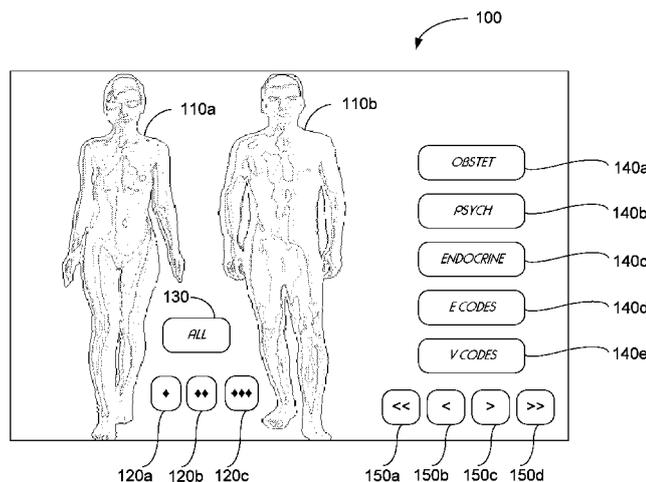


FIG. 1

(57) Abstract: Systems and methods for displaying a graphical user interface for medical code lookup comprising a first region displaying at least one anatomical image for selecting at least one anatomical part, a second region displaying a secondary anatomical image including either a selectable cross section image, a selectable contents type image, a three dimensional image, or selectable regions similar to buttons, a third region displaying selectable classification regions corresponding to a classification group of medical codes relevant to selected sections from the secondary anatomical image, a fourth region displaying a results code set for selected classification regions, including selectable medical codes from each respective classification group, navigation regions to display other regions, and a medical codes display region for displaying selected codes from the results code set.

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## TITLE

**Medical Code Lookup Interface**

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims the benefit of non-provisional application Serial Number 12/566,784 filed on September 25, 2009, which claims the benefit of provisional application Serial Number 61/221,381, filed June 29, 2009.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH  
OR DEVELOPMENT

**[0002]** Not Applicable

## BACKGROUND OF THE INVENTION

## 1. Field of Invention

**[0003]** This invention pertains to medical codes used by medical professionals for the classification of diseases and related health problems. More particularly, this invention pertains to an apparatus for presenting codes based on iterative selection of indicia representative of anatomical parts and of corresponding classification groupings relevant to those anatomical parts.

## 2. Description of the Related Art

**[0004]** Medical codes typically include such codes as medical diagnosis codes and medical service or procedure codes that are used to identify specific medical diagnosis performed by and/or interventions taken by medical professionals. To effectively treat patients and/or perform administrative tasks such as billing, healthcare providers often require access to these medical codes.

**[0005]** Medical codes currently used within the United States, for example, are varied and include such codes as the American Medical Association (AMA) copyrighted Current Procedure Terminology (CPT) codes, the Healthcare Common Procedure Coding System (HCPCS) codes maintained by Medicare, anesthesia codes, dental codes, and many other proprietary code sets, such as those used by workers compensation boards, for example. One commonality of these code sets is

a series of alphanumeric codes with descriptions, and they are often divided into sections and subsections by service classification, body region or body part.

**[0006]** Medical diagnosis codes are based on standardized code sets that are maintained at the national and international level. For example, the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) is based on the World Health Organization's Ninth Revision, International Classification of Diseases (ICD-9). This code set is currently used for medical transactions in the United States.

**[0007]** The National Center for Health Statistics (NCHS) is the Federal agency responsible for use of the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) in the United States, and has developed a clinical modification of the classification for morbidity purposes. The ICD-10 code set is used to code and classify mortality data from death certificates, having replaced ICD-9 for this purpose as of January 1, 1999.

**[0008]** The ICD-10 code set is copyrighted by the World Health Organization (WHO), which owns and publishes the classification. WHO has authorized the development of an adaptation of ICD-10 for use in the United States for U.S. government purposes. The ICD-10-CM code set is planned as the replacement for ICD-9-CM, volumes 1 and 2 in October 2013.

**[0009]** The current ICD-9 code set consists of an alphanumeric code having between 3 and 5 characters and a description, and currently comprises approximately 16,000 codes. ICD-10 may contain on the order of 80,000 codes.

**[0010]** Current methods of code lookup use variations of text search, or a navigation of the code structure using the standard chapter headings of the particular code set. This invariably leads to difficulty, as the descriptions in the code set being searched often contain abbreviations and/or different wording than the search term – for example “neck” vs. “cervical”. It is also possible that the search terms being entered can find one of a sub-group of codes, but exclude others in the sub-group which in fact may be more appropriate, as the wording in the descriptions can often vary amongst the same sub-group.

**[0011]** Such an environment often makes it necessary for the individual doing the search to become a coding expert to have any proficiency at searching for

medical codes. In addition, entering search terms can be time consuming, especially if the functionality is being accessed on a handheld portable device or some other touch screen device.

**[0012]** Thus, there is a need for a more user-friendly and functional mechanism for searching for and verifying medical codes.

#### BRIEF SUMMARY OF THE INVENTION

**[0013]** According to one embodiment of the present invention, a graphical user interface for display of regions on a display device within a medical system configured for medical code lookup, the graphical user interface comprising: (1) a first region to display at least one anatomical image on the display device, wherein each anatomical image includes a plurality of selectable anatomical part regions, and to display a plurality of selection regions, wherein display of a corresponding region is dependent upon: (a) selection of at least one anatomical part, and (b) selection of a selection region, (2) a second region to display a secondary anatomical image, wherein the secondary anatomical image displayed is dependent upon at least one selection from the first region, and wherein the secondary anatomical image includes at least one of (a) a cross section image that includes selectable regions of each selected anatomical part region, (b) a contents type image that includes a selectable frontal view, (c) a three dimensional image with selectable regions and (d) selectable regions having a visual appearance similar to a button, (3) a third region to display a plurality of selectable classification regions, wherein each classification region corresponds to a classification group of medical codes that is relevant to at least one of: (a) selected sections from a respective selected anatomical part region, and (b) a respective selected layer region, (4) a fourth region to display a results code set upon selection of at least one classification region, wherein the results code set includes medical codes from each respective classification group that corresponds to each selected classification region, and wherein each medical code in the results code set is selectable, (5) a plurality of navigation regions operable to cause display of a corresponding region, and (6) a medical code display region operable to display at least one selected code from the results code set is provided.

**[0014]** In some embodiments, the first layer diagram further comprises at least one multiple-selection region operable for selecting additional anatomical part regions.

**[0015]** In another embodiment, an all-selection region provides for selecting every anatomical part region from the anatomical image.

**[0016]** In another embodiment, the number of selection regions and their corresponding layout correspond to the particular medical codes in use.

**[0017]** In some embodiments, the medical codes include at least one of medical procedure codes, medical diagnosis codes, disease classification codes, health related problem codes, mental health codes, anesthesia codes, pharmaceutical codes, topographical codes and dental codes.

**[0018]** In some embodiments, the selection regions are applicable for medical diagnosis codes and include at least one of obstetrical functionality, psychiatric functionality, endocrine functionality, external injury functionality and supplemental functionality.

**[0019]** In some embodiments, one selection region corresponds to obstetrical functionality for navigation to the second region, and the second region displays an image of a selectable pregnant female abdomen image.

**[0020]** In other embodiments, the selectable classification groups include at least one of psychiatric illness, etiology, external injury cause and supplemental.

**[0021]** Other embodiments provide navigation regions operable for navigation to the first layer diagram, navigation to a previous region, navigation to a next region and navigation to the fourth region.

**[0022]** In another embodiment, the graphical user interface includes at least one user input selection device.

**[0023]** In another embodiment, the graphical user interface includes a touch screen for receiving input and for displaying each region.

**[0024]** In another embodiment, touch screen is operable for a hand-held device.

**[0025]** In another embodiment, the hand-held device comprises at least one button external to the touch screen device to provide input for selection for at least one of region, navigation region, selection region, anatomical part region, at least one section of anatomical part region, classification region, at least one medical code from the results code set and medical code display region.

**[0026]** In another embodiment, a voice input interface is included for receiving voice signals for selection of at least one of region, navigation region, selection region, anatomical part region, at least one section of anatomical part region, classification region, at least one medical code from the results code set and medical code display region.

**[0027]** In another embodiment, a refinement display region is included for receiving text input to refine medical codes with smart search functionality.

**[0028]** In another embodiment, an output display region is included (1) to copy selected codes to a clipboard interface, or (2) to forward selected codes to another system.

**[0029]** In another embodiment, at least one selectable region of each region has a visual appearance similar to a button.

**[0030]** In another embodiment, the visual appearance of each selectable region is similar to an icon.

**[0031]** Yet another embodiment provides a method for displaying a graphical user interface for medical code lookup on a display device within a medical system, the method comprising: (1) displaying a first region to include: at least one anatomical image for selection of at least one anatomical part region and subsequent display of a corresponding region, and a plurality of selection regions, each operable for selection and display of another region; (2) upon selection of at least one anatomical part region from the first region, displaying a second region that includes a secondary anatomical image dependent upon selections from the first region, and wherein the secondary anatomical image includes at least one of (a) a cross section image that includes selectable regions of each selected anatomical part region, (b) a contents type image that includes a selectable frontal view, (c) a three dimensional image with selectable regions and (d) selectable regions having a visual appearance similar to a button, (3) upon selection from the

secondary anatomical image, displaying a third region that includes a plurality of selectable classification regions that correspond to a classification group of medical codes that is relevant to selected regions from the secondary anatomical image, (4) upon selection of at least one classification region, displaying a fourth region wherein a results code set includes selectable medical codes from each respective classification group that corresponds to each respective classification region, (5) displaying a plurality of navigation regions within each region, wherein the navigation regions are operable to cause display of a corresponding region and (6) displaying at least one selected code from the results code set to a separate medical code display region.

**[0032]** Still another embodiment provides for a computer-implemented method for displaying a graphical user interface for medical code lookup on a display device within a medical system, the method comprising: (1) computer readable code that causes display of a first region to include (a) at least one anatomical image for selection of at least one anatomical part region and subsequent display of a corresponding region, and (b) a plurality of selection regions operable for selection and display of another region, (2) computer readable code that, upon selection of at least one anatomical part region from the first region, causes display of a second region that includes a secondary anatomical image dependent upon selections from the first region, and wherein the secondary anatomical image includes at least one of (a) a cross section image that includes selectable regions of each selected anatomical part region, (b) a contents type image that includes a selectable frontal view, (c) a three dimensional image with selectable regions and (d) selectable regions having a visual appearance similar to a button, (3) computer readable code that, upon selection from the secondary anatomical image, causes display of a third region that includes a plurality of selectable classification regions that correspond to a classification group of medical codes that is relevant to selected regions from the secondary anatomical image, (4) computer readable code that, upon selection of at least one classification region, causes display of a fourth region wherein a results code set includes selectable medical codes from each respective classification group that corresponds to each respective classification region, (5) computer readable code that causes display of a plurality of navigation regions within each region, wherein the navigation regions are operable to cause display of a corresponding region and (6) computer readable code

that causes display of at least one selected code from the results code set to a separate medical code display region.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

**[0033]** The above-mentioned features will become more clearly understood from the following detailed description read together with the drawings in which:

**[0034]** FIG. 1 is an embodiment of a graphical user interface displaying a first layer with anatomical images according to the present invention.

**[0035]** FIG. 2 is an embodiment illustrating rollover functionality of a first layer of a graphical user interface according to FIG. 1.

**[0036]** FIG. 3A is an embodiment of a graphical user interface displaying a second layer with an anatomical image part according to the present invention.

**[0037]** FIG. 3B is an embodiment of a graphical user interface displaying a second layer with an anatomical image part and including rollover functionality according to the present invention.

**[0038]** FIG. 4 is an embodiment of a graphical user interface displaying a third layer including classification selection regions according to the present invention.

**[0039]** FIG. 5 is an embodiment of a graphical user interface displaying a fourth layer including a results code set according to the present invention.

**[0040]** FIG. 6 is a flow diagram for a graphical user interface according to one embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0041]** Reference is now made in detail to the description of the embodiments of systems and methods for a graphical user interface for providing lookup of diagnosis codes and medical service codes to medical systems as illustrated in the accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are intended to convey the scope of the

invention to those skilled in the art. Furthermore, all "examples" given herein are intended to be non-limiting.

**[0042]** FIG. 1 illustrates a graphical user interface **100** for interaction with a processor that controls the lookup of medical codes. The graphical user interface **100** allows a user to drill down to a set of medical codes, such as medical procedure codes or medical diagnosis codes, with a few clicks, touches, or even voice commands. In one embodiment, there are three selection regions, layers, or screens that lead to a fourth and final region containing an appropriately filtered subset of medical codes. It should be understood that the number of regions is merely a design consideration that can be adapted for more or fewer regions as different type code sets are incorporated within the corresponding medical system.

**[0043]** As used herein, the processor should be broadly construed to mean any computer or component thereof that executes software. In one embodiment the processor is a general purpose computer, in another embodiment, it is a specialized device for implementing the functions of the invention. Those skilled in the art will recognize that the processor includes an input component, an output component, a storage component, and a processing component. The input component receives input from external devices, such as a mouse, a keyboard, a touch screen input, a scroll device input, a voice input, remote services, or any other input that is common for processors and computerized devices. The output component sends output to external devices, such as a graphical display, a touch screen, or any other display device capable of receiving and displaying images and other indicia. The storage component stores data and program code. In one embodiment, the storage component includes random access memory. In another embodiment, the storage component includes non-volatile memory, such as floppy disks, hard disks, and writeable optical disks. The processing component executes the instructions included in the software and routines.

**[0044]** In one embodiment, the processor controls the lookup of medical codes in a medical computer system having a graphical user interface **100**. The processor receives information from an input device for selection of the displayed indicia, text, or portions of displayed images, and display of selected indicia, images, and result codes.

**[0045]** Another embodiment of the graphical user interface **100** is utilized in a hand-held computer device such as can be used by a doctor or other medical staff performing diagnostics. Such a hand-held device would typically provide a touch screen input or a scroll device input. An alternative input for the hand-held device could also be a stylus input, or any other input that is commonly used for hand-held computerized devices.

**[0046]** In another embodiment, the graphical user interface **100** is used in a personal computer system, or any other computer system, that provides for a graphical display and an input device for selection of indicia or regions on a display device. It should be noted also that the present invention can be adapted for voice command inputs to the graphical user interface **100**.

**[0047]** The graphical user interface **100** is adaptable for a multitude of medical codes, such as medical procedure codes, medical diagnosis codes, disease classification codes, health related problem codes, mental health codes, anesthesia codes, pharmaceutical codes, topographical codes and dental codes, among many others too numerous to mention. Exemplary medical procedure codes include such code sets as the American Medical Association Current Procedural Terminology (CPT) codes, Healthcare Common Procedure Coding System (HCPCS) codes, National Drug Code (NDC) codes, and Nursing Interventions Classification (NIC) codes, among others. Exemplary medical diagnosis codes include such code set as the International Classification of Diseases (ICD-9 and ICD-CM-9), the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10 and ICD-10-CM), among many others. The present invention is also adaptable for modifications and additions to these codes.

**[0048]** One embodiment is a system for iterative lookup and retrieval of codes related to parts of an object. The system includes a processor, an input device, an output device, and optionally, a data store. The data store is either included as part of the system, or access to the data store is provided to the system. The parts of an object include parts inside the object and on the outside, or surface, of the object. The object of interest is a solid, physical structure or mass that includes inner parts and surface parts that make up the whole of the object.

**[0049]** Indicia representative of the object, its various parts, and other related indicia are displayed through the output device via the processor. The

processor also displays selectable control elements through the output device (see FIG. 6). The processor executes an iterative process for displaying selectable indicia portions through the output device, and for selection of all or part of the selectable indicia portions via the input device, until at least one relevant part is located and displayed via the output device. The iterative process is illustrated in steps 610, 614, 620, and 640 of the flow diagram of FIG. 6, which is discussed in detail below. The various indicia representative of the object and its various parts, as well as the codes associated with each part are available in the data store. The indicia and codes are retrieved by the processor during processing.

**[0050]** Each successive iteration occurs in response to selection of one or more portions of the indicia via the input device. Upon selection of the indicia portion, a new indicia is displayed via the output device to indicate the selection. Completing selection of one or more portions of the indicia occurs through selection of control elements via the input device. Accepting the selection of a portion of the indicia triggers the next iteration and display, via the output device, of another indicia representative of a sub-set of the object or of the previously displayed indicia. In one embodiment, the iterative process reaches a point where display includes indicia representative of parts inside the originally displayed or the previously displayed object. Such display can be a cross-section representation or a contents representation, as in step 620 of FIG. 6. The iterative process continues until it is no longer necessary to select a portion of the indicia.

**[0051]** After at least one iteration, and after it is no longer necessary to select a portion of the indicia, control elements representative of classification groups of codes related to the indicia are displayed via the output device as in step 660. The control elements are displayed as images, words, numbers, letters, symbols, or any other representative image or icon commonly used for displaying and representing selection choices. In one embodiment, the classification groups of available codes are narrowed through selection of control elements via the input device, so that a smaller set of control elements are displayed via the output device. Selection of one or more control elements generates a group of codes related to the previously selected indicia, from which a relevant code or codes can be selected and displayed.

**[0052]** One embodiment includes indicia representative of all or part of a human body so that the system is used in lookup of codes for medical diagnosis and analysis related to a patient. In such an embodiment, the codes related to

medical diagnosis are divided into sections and sub-sections according to service classification, body region, or body part. The system allows for drilling down into the data, via selection of indicia representative of body parts or regions so that smaller groups of codes can be identified and selected from. Because the internal structures of the body are not visible, the progressive display of indicia allows viewing of the internal structures in a manner conducive to selection of the desired body part. A manageable group of codes is then displayed, via the output device, from which the appropriate, or relevant, code or codes can be selected and displayed.

**[0053]** Returning again to FIG. 1, the graphical user interface **100** typically displays two anatomical images **110**. A typical anatomical image **110** can include a female image **110a** and a male image **110b**. The anatomical images **110** are typically full body images depicting a high level view of the various parts for each body. The display shown in FIG. 1 depicts selectable options that are present on the screen for diagnosis code lookup. Each anatomical image **110** includes target regions for selection of a particular body part. (If the user desired to skip to the next region without selecting a body part, the navigation selection region **150c** should be selected as described below.) Additionally, the anatomical image **110** can typically be included within a display frame for selecting the whole body. Also, the anatomical image **110** can be a three dimensional image allowing, for example, rotation of the body for selection of body parts on either side or on the rear side of the body.

**[0054]** To perform a diagnosis code lookup, a user typically selects an anatomical part or a body part from either the female image **110a** or the male image **110b** by clicking or touching the respective body part or a selection region **140** (or diagnosis selection region in this example). The selection regions **140** shown include obstetrics **140a**, psychiatric **140b**, endocrine **140c**, E codes **140d** and V codes **140e**.

**[0055]** Selecting one of the selection regions **140** causes the display to navigate to another layer, depending on which selection region **140** is selected. The second layer, see FIG. 3, typically displays a cross section and/or contents type image of the body part (or anatomical part) that was selected. The third layer, see FIG. 4, typically displays classification selection regions representing classifications of medical codes according to the selections made at the first and second layer

screens. The fourth layer screen typically displays a filtered set of medical codes within the codes sets that are selected at the third layer screen.

**[0056]** At the first layer screen or display of the graphical user interface **100** for example, selecting obstetrics **140a** causes navigation to the second layer screen where an image of a pregnant female abdomen (not shown) is displayed. Selection of the psychiatric **140b** selection region causes navigation to the third layer screen where psychiatric illness classification groups are displayed. Selection of the endocrine **140c** selection region also causes navigation to the third layer screen, where in this case selection of an etiology is performed.

**[0057]** For the E codes **140d** and V codes **140e** where the medical diagnosis codes have no relevance to a body part, selection causes navigation to the third layer screen for selection of classification groups relating to external injuries (automobile accident, skiing accident, etc.) or other supplemental classifications (health status, immunizations, etc.).

**[0058]** It should be noted that the options of selectable selection regions **140** displayed at each layer screen is variable and dependent upon the medical code set and/or other codes sets that are being searched, as well as the version of the product that is in use. The graphical user interface **100** is adaptable for providing a search within a single set of codes, such as medical diagnosis codes, but is also capable of combining multiple sets of codes, such as medical diagnosis codes and medical procedure codes, and even more sets of codes simultaneously.

**[0059]** Additionally, it should be noted that the selection regions **140**, as well as other selection regions, within the present invention are described in this disclosure in a format comparable to buttons displayed on the screen. The display of the selection regions on a screen are not limited to this configuration however, and can be displayed in any fashion that is common for graphical user interfaces to signify selection functionality, such as buttons, icons, text regions, buttons with images, buttons with text, textual descriptions, and the like. Additionally, rollover functionality can be applied to any selection region to further reveal the functionality.

**[0060]** It should be noted also that additional selection regions **140** or other selection regions are made available in the event of desired codes that are not applicable to a specific body part, for example.

**[0061]** Additionally, the anatomical images **110** displayed on the first layer screen can be varied according to the medical environment. For example, an OB/GYN practice has no need for displaying a male image, and can thus begin with a full body pregnant female image on the first layer. Alternatively, an OB/GYN can also default to the second layer screen as the starting point and display the cross-section image of a pregnant female body image. Other medical practice groups could similarly default to certain start screens such as a head image for a neurosurgeon, etc.

**[0062]** Additionally, there is capability for selecting multiple body parts from the anatomical image **110** with the multi-selection regions (multi-selection buttons) **120**. In the example shown, there is the option for selecting 2, 3 or 4 body parts with multi-selection buttons **120a**, **120b** and **120c** respectively. Prior to selecting the body parts, the user simply selects one of the multi-selection buttons **120** and then selects the corresponding number of body parts from the anatomical image **110**. Of course, the number of multi-selection buttons **120** as well as the corresponding number of body parts that can be selected is variable and limited only by design considerations. Additionally, it is within the scope of the graphical user interface to use an input field to receive the number of body parts that can be selected.

**[0063]** Also, the user can select the all-selection button **130** to select all body parts of the respective anatomical image **110**. The user is then presented with display screen similar to FIG. **3A** below that typically includes both a frontal view and a cross section view for selection of the particular tissue (e.g., skin) or cause involved that affects the whole body. This 'whole body' image does not necessarily show the whole body, but rather shows various tissues, bones, etc. that can be affected over the entire body.

**[0064]** Finally, each layer screen includes navigation regions (control elements, navigation buttons, etc.) **150** for navigating to other layer diagrams within the graphical user interface **100**. For example, navigation button **150a** causes navigation to return to the first layer diagram. Selecting navigation button **150b** causes navigation to the previous layer diagram. Selecting navigation button **150c** causes navigation to the next layer screen. The selection of navigation button **150d** causes navigation to the final or end layer screen (typically the fourth layer).

[0065] If a layer cannot be reached from a present layer, then the corresponding navigation button **150** does not appear on the present display region.

[0066] FIG. **2** illustrates the graphical user interface **100** with the visual effect from a rollover **200** of a particular body part. A rollover **200** can also be effected by a mouseover or by touching the screen on a hand-held or other touch screen device. In this example, the diagnosis is an upper arm fracture and the upper arm is highlighted by a rollover **200**. Typically, a rollover actually highlights all four of the upper arms in the image, since a full body image **110** has not yet been selected. Alternatively, functionality could be adapted to only highlight one side of the body, such as the upper left arm in this case.

[0067] Once the user selects the particular body part or body region (anatomical region), the second layer screen **300** is displayed. In this example, the upper left arm for the male image **110b** is selected. The relevant anatomically appropriate image for the selected body part or region is shown in the second layer screen **300**. These images may be cross-sectional or contents type images.

[0068] FIG. **3A** and FIG. **3B** depict an embodiment of a typical second layer screen **300** for the graphical user interface **100**. A typical second layer screen **300** displays an anatomical image such as a cross section image **310a** for the respective body part that has been selected at the first layer of the graphical user interface **100**. The selected body part is musculoskeletal and therefore, the cross-section displays an upper arm having selectable regions or portions, such as skin, subcutaneous, muscle, vascular, nerve, bone and bone marrow. Alternatively the anatomical image can be a three dimensional image with selectable regions.

[0069] In the event that the body region is a hollow body section, such as the abdomen, the anatomical image displayed in the second layer is a contents type, simplified frontal image, or a three dimensional image of the various organs, along with a cross sectional view depicting skin, subcutaneous muscle, vascular, nerve and bone, along with any deep organs not easily depicted in the frontal image. Thus, the second layer can, in some instances, display both a frontal image and a side image of the selected body part.

[0070] For selection of the head, a cross section image is displayed that includes the upper neck, together with regions for the brain, cerebellum,

brainstem, cerebral vascular, sinus and nose, mouth and larynx. A button is also typically included for psychiatric disorders.

**[0071]** It should be noted that the nose, eye, mouth and ear are also target regions for the first layer screen as shown in FIG. **1** above.

**[0072]** Fig. **3A** displays the cross section image of the upper arm selected from the first layer screen. Since an upper arm fracture is the diagnosis in this example, the user selects the bone **320**. FIG. **3B** illustrates the rollover effect **330** of the bone 320.

**[0073]** In an alternate embodiment, the graphical user interface **100** is accessed on a computerized device with a small screen. In such an embodiment, the selection process is typically facilitated with a series of selectable color coded buttons. Each selectable color coded button corresponds to one of the seven objects in the upper arm image. Of course, other display images with a different count of objects will have a correspondingly different count of colors from which to select.

**[0074]** Alternatively, selectable alpha coded buttons can also be utilized, such as S for skin, SC for subcutaneous, M for muscle, V for vascular, N for nerve, and the like.

**[0075]** It should be noted also that the multiple-selection buttons **120**, the all-selection button **130** and the navigation buttons **150**, as displayed in the first layer **100** are also available in the second layer **300**, though these buttons are not shown in FIG. **3A** or FIG. **3B**.

**[0076]** Also, as noted above, the user can select the all-selection button **130** from the first layer screen to select all body parts of the respective anatomical image 110. The user is then presented with display screen similar to FIG. **3A** that typically includes both a frontal view and a cross section view for selection of the particular tissue (e.g., skin) or cause involved that affects the whole body. This 'whole body' image does not necessarily show the whole body, but rather shows various tissues, bones, etc. that can be affected over the entire body.

**[0077]** FIG. **4** depicts an embodiment of a typical third layer **400** of the graphical user interface **100**. The third layer **400** is typically used in the selection of an etiology or service type. The selectable classification regions (buttons) **410**

represent medical codes of the classification group (or set) that is being searched, as well as the version of the product (single or multi code set). If the graphical user interface **100** represents a multi code set, additional buttons (selection regions) are made available to allow the selection of an alternative code set.

**[0078]** In the particular example above where the diagnosis is a broken arm, the selectable classification buttons **410** of FIG. **4** are typical of the conditions that could apply based on selection of the upper arm and the bone. A different set of selectable classification buttons **410** appear if the diagnosis were different, for example, related to the abdomen.

**[0079]** It should be noted also, that the selectable classification buttons **410** shown in FIG. **4** are a text based representation, though it should be clear to those of skill in the art that icons or other images, color coding, etc. could be used to represent the various causes, type of problems, or procedures that are relevant to the underlying code set that is queried, and to the selections made at the preceding layers. Only those classification buttons **410** that are relevant to the selections in the previous layers are displayed as active for selection.

**[0080]** Additionally, the multi-selection buttons **120**, the all-selection button **130** and the navigation buttons **150** are available at the third display region. The multi-selection buttons **120** are used for selection of more than one classification button **410**.

**[0081]** For example, a user can select multi-selection button **120a** for two items, then select foot, then mouth on the full body image **110** of the first layer, select skin at the second layer, and then select infectious to locate the code for foot and mouth disease.

**[0082]** A rollover of one of the selectable classification buttons **410** results in a user tooltip to clarify the functionality of that particular item. The selectable classification buttons **410** shown in FIG. **4** relate to diagnosis code lookup and depict the list of causal factors according to the differential diagnosis mnemonic 'VINDICATUM' in addition to several additional categories. The VINDICATUM mnemonic represents the causal factors (1) vascular, (2) inflammatory (3) infectious, (4) neoplastic, (5) drugs, (6) iatrogenic, (7) congenital, (8) autoimmune, (9) trauma, (10) unknown and (11) metabolic. In order to further aid in classification, additional categories have been added including (12) parasitic, (13)

developmental, (14) immunological, (15) mechanical, (16) symptoms and pain, (17) degenerative, (18) nutritional, (19) chronic disease, (20) bites and stings and (21) allergic.

**[0083]** In the event that the user has entered the third layer via either the E code or V code lookup button from the first layer, the third layer is dependent on the need for sub-classification of the section that has been selected. As noted above also, the buttons can be either text or icon/images dependent on the suitability that each provides in conveying the meaning to the user.

**[0084]** In some embodiments, an additional subset layer appears between the third layer and the fourth layer where the cause or service type selected at the third layer requires additional categories.

**[0085]** In the above example seeking a diagnosis code for an upper arm fracture, the user selects the classification button for trauma (e.g., image of a hammer) and then the fourth layer is displayed.

**[0086]** FIG. 5 depicts a typical embodiment of the fourth layer **500** for selecting results from a results code set **520**. The results code set **520** typically results from a query corresponding to (1) the selected body part, (2) the tissue or organ and (3) the cause, problem type or procedure as selected in the previous layers.

**[0087]** Additionally, it is possible for the user to arrive at the fourth layer via selection of the end or final navigation button **150d**. In this event, the results code set **520** displays the full set of codes. The full set of codes can still be filtered via the refine results **510** text input field which allows for a smart search of the results code set **520**.

**[0088]** The results code set **520** typically displays a tree view that displays the underlying code set in logical groups with their respective header codes as applicable depending on the code set being searched. The results code set **520** list, typically filtered, allows the user to easily expand or contract the tree view as a whole or at an individual tree level. Any code in the results code set **520** can be selected or deselected. Selected codes are displayed simultaneously in the selected codes field **530** and are also copied to the device clipboard memory. A clear button **540** allows for resetting the selected codes field **530**.

[0089] In the example shown, two codes **522**, **524** are selected and are therefore displayed in the selected codes field **530**.

[0090] Additionally, a label region **550** displays the selections that caused the present displayed code sets to be displayed.

[0091] In an alternative embodiment, the graphical user interface 100 interfaces with another system, database, etc. and provides capability for sending the results to another system beyond the medical system in which the graphical user interface 100 resides. For example, an additional 'Send' button displayed at the fourth layer can send the results to another system, database, or other collection mechanism. In another example, a 'Copy' button can copy the results to a clipboard interface for insertion into another program or location.

[0092] In another alternative embodiment, selection of a letter or entering a letter in a field, allows for instantly jumping to the results code set 520 items that begin with the corresponding letter.

[0093] Navigation buttons **150** are also present for returning to the previous layer or to the first layer. Using the navigation buttons **150** at the fourth layer allow the user to return to the third layer, change the selected code set, and then proceed again to the fourth layer with the upper level filters remaining as previously selected via the body part and tissue selections, for example, in the first and second layers. For example, a user could have previously selected the upper arm, bone and trauma to locate the appropriate medical diagnosis code for a fracture. That same user could then change the third layer to service, select surgical procedure, and locate the appropriate code for surgical treatment of the fracture.

[0094] The code lookup interface can also interact with other systems. In one embodiment, the graphical user interface **100** is embedded in other coding, medical record, billing, or related systems. The system is then called at the appropriate time during the workflow within that system (an originating system or application), used for the code lookup, and returns the set of selected codes to the originating application and simultaneously closing the code lookup system.

[0095] As noted above, the graphical user interface **100** also provides for voice controlled operation. Verbal commands are provided through voice

conversion software on the computerized device or hand-held device. Thus, the code search can still be conducted via the anatomical images in the same drill-down fashion with auditory commands replacing or in addition to touch screen or keystrokes.

**[0096]** FIG. 6 is a flow diagram **600** depicting operation of the graphical user interface **100** for medical code lookup within a medical system. At step **610** the first region (screen) is displayed and includes at least one anatomical image, selection regions, and navigation regions. The selection process can flow through any of steps **612**, **614** and/or **616**. It should be noted also that the flow diagram **600** is representative of both a single pass through the medical code lookup process and also of the iterative process described above. The iterative process is included within step **614** after an initial selection in step **610**. Control elements are included within each step of the process.

**[0097]** At step **614**, a selection is made from the anatomical images. Typically, two anatomical images are provided with one being female and the other male. Each anatomical image is selectable so that the user can select at least one body part from the anatomical image.

**[0098]** At step **612**, a selection is made from the layer buttons (selection regions). The layer buttons can represent diagnosis codes, procedure codes, or any other type codes suitable for medical code lookup, and are operable for selection and display of other screens. After selection of a layer button, control is transferred to the appropriate screen.

**[0099]** At step **616**, a selection is made from the navigation regions, which are selectable for proceeding to another layer. This step is typically performed without prior selection of a body part. When the navigation buttons are used, it is typically used instead of the other selection methods of the first layer screen. Use of the navigation buttons transfer control directly to either the second, third or fourth layer screen displays.

**[00100]** At step **620**, the second layer screen is displayed as a result of the selection least one anatomical part (body part) or selection region from the first layer screen. The second layer screen includes selectable portions of each selected anatomical part. In the event that this screen is selected from the navigation

regions, it would display selectable portions of a set of images denoting tissue types.

**[00101]** At step **630**, a selection region is selected from the first layer screen and control is transferred to the classification regions of the third layer screen.

**[00102]** At step **640**, the user typically selects a portion of an anatomical part (body part). Multiple portions of a body part may be selected. Additionally, multiple portions of multiple body parts may be selected.

**[00103]** At step **650**, the third layer is displayed depicting selectable classification regions (classification buttons) that correspond to classification groups of medical codes that are relevant to each selected portion from the respective selected body part.

**[00104]** At step **660**, classification regions are selected and at step 670, the fourth layer screen is displayed presenting a result code set that includes medical codes from each classification group that corresponds to each respective selected code set button or image.

**[00105]** At step **680**, the selected codes from the result code set are displayed.

**[00106]** The foregoing description of the exemplary embodiments of the invention has been presented only for the purposes of illustration and description and is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many modifications and variations are possible in light of the above teaching.

**[00107]** The embodiments were chosen and described in order to explain the principles of the invention and their practical application so as to enable others skilled in the art to utilize the invention and various embodiments and with various modifications as are suited to the particular use contemplated. Alternative embodiments will become apparent to those skilled in the art to which the present invention pertains without departing from its spirit and scope. Accordingly, the scope of the present invention is defined by the appended claims rather than the foregoing description and the exemplary embodiments described therein.

## CLAIMS

What is claimed is:

1. A graphical user interface for display of at least one region on a display device within a medical system, wherein the medical system is configured for medical code lookup, the graphical user interface comprising:

a first region configured to display at least one anatomical image on the display device, wherein each anatomical image includes a plurality of selectable anatomical part regions, and to display a plurality of selection regions, wherein display of a corresponding region is dependent upon selection of at least one of the following:

at least one anatomical part region; and

a selection region;

a second region configured to display a secondary anatomical image, wherein the secondary anatomical image displayed is dependent upon at least one selection from the first region, and wherein the secondary anatomical image includes at least one of the following:

a cross section image that includes selectable regions of each selected anatomical part region;

a contents type image that includes a selectable frontal view;

a three dimensional image with selectable regions; and

selectable regions having a visual appearance similar to a button;

a third region configured to display a plurality of selectable classification regions, wherein each classification region corresponds to a classification group of medical codes that is relevant to at least one of the following:

selected sections from a respective selected anatomical part region;

and

a respective selected region;

a fourth region configured to display a results code set upon selection of at least one classification region, wherein the results code set includes medical codes from each respective classification group that corresponds to each selected

classification region, and wherein each medical code in the results code set is selectable;

a plurality of navigation regions, each operable to cause display of a corresponding region; and

a medical code display region within the fourth region, the code display region operable to display at least one selected code from the results code set.

2. The graphical user interface of claim 1, wherein the first region further comprises at least one multiple-selection region operable for selecting at least one additional anatomical part region.

3. The graphical user interface of claim 2, further comprising an all-selection region operable for selecting every anatomical part region from the anatomical image.

4. The graphical user interface of claim 1, wherein the number of selection regions and corresponding layout of the selection regions within the first region correspond to the particular medical codes in use.

5. The graphical user interface of claim 1, wherein the medical codes include at least one of the following: medical procedure codes; medical diagnosis codes; disease classification codes; health related problem codes; mental health codes; anesthesia codes; pharmaceutical codes; topographical codes; and dental codes.

6. The graphical user interface of claim 5, wherein selection regions are applicable for medical diagnosis codes and include at least one of: obstetrical functionality; psychiatric functionality; endocrine functionality; external injury functionality; and supplemental functionality.

7. The graphical user interface of claim 6, wherein one selection region corresponds to obstetrical functionality and is operable for navigation to the second region, and wherein the second region displays an image of a selectable pregnant female abdomen image.

8. The graphical user interface of claim 5, wherein the plurality of selectable classification groups include at least one of the following: psychiatric illness; etiology; external injury cause; and supplemental.

9. The graphical user interface of claim 1, wherein the plurality of navigation regions include navigation regions operable upon selection for: navigation to the first layer diagram; navigation to a previous region; navigation to a next region; and navigation to the fourth region.

10. The graphical user interface of claim 1, further comprising at least one user input selection device.

11. The graphical user interface of claim 1, further comprising a touch screen operable for receiving input and for displaying each region.

12. The graphical user interface of claim 11, wherein the touch screen is operable for a hand-held device.

13. The graphical user interface of claim 12 further comprising at least one button external to the touch screen, and operable to provide input for selection for at least one of the following: region; navigation region; selection region; anatomical part region; at least one section of anatomical part region; classification region; at least one medical code from the results code set; and medical code display region.

14. The graphical user interface of claim 10, wherein the user input selection device includes a voice input interface for receiving voice signals for selection of at least one of the following: region; navigation region; selection region; anatomical part region; at least one section of anatomical part region; classification region; at least one medical code from the results code set; and medical code display region.

15. The graphical user interface of claim 1, further comprising a refinement display region operable for receiving text input to refine medical codes with smart search functionality.

16. The graphical user interface of claim 1, further comprising an output display region operable for at least one of the following: to copy selected codes to a clipboard interface; and to forward selected codes to another system.

17. The graphical user interface of claim 1, wherein at least one selectable region of each region has a visual appearance similar to a button.

18. The graphical user interface of claim 17, wherein the visual appearance of each selectable region is similar to an icon.

19. A method for displaying a graphical user interface for medical code lookup on a display device within a medical system, the method comprising:

displaying a first region to include:

at least one anatomical image for selection of at least one anatomical part region and subsequent display of a corresponding region;

a plurality of selection regions operable for selection and display of another region;

upon selection of at least one anatomical part region from the first region, displaying a second region that includes a secondary anatomical image dependent upon selections from the first region, and wherein the secondary anatomical image includes at least one of the following:

a cross section image that includes selectable regions of each selected anatomical part region;

a contents type image that includes a selectable frontal view;

a three dimensional image with selectable regions; and

selectable regions having a visual appearance similar to a button;

upon selection from the secondary anatomical image, displaying a third region that includes a plurality of selectable classification regions that correspond

to a classification group of medical codes that is relevant to selected regions from the secondary anatomical image;

upon selection of at least one classification region, displaying a fourth region wherein a results code set includes selectable medical codes from each respective classification group that corresponds to each respective classification region;

displaying a plurality of navigation regions within each region, wherein the navigation regions are operable to cause display of a corresponding region; and

displaying at least one selected code from the results code set to a separate medical code display region.

20. A computer-implemented method for displaying a graphical user interface for medical code lookup on a display device within a medical system, the method comprising:

computer readable code that causes display of a first region to include:

at least one anatomical image for selection of at least one anatomical part region and subsequent display of a corresponding region;

a plurality of selection regions operable for selection and display of another region;

computer readable code that, upon selection of at least one anatomical part region from the first region, causes display of a second region that includes a secondary anatomical image dependent upon selections from the first region, and wherein the secondary anatomical image includes at least one of the following:

a cross section image that includes selectable regions of each selected anatomical part region; and

a contents type image that includes a selectable frontal view;

a three dimensional image with selectable regions; and

selectable regions having a visual appearance similar to a button;

computer readable code that, upon selection from the secondary anatomical image, causes display of a third region that includes a plurality of selectable classification regions that correspond to a classification group of medical codes that is relevant to selected regions from the secondary anatomical image;

computer readable code that, upon selection of at least one classification region, causes display of a fourth region wherein a results code set includes selectable medical codes from each respective classification group that corresponds to each respective classification region;

computer readable code that causes display of a plurality of navigation regions within each region, wherein the navigation regions are operable to cause display of a corresponding region; and

computer readable code that causes display of at least one selected code from the results code set to a separate medical code display region.

21. An apparatus for locating a code, said apparatus comprising:
- an output device selectively displaying a plurality of indicia;
  - an input device allowing selection of at least one of said plurality of indicia;
- and
- a processor executing a process including:
    - a) displaying at least one of said plurality of indicia through said output device, said at least one of said plurality of indicia representing an anatomical part;
    - b) iteratively displaying another one of said plurality of indicia through said output device until said another one of said plurality of indicia corresponds to said code, said another one of said plurality of indicia related to a selected region of said at least one of said plurality of indicia, said another one of said plurality of indicia defining a sub-set of said anatomical part, said selected region defining at least one code related to said sub-set of said anatomical part; and
    - c) displaying said code through said output device.

22. The apparatus of claim 21, wherein said input device is a touch screen.

23. The apparatus of claim 21, wherein said input device is at least one of the following: mouse, keyboard, scroll device, voice input.

24. The apparatus of claim 21, wherein said output device is a touch screen.
25. The apparatus of claim 21, wherein said output device is a graphical display.

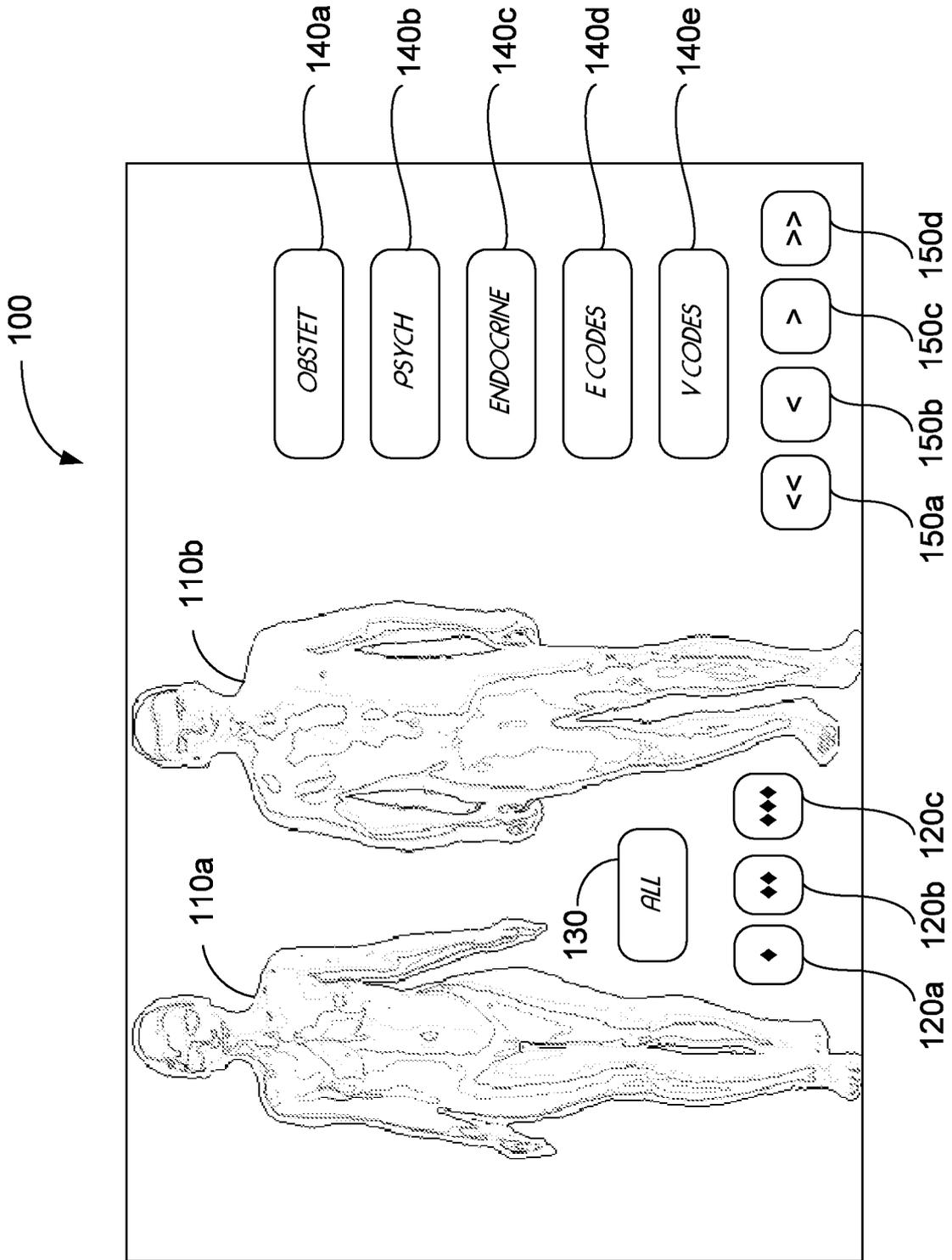


FIG. 1

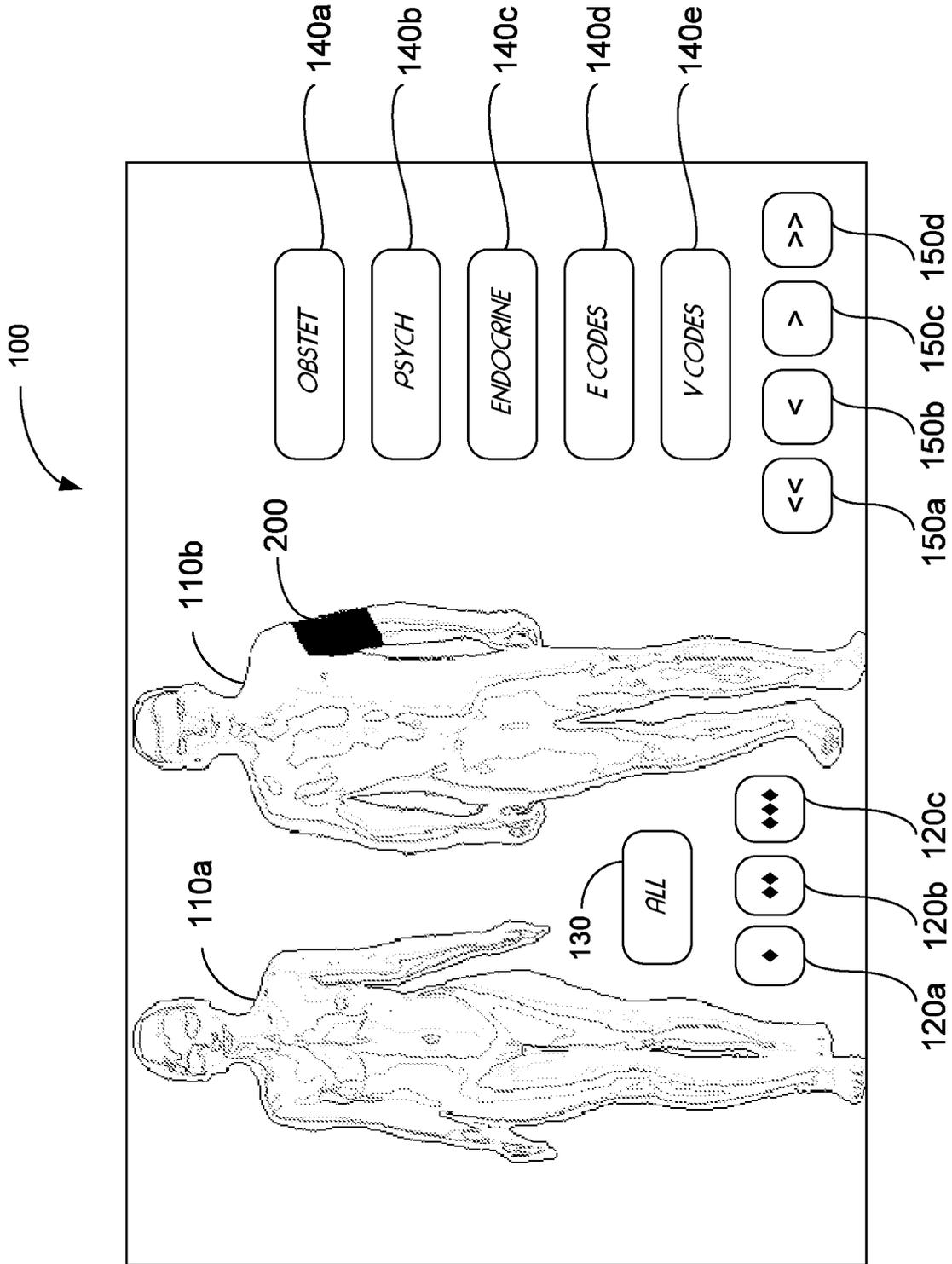


FIG. 2

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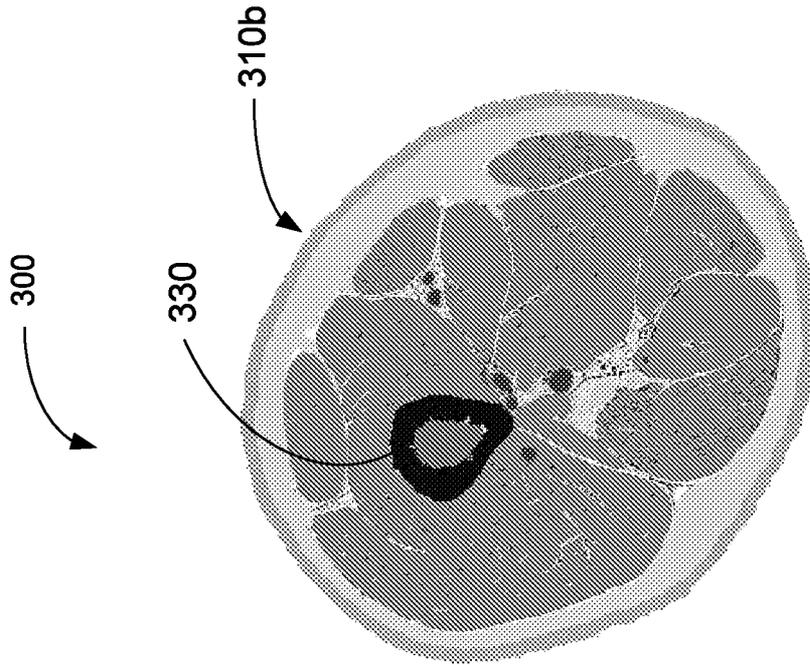


FIG. 3B

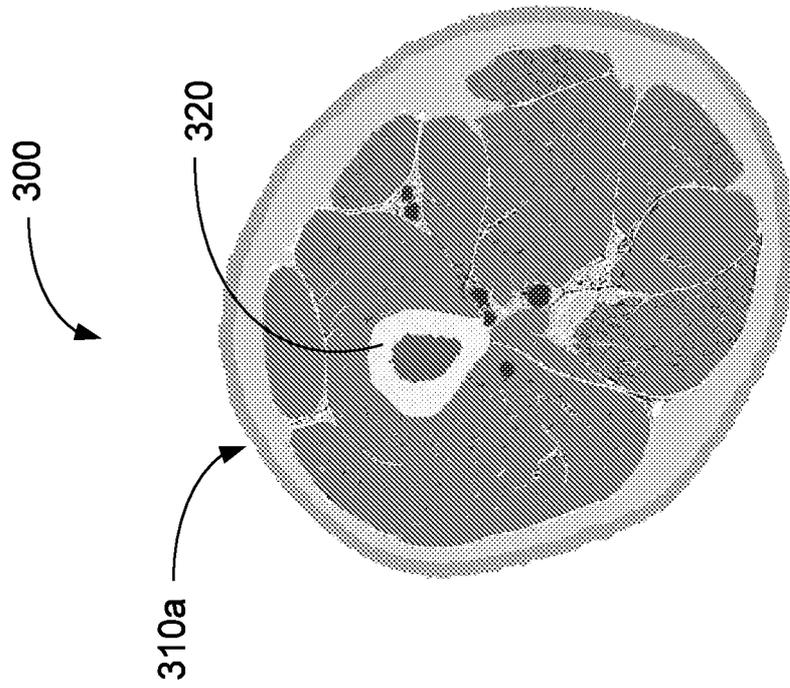


FIG. 3A

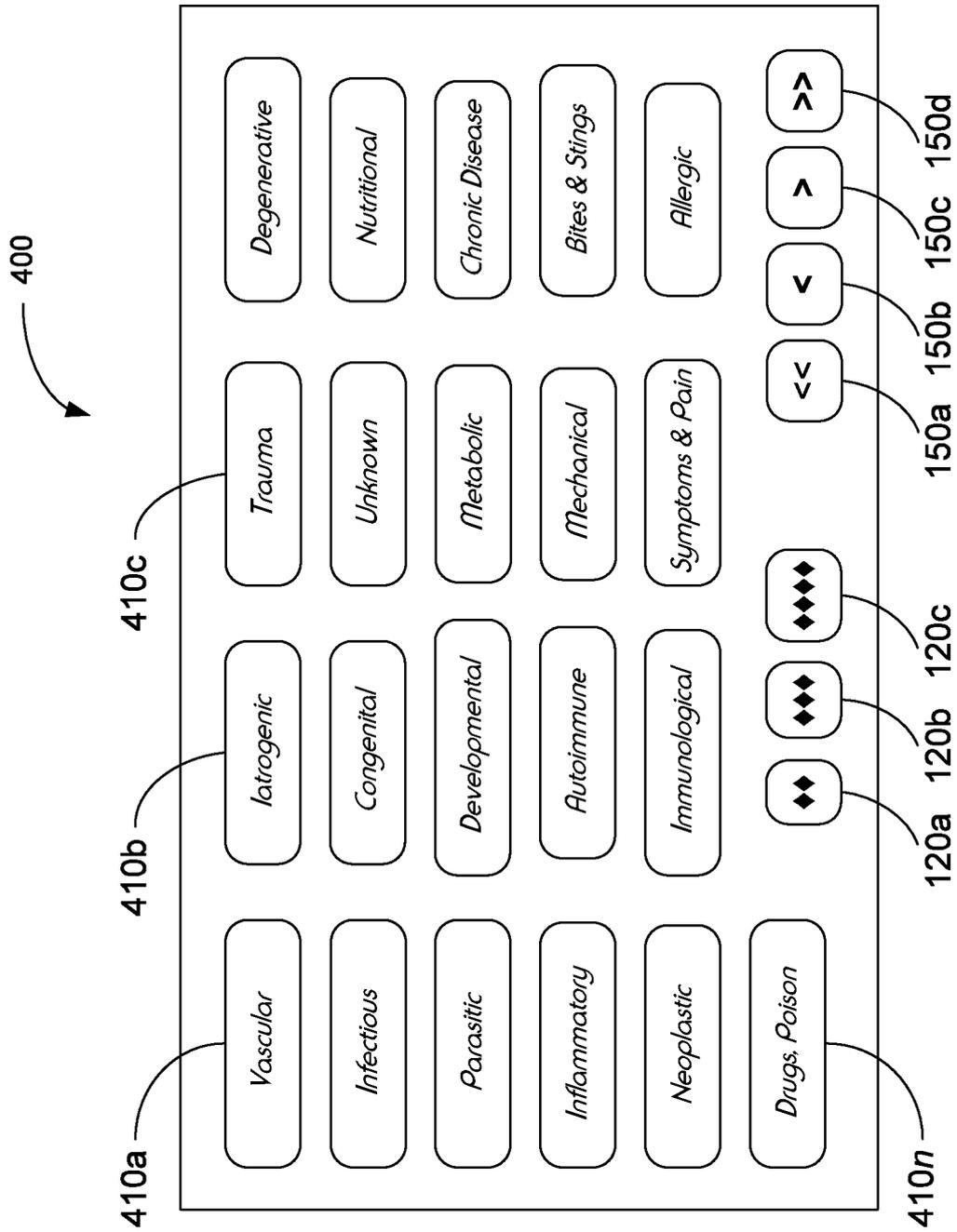


FIG. 4

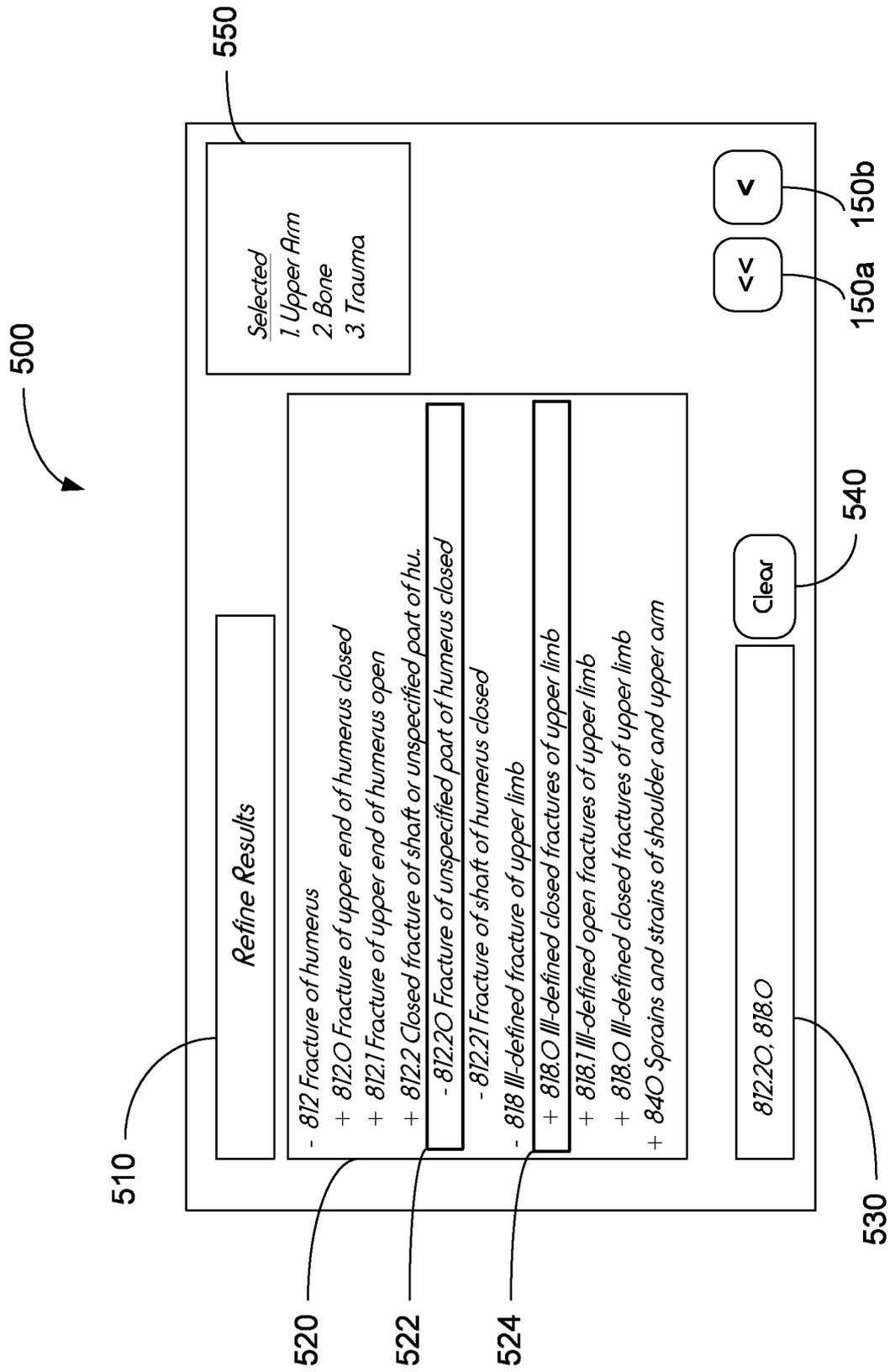


FIG. 5

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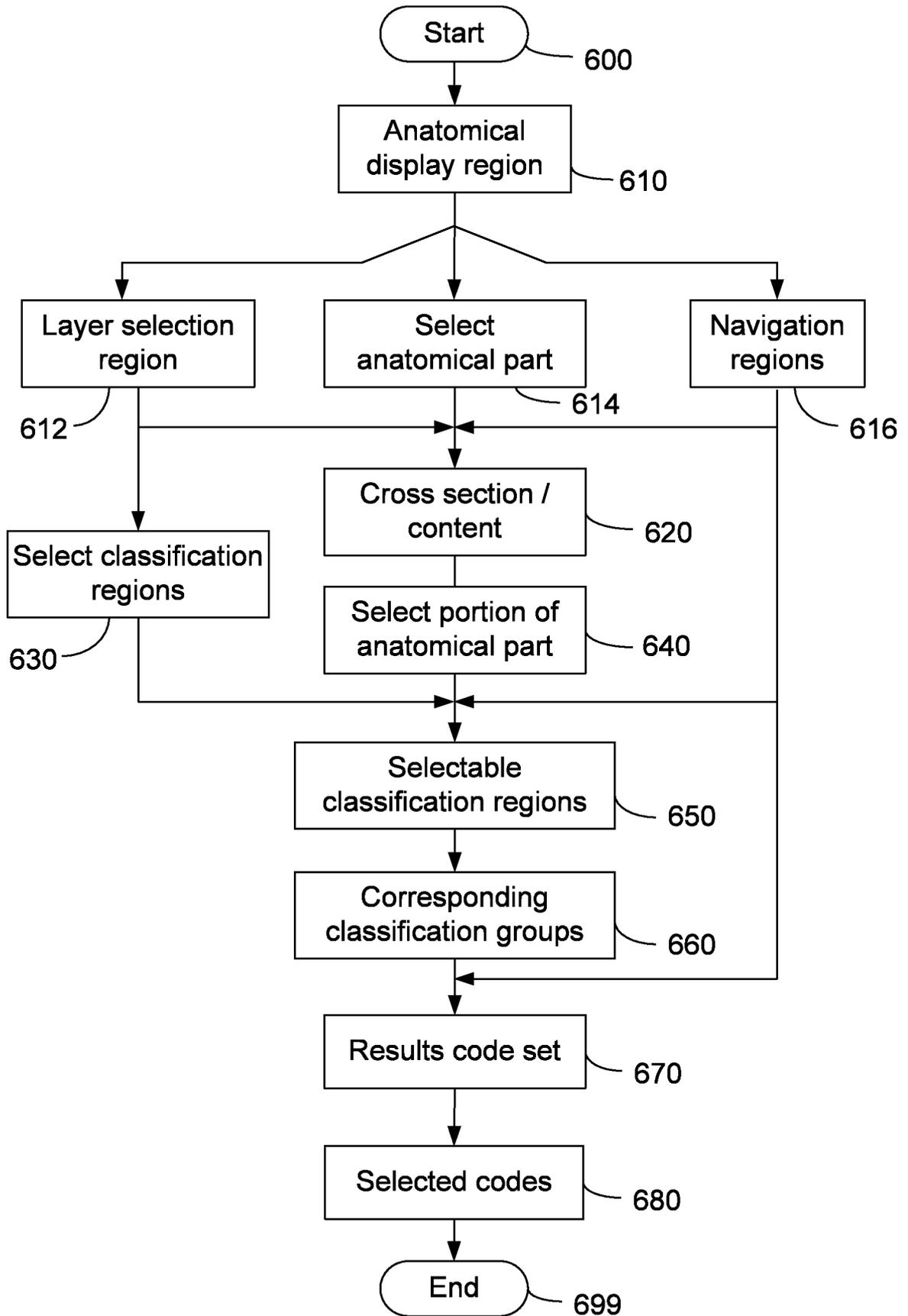


FIG. 6

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 10/40236

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06Q 10/00 (2010.01)

USPC - 705/2

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)  
USPC: 705/2Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
USPC: 705/1.1, 2, 3, 7, 500; 382/100, 128, 181, 182, 224; 715/700, 716, 762 (keyword limited; terms below)

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

Electronic databases: PubWEST(PGPB, USPT, EPAB, JPAB); Google Scholar

Search Terms Used: GUI, UI, interface, graphic, menu, generate, produce, make, create, display, output, show, compile, anatomy, body, bodies, human, organism, model, interface, representation, diagram, select, click, choose, highlight, touch, chosen, pick etc.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 2009/0070140 A1 (Morsch et al.) 12 March 2009 (12.03.2009), see entire document; especially para [0006], [0008], [0027]-[0031], [0033], [0035], [0039]-[0044], [0046]-[0053], [0055], [0058], Fig. 2-3, 5A-5D	1-6, 8-14, and 16-25 ----- 7 and 15
Y	US 2008/0273774 A1 (Mikhail et al.) 06 November 2008 (06.11.2008), see para [0054], Fig. 1	7
Y	US 2003/0146942 A1 (Helgason et al.) 07 August 2003 (07.08.2003), see para [0021]	15
A	US 2009/0037223 A1 (Green et al.) 05 February 2009 (05.02.2009), see entire document;	1-25
A	US 2007/0076931 A1 (Haider et al.) 05 April 2007 (05.04.2007), see entire document	1-25
A	US 2006/0173858 A1 (Cantlin et al.) 03 August 2006 (03.08.2006), see entire document	1-25
A	US 2005/0283387 A1 (Donoghue et al.) 22 December 2005 (22.12.2005), see entire document	1-25
A	US 2005/0273363 A1 (Lipscher et al.) 08 December 2005 (08.12.2005), see entire document	1-25

 Further documents are listed in the continuation of Box C.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

17 August 2010 (17.08.2010)

Date of mailing of the international search report

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