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(54) **METHOD OF ULTRASONIC IMAGING**

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(57) **ABSTRACT**

A method of ultrasonic imaging includes displaying a first ultrasonic image, receiving an operator's input defining a region of interest, creating a first time intensity curve for the region of interest in the first ultrasonic image, displaying the first time intensity curve on a display device with the first ultrasonic image, and storing information on a position of the region of interest in a non-transitory storage medium. The method includes displaying a second ultrasonic image, reading information on the position from the non-transitory storage medium, creating a second time intensity curve for the region of interest in the second ultrasonic image; and displaying the second time intensity curve on the display device with the second ultrasonic image.

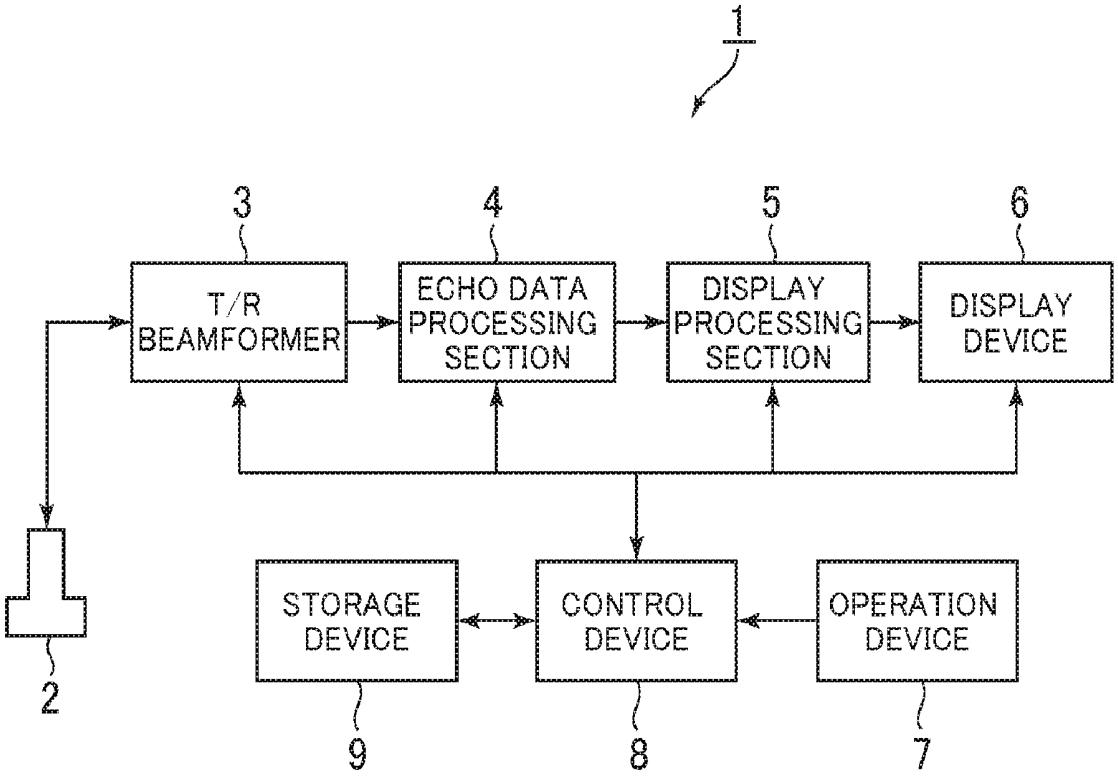


FIG.1

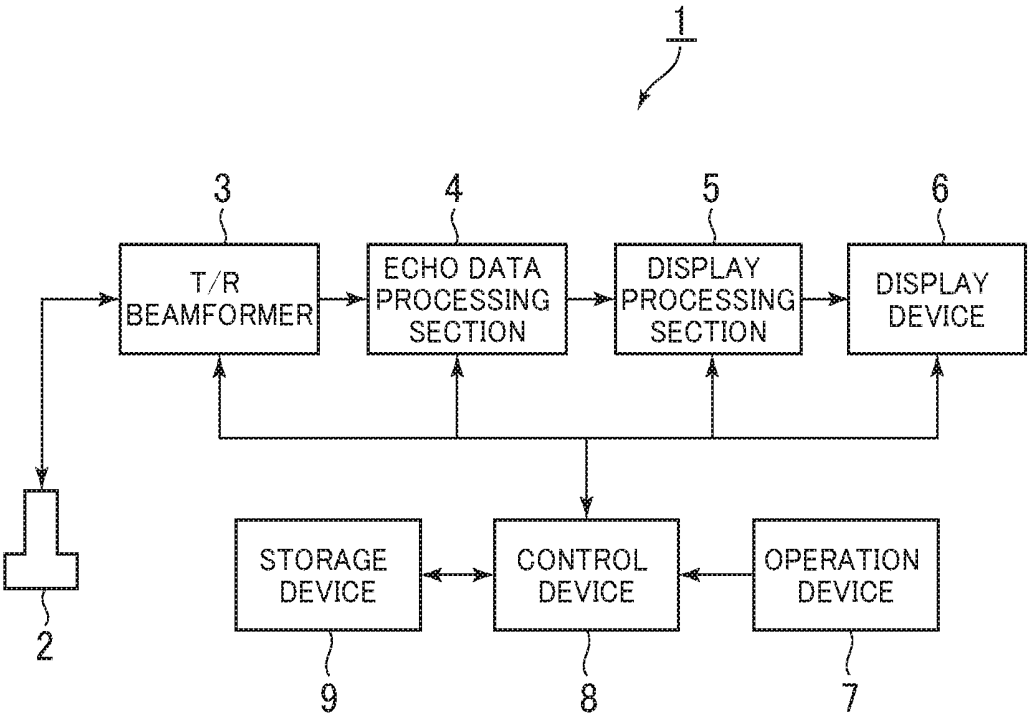

1
3
4
5
6
T/R BEAMFORMER
ECHO DATA PROCESSING SECTION
DISPLAY PROCESSING SECTION
DISPLAY DEVICE
2
STORAGE DEVICE
CONTROL DEVICE
OPERATION DEVICE
9
8
7

FIG.2

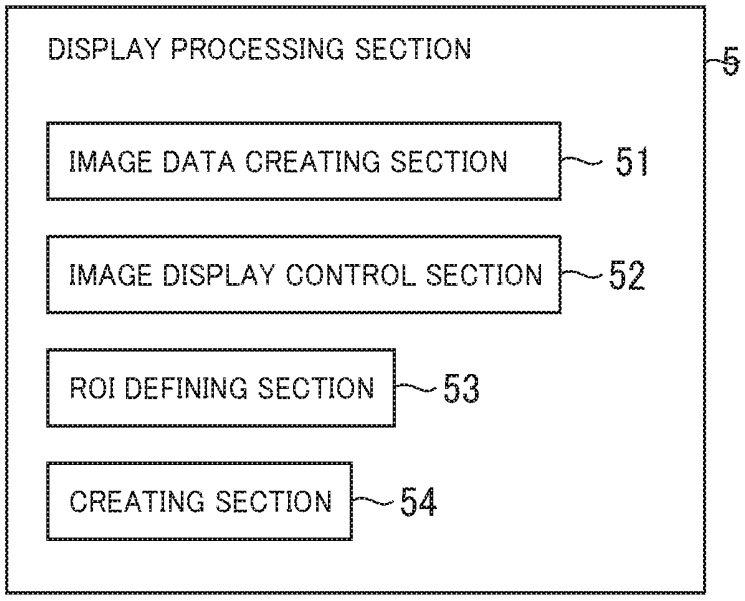

DISPLAY PROCESSING SECTION
5
IMAGE DATA CREATING SECTION
51
IMAGE DISPLAY CONTROL SECTION
52
ROI DEFINING SECTION
53
CREATING SECTION
54

FIG.3

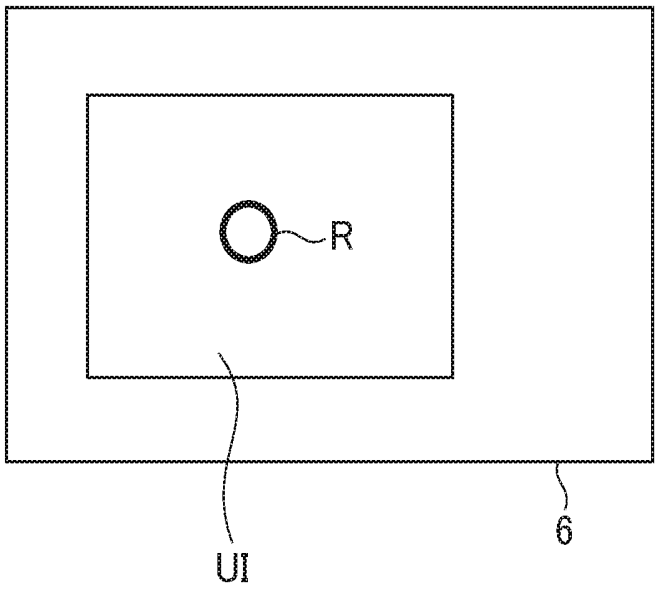


FIG.4

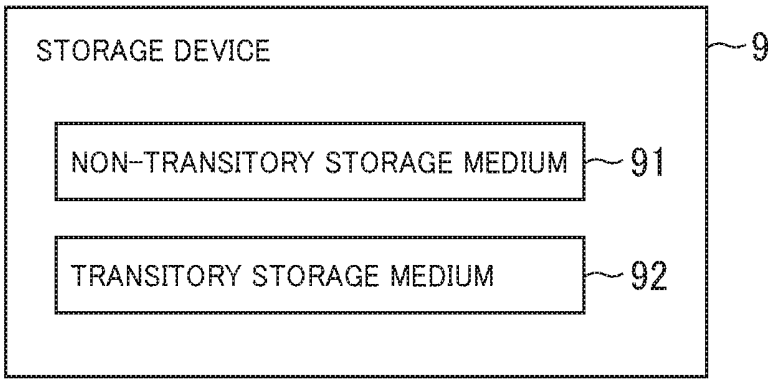

STORAGE DEVICE
9
NON-TRANSITORY STORAGE MEDIUM
91
TRANSITORY STORAGE MEDIUM
92

FIG.5

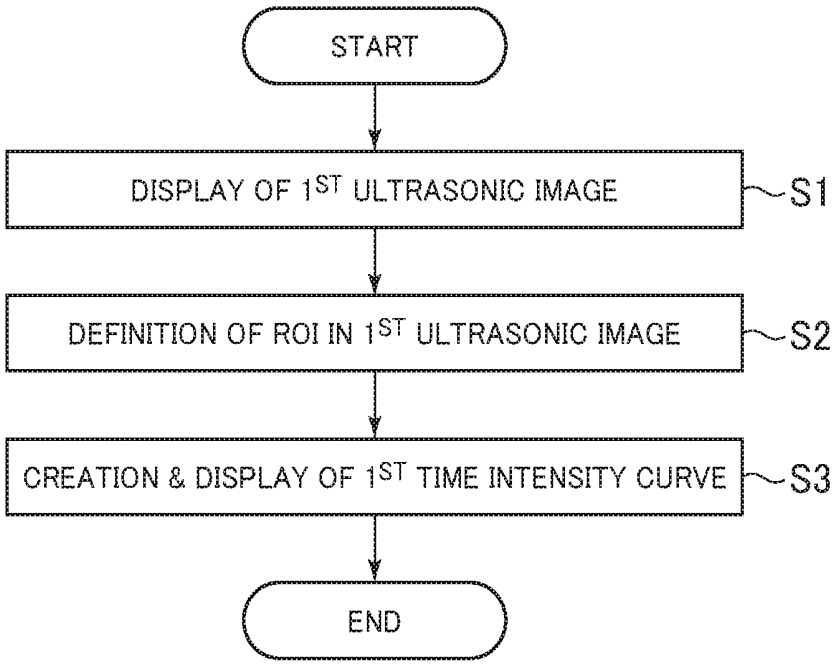

START
DISPLAY OF 1ST ULTRASONIC IMAGE
S1
DEFINITION OF ROI IN 1ST ULTRASONIC IMAGE
S2
CREATION & DISPLAY OF 1ST TIME INTENSITY CURVE
S3
END

FIG.6

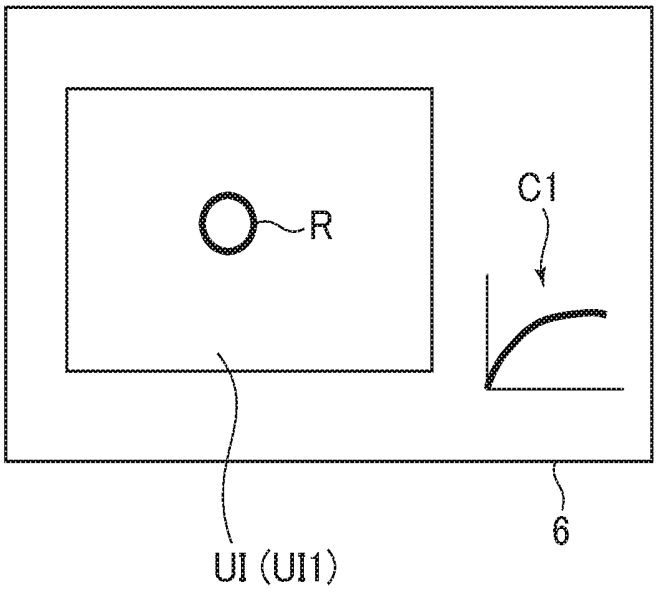


FIG.7

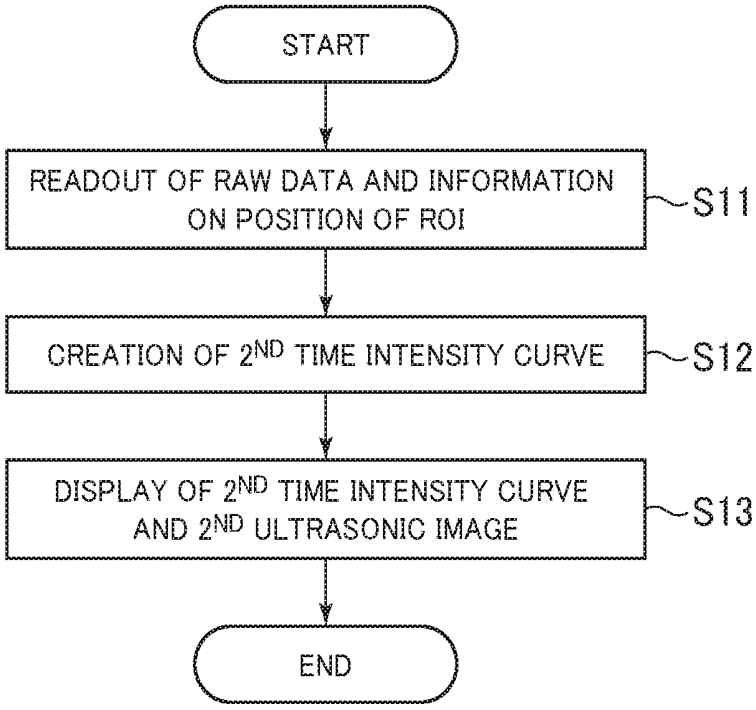

START
READOUT OF RAW DATA AND INFORMATION ON POSITION OF ROI
S11
CREATION OF 2ND TIME INTENSITY CURVE
S12
DISPLAY OF 2ND TIME INTENSITY CURVE AND 2ND ULTRASONIC IMAGE
S13
END

FIG.8

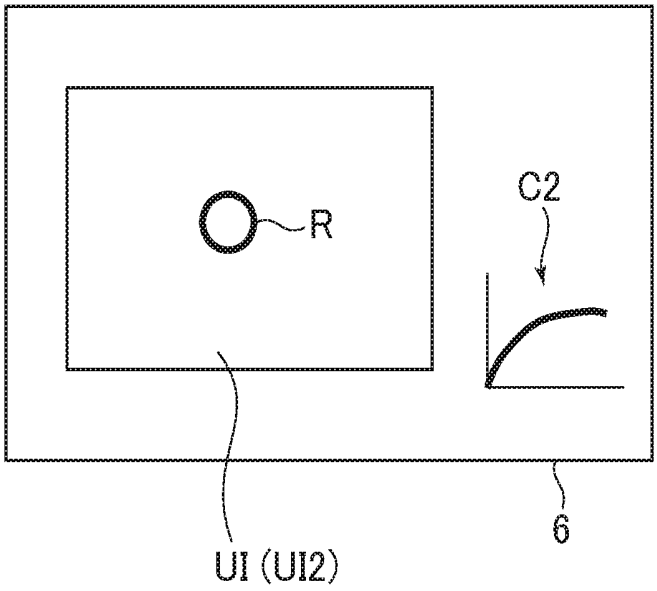


FIG.9

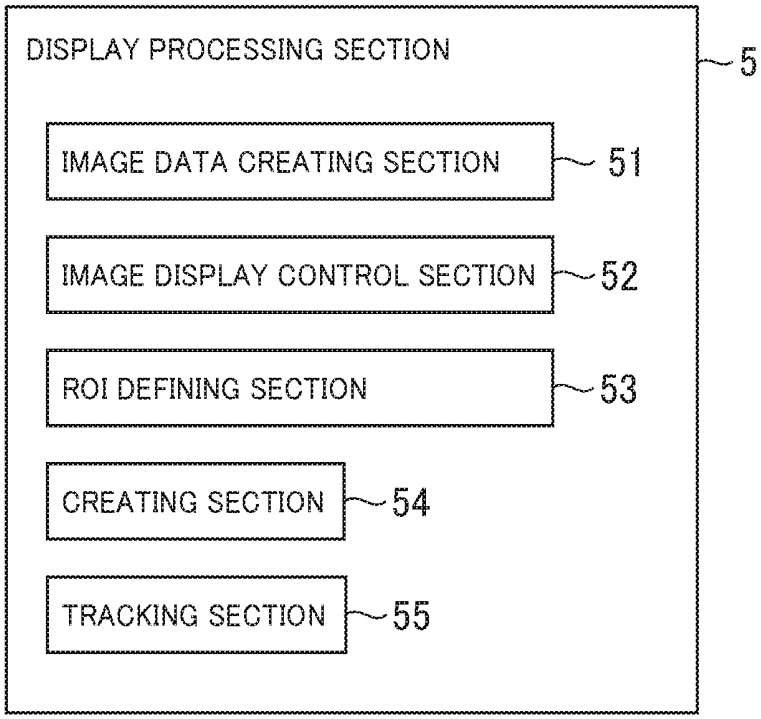
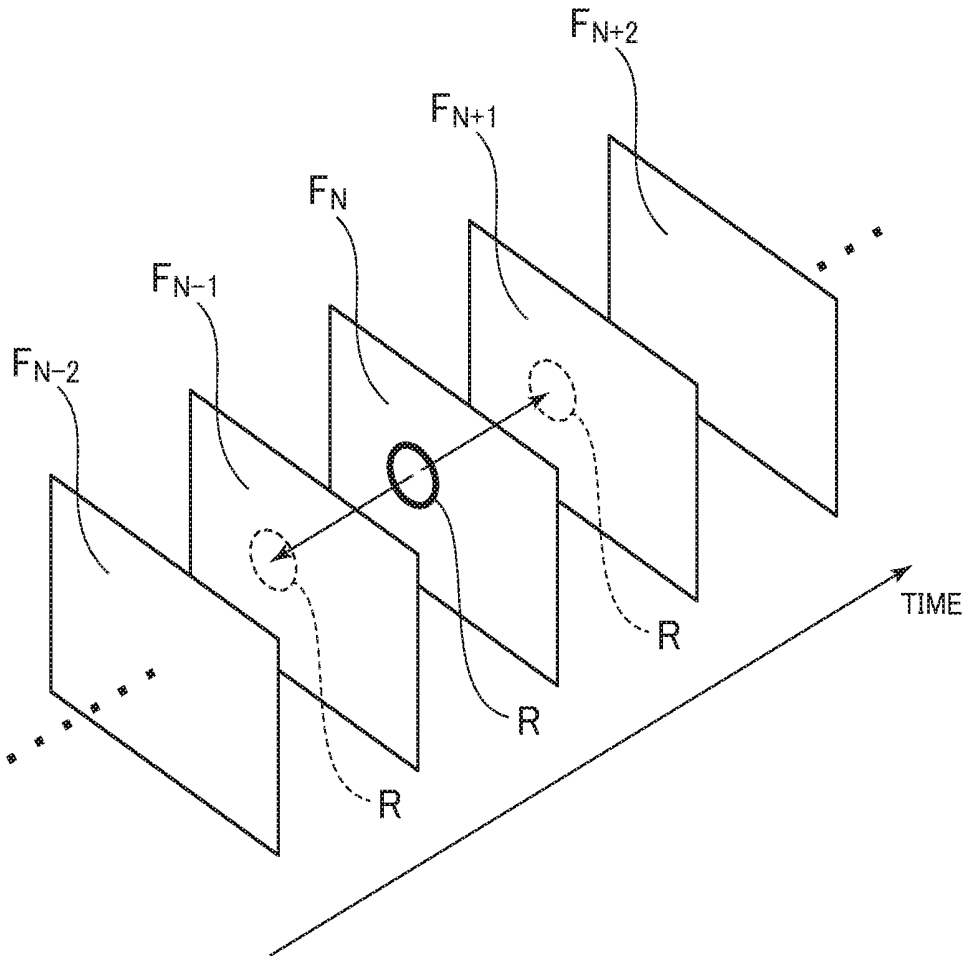

DISPLAY PROCESSING SECTION
5
IMAGE DATA CREATING SECTION
51
IMAGE DISPLAY CONTROL SECTION
52
ROI DEFINING SECTION
53
CREATING SECTION
54
TRACKING SECTION
55

FIG.10



METHOD OF ULTRASONIC IMAGING

FIELD OF INVENTION

[0001] The present invention relates to a method for displaying a curve of a temporal change of brightness, i.e., a TIC (Time Intensity Curve) in a region of interest defined in an ultrasonic image.

BACKGROUND OF INVENTION

[0002] A TIC is a graph having average signal intensity for a region of interest defined in an ultrasonic image on a vertical axis and time on a horizontal axis. For example, when it is desired to observe a difference in inflow and outflow of a contrast medium between the inside and outside of a tumor, a region of interest is defined in a contrast image in the inside and outside of the tumor. By observing the TIC in this condition, a difference in temporal change may be visually/quantitatively evaluated.

BRIEF DESCRIPTION OF THE INVENTION

[0003] Purposes for which the TIC is used include a study purpose and a presentation purpose. The shape of a region of interest and the position where it should be placed have been determined relying upon various opinions including, for example, the opinion that it is preferable to draw a region of interest freehand so that the region has generally the same shape as the contour of a tumor to contain the whole tumor, and the opinion that it is sufficient to place a circular region of interest small enough in the inside of a tumor. Therefore, elaborate processing operations, such as shaping or positioning of a region of interest according to the shape of a tumor or the like are sometimes required, which may take several days. Moreover, after once completing an operation of defining the region of interest to observe a TIC, the operator may sometimes desire to resume the operation and change the position of the previously defined region of interest or add another region of interest.

[0004] As such, the operation of defining or editing a region of interest for which a TIC is to be created may sometimes require resumption after once completing it. In this case, the operation is conventionally redone from the beginning, causing significantly lowered operational efficiency.

[0005] In one aspect, the invention made for solving the aforementioned problem is an ultrasonic diagnostic apparatus comprising: a display device for displaying thereon a first ultrasonic image of a subject; an input device for accepting an operator's input for defining a region of interest in said first ultrasonic image; a creating section for creating a first time intensity curve in said region of interest; and a non-transitory storage medium for storing therein information on a position of said region of interest on said display device and data for said first ultrasonic image, wherein said creating section further creates, after reading said information on a position and said data stored in said non-transitory storage medium, a second time intensity curve in said region of interest whose position is located based on said information on a position in a second ultrasonic image displayed on said display device based on said data.

[0006] According to the invention in the aspect described above, information on a position of a region of interest defined in a first ultrasonic image and data for the first ultrasonic image are stored in a non-transitory storage medium, and a position of the region of interest in a second ultrasonic image displayed on the display device based on the data is located based on the information on a position. Then, a second time intensity curve in the region of interest whose position is thus located is created. Therefore, in the case that after completing an operation of defining a region of interest once, the operator resumes the operation, the region of interest is defined at the position before completion, and therefore, the need for redoing the operation from the beginning is eliminated, thus improving operational efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** is a block diagram showing a general configuration of an ultrasonic diagnostic apparatus in accordance with the present invention.

[0008] FIG. **2** is a block diagram showing a configuration of a display processing section in the ultrasonic diagnostic apparatus shown in FIG. **1**.

[0009] FIG. **3** is a diagram showing a display device on which an ultrasonic image having a region of interest defined therein is displayed.

[0010] FIG. **4** is a block diagram showing a storage device.

[0011] FIG. **5** is a flow chart explaining creation of a first time intensity curve.

[0012] FIG. **6** is a diagram showing the display device on which the first time intensity curve is displayed.

[0013] FIG. **7** is a flow chart explaining creation of a second time intensity curve.

[0014] FIG. **8** is a diagram showing the display device on which the second time intensity curve is displayed.

[0015] FIG. **9** is a block diagram showing a configuration of the display processing section in a variation.

[0016] FIG. **10** is a diagram explaining tracking.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Now an embodiment of the present invention will be described with reference to the drawings. An ultrasonic diagnostic apparatus **1** shown in FIG. **1** comprises an ultrasonic probe **2**, a transmission/reception (T/R) beamformer **3**, an echo data processing section **4**, a display processing section **5**, a display device **6**, an operating device **7**, a control device **8**, and a storage device **9**. The ultrasonic diagnostic apparatus **1** has a configuration as a computer.

[0018] The ultrasonic probe **2** is configured to have a plurality of ultrasonic vibrators (omitted in the drawing) arranged in an array, and it is by the ultrasonic vibrators that ultrasound is transmitted to a subject and echo signals therefrom are received.

[0019] The T/R beamformer **3** supplies to the ultrasonic probe **2** an electric signal for transmitting ultrasound from the ultrasonic probe **2** under specific scan conditions, based on a control signal from the control device **8**. The T/R beamformer **3** also performs signal processing, such as A/D conversion and phased addition processing, on the echo signals received by the ultrasonic probe **2**, and outputs signal-processed echo data to the echo data processing section **4**.

[0020] The echo data processing section **4** performs processing for producing an ultrasonic image on the echo data output from the T/R beamformer **3**. For example, the echo

data processing section **4** performs B-mode processing, such as logarithmic compression processing and envelope detection processing, to create B-mode data.

[0021] Moreover, the echo data processing section **4** may perform processing for producing a contrast image in which a contrast medium administered to the subject is enhanced, on the echo data output from the T/R beamformer **3** to create contrast data. For example, the echo data processing section **4** performs filtering for extracting harmonic components in echo signals. The echo data processing section **4** may perform processing of extracting echo signals of the contrast medium according to a pulse inversion technique. The echo data processing section **4** may also perform processing (amplitude modulation) for extracting signal components of the contrast medium by transmitting ultrasound of different amplitudes and subtracting between echo data based on resulting echo signals.

[0022] The display processing section **5** comprises an image data creating section **51**, an image display control section **52**, a region-of-interest (ROI) defining section **53**, and a creating section **54**, as shown in FIG. **2**. The image data creating section **51** scan-converts the data input from the echo data processing section **4** by a scan converter to create ultrasonic image data.

[0023] As used herein, the data before being scan-converted into the ultrasonic image data will be referred to as raw data. When the raw data is the B-mode data, B-mode image data is created as the ultrasonic image data. When the raw data is the contrast data, contrast image data is created as the ultrasonic image data.

[0024] The image display control section **52** may also create combined image data as the ultrasonic image data, which is obtained by adding the B-mode image data and contrast image data together in a required proportion of addition. The image display control section **52** may create combined image data by creating combined data in which the B-mode data and contrast data are added together in a required proportion of addition, and scan-converting the combined data.

[0025] The image display control section **52** displays an ultrasonic image on the display device **6** based on the ultrasonic image data. The ultrasonic image is, for example, a B-mode image based on the B-mode image data or a contrast image based on the contrast image data. The ultrasonic image may also be a combined image based on the combined image data.

[0026] The image display control section **52** displays a time intensity curve, i.e., a TIC, for the contrast image on the display device **6**. The image display control section **52** is an exemplary embodiment of the image display control section in the present invention. The function by the image display control section **52** is an exemplary embodiment of the image display control function in the present invention.

[0027] The ROI defining section **53** defines a region of interest R in an ultrasonic image UI displayed on the display device **6**, as shown in FIG. **3**. The ultrasonic image UI is a combined image, for example. The ROI defining section **53** defines the region of interest R based on, for example, an operator's input at the operating device **7**. The function of the ROI defining section **53** is an exemplary embodiment of the region-of-interest defining function in the present invention.

[0028] The creating section **54** creates a time intensity curve for the ultrasonic image UI in the region of interest R. Details thereof will be discussed later. The creating section **54** is an exemplary embodiment of the creating section in the present invention. The function of the creating section **54** is an exemplary embodiment of the creating function in the present invention.

[0029] The display device **6** is an LCD (Liquid Crystal Display), an organic EL (Electro-Luminescence) display, or the like. The display device **6** is an exemplary embodiment of the display device in the present invention.

[0030] The operation device **7** is an input device for accepting an operator's input. For example, the operation device **7** is configured to include buttons, a keyboard, etc. for accepting an input of a command and information from the operator, and to further include a pointing device, such as a trackball, and the like. For example, the operating device **7** accepts an operator's input for defining the region of interest R. The operating device **7** is an exemplary embodiment of the input device in the present invention.

[0031] The control device **8** is circuitry for controlling the ultrasonic diagnostic apparatus **1**, and is, for example, a processor such as a CPU (Central Processing Unit). The control device **8** loads thereon programs stored in the storage device **9** to control several sections in the ultrasonic diagnostic apparatus **1**. For example, the control device **8** loads thereon programs stored in the storage device **9**, and executes the functions of the T/R beamformer **3**, echo data processing section **4**, and display processing section **5** by the loaded programs.

[0032] The control device **8** may execute all of the functions of the T/R beamformer **3**, all of the functions of the echo data processing section **4**, and all of the functions of the display processing section **5** by the programs, or execute only part of the functions by the programs. In the case that the control device **8** executes only part of the functions, the remaining functions may be executed by hardware, such as circuitry, other than the control device **8**.

[0033] It should be noted that the functions of the T/R beamformer **3**, echo data processing section **4**, and display processing section **5** may be implemented by hardware, such as circuitry, other than the control device **8**.

[0034] The storage device **9** comprises a non-transitory storage medium **91** and a transitory storage medium **92**, as shown in FIG. **4**. The non-transitory storage medium **91** is, for example, an HDD (Hard Disk Drive), ROM (Read Only Memory), and the like. The non-transitory storage medium **91** may include a portable storage medium, such as a CD (Compact Disk) or a DVD (Digital Versatile Disk). The programs executed by the control device **8** are stored in the non-transitory storage medium **91**. The non-transitory storage medium **91** is an exemplary embodiment of the non-transitory storage medium in the present invention.

[0035] The transitory storage medium **92** is RAM (Random Access Memory), and the like.

[0036] Now an operation of the ultrasonic diagnostic apparatus **1** in the present embodiment will be described. First, ultrasound transmission/reception is performed by the ultrasonic probe **2** to/from a subject into which a contrast medium is injected, and echo data in a plurality of frames are acquired, based on which raw data in the plurality of frames are created. The raw data is, for example, B-mode data, contrast data, and combined data. The raw data in the plurality of frames are stored in the non-transitory storage medium **91** or transitory storage medium **92**. A B-mode image based on the B-mode data and a contrast image based

on the contrast data, or a combined image in which the images are combined together may be displayed on the display device **6**.

[0037] Next, creation of a time intensity curve (TIC) based on the raw data stored in the non-transitory storage medium **91** or transitory storage medium **92** will be described with reference to the flow chart in FIG. **5**. The creation of the time intensity curve may be performed in the presence or absence of the subject from which the raw data has been acquired. In the case that the creation is performed in the absence of the subject, the raw data is stored in the non-transitory storage medium **91**.

[0038] First, at Step S**1**, the image display control section **52** displays on the display device **6** an ultrasonic image UI based on the raw data stored in the non-transitory storage medium **91** or transitory storage medium **92**. For example, the image display control section **52** may display a combined image as the ultrasonic image UI. However, the ultrasonic image UI is not limited to the combined image. The ultrasonic image UI displayed here will be referred to as first ultrasonic image UI**1**.

[0039] Next, at Step S**2**, the ROI defining section **53** defines a region of interest R in the first ultrasonic image UI**1** displayed on the display device **6**. Once the operating device **7** has accepted an operator's input for defining the region of interest R, the ROI defining section **53** performs definition of the region of interest R. Moreover, once the operating device **7** has accepted the operator's input for defining the region of interest R, the control section **8**, for example, stores in the non-transitory storage medium **91** information on a position of the region of interest R on the display device **7**. The information on a position of the region of interest R is stored in connection with the raw data. The function of the aforementioned storage by the control section **8** is an exemplary embodiment of the storing function in the present invention.

[0040] It should be noted that the timing of when to store the information on a position of the region of interest R is not limited to the aforementioned timing. For example, the information on a position of the region of interest R may be stored when a time intensity curve C is created at Step S**3**.

[0041] Next, at Step S**3**, the creating section **54** creates a time intensity curve C in the region of interest R defined at Step S**2**. The time intensity curve C is a curve representing a temporal change of brightness of the ultrasonic image UI, which is a temporal change of the average brightness, for example, within the region of interest R. More specifically, the creating section **54** creates the time intensity curve C based on values of the ultrasonic image data (combined image data or contrast image data) or raw data (combined data or contrast data).

[0042] The time intensity curve C here will be referred to as first time intensity curve C**1**. The image display control section **52** displays the first time intensity curve C**1** side by side with the first ultrasonic image UI on the display device **6**, as shown in FIG. **6**.

[0043] In the case that the raw data is stored only in the transitory storage medium **92**, the raw data is stored in the non-transitory storage medium **91** at Step S**3**, for example. The non-transitory storage medium **91** may also store therein the ultrasonic image data.

[0044] The non-transitory storage medium **91** may also store therein conditions for creating the first time intensity curve C**1**. The conditions for creating the first time intensity curve C**1** may include, for example, one required to draw the time intensity curve, such as a curve rendering method (a function, etc.).

[0045] Next, a case in which after the first time intensity curve C**1** is displayed at Step S**3**, the operator completes the operation once and then resumes display of the time intensity curve will be described with reference to the flow chart in FIG. **7**. First, at Step S**11**, the creating section **54** reads the raw data and information on a position of the region of interest R stored in the non-transitory storage medium **91**. Next, at Step S**12**, the creating section **54** creates a time intensity curve C in the region of interest R whose information on a position is read from the non-transitory storage medium **91**, based on the raw data read from the non-transitory storage medium **91**. The time intensity curve C created here will be referred to as second time intensity curve C**2**.

[0046] The creating section **54** uses the information on a position read from the non-transitory storage medium **91** to identify ultrasonic image data or raw data of a portion for which the second time intensity curve C**2** is to be created, and creates the second time intensity curve C**2**. Moreover, the creating section **54** creates the second time intensity curve C**2** under the conditions stored in the non-transitory storage medium **91**.

[0047] The data for which the second time intensity curve C**2** is to be created in the ultrasonic image data or raw data is data of a portion in which the region of interest R is defined in the ultrasonic image displayed at Step S**13** discussed later. Therefore, identifying data of a portion for which the second time intensity curve C**2** is to be created is equivalent to locating the position of the region of interest in the ultrasonic image.

[0048] Next, at Step S**13**, the image display control section **52** displays the second time intensity curve C**2** created at Step S**12** on the display device **6**, as shown in FIG. **8**. The image display control section **52** also displays the ultrasonic image UI based on the raw data read at Step S**1** side by side with the second time intensity curve C**2**. The ultrasonic image UI is a combined image, for example. The ultrasonic image UI displayed here will be referred to as second ultrasonic image UI**2**. The second ultrasonic image UI**2** is the same image as the first ultrasonic image UI**1**. Second ultrasonic images UI**2** in a plurality of frames may be displayed.

[0049] The ROI defining section **53** displays the region of interest R in a portion located at Step S**2** in the second ultrasonic image UI**2**.

[0050] At this time, the operator may perform an input at the operating device **7** for modifying the region of interest R displayed on the display device **6**. According to the input, the ROI defining section **53** modifies the region of interest R. The modification of the region of interest R may include modification of the position of the region of interest R or modification of the shape of the region of interest R.

[0051] The operator may also perform an input at the operating device **7** for defining a new region of interest in the second ultrasonic image UI**2**. According to the input, the ROI defining section **53** refreshes definition of the region of interest.

[0052] According to the embodiment described above, even in the case in creating a time intensity curve C that the operator cannot complete on a single try a processing operation for obtaining a region of interest at an optimal

position and of an optimal shape or an operation of defining a region of interest for which a time intensity curve C suitable for diagnosis is to be obtained, and resumes the operation after completing it, he/she does not have to redo the operation from the beginning. Thus, operational efficiency may be improved. Moreover, the operator can freely suspend operations.

[0053] Next, a variation of the embodiment will be described. As shown in FIG. **9**, the display processing section **5** may comprise a tracking section **55**. The tracking section **55** tracks the portion in which the region of interest R is defined in each of the first ultrasonic images UI**1** and second ultrasonic images UI**2** across a plurality of frames. In the case that the same portion in the subject moves in ultrasonic images UI across a plurality of frames caused by the subject's body motion or movement of the ultrasonic probe **2**, the tracking section **55** tracks the movement to follow the region of interest. For example, the tracking section **55** calculates a correlation between B-mode images in two frames to detect movement of the portion in which the region of interest R is defined. The tracking section **55** is an exemplary embodiment of the tracking section in the present invention.

[0054] In this variation, once the region of interest R has been defined in the first ultrasonic image UI**1** at Step S**2**, frame information for identifying a frame of the first ultrasonic image UI**1** for which the operator has defined the region of interest R is stored in the non-transitory storage medium **91**.

[0055] Moreover, at Step S**3**, the tracking section **55** tracks the portion in which the region of interest R is defined in each of the first ultrasonic images UI**1** across a plurality of frames. The tracking section **55** may perform tracking in the B-mode image data from which the first ultrasonic image UI**1** is produced. The creating section **54** then creates the first time intensity curve C**1** in the region of interest R whose position is located by tracking by the tracking section **55**.

[0056] The non-transitory storage medium **91** stores therein information indicating whether or not the tracking has been performed by the tracking section **55** at Step S**3**. The operator may perform an input at the operating device **7** for selecting whether to enable or disable the tracking function by the tracking section **55**.

[0057] Moreover, in this variation, at Step S**12**, when information indicating that the tracking has been performed at Step S**3** is stored, the tracking section **55** tracks the portion in which the region of interest R is defined in each of the second ultrasonic images UI**2** across a plurality of frames. The tracking section **55** may perform tracking in the B-mode image data from which the second ultrasonic image UI**2** is produced.

[0058] The tracking section **55** starts tracking with reference to the position of the region of interest R in the second ultrasonic image UI**2** in the same frame as that identified by the frame information stored in the non-transitory storage medium **91**. For example, in the case that the frame information stored in the non-transitory storage medium **91** indicates an N^{th} frame, the tracking section **55** starts tracking with reference to the position of the region of interest R in the second ultrasonic image UI**2** in the N^{th} frame F_N, as shown in FIG. **10**. Specifically, the tracking section **55** calculates a correlation between the frame F_N and its immediately preceding frame F_{N-1} to calculate movement of the region of interest R between the frame F_N and frame F_{N-1}. The tracking section **55** also calculates a correlation between the frame F_N and its immediately following frame F_{N+1} to calculate movement of the region of interest R between the frame F_N and frame F_{N-1}.

[0059] Once the position of the region of interest R has been located in the frame F_{N-1}, the tracking section **55** calculates movement of the region of interest R between the $frame_{N-1}$ and $frame_{N-2}$. Similarly thereafter, the tracking section **55** calculates movement of the region of interest R up to a first frame (a frame acquired temporally first) to locate its position. Moreover, once the position of the region of interest R has been located in the frame F_{N+1}, the tracking section **55** calculates movement of the region of interest R between the $frame_{N+1}$ and $frame_{N+2}$. Similarly thereafter, the tracking section **55** calculates movement of the region of interest R down to a last frame (a frame acquired temporally last) to locate its position.

[0060] The creating section **54** creates, at Step S**12**, a second time intensity curve C**2** in the region of interest R whose position is located by tracking by the tracking section **55**. At Step S**13**, the second time intensity curve C**2** in the tracked region of interest R is displayed.

[0061] Moreover, in the case that second ultrasonic images UI**2** in a plurality of frames are displayed at Step S**13**, the ROI defining section **53** displays the region of interest R whose position is located by tracking by the tracking section **55** in each of the second ultrasonic images UI**2** in the plurality of frames.

[0062] According to this variation, even in the case that the subject's body motion or movement of the ultrasonic probe **2** is encountered, a first time intensity curve C**1** before suspending operations and a second time intensity curve C**2** after the suspension may be displayed as time intensity curves in the same portion in the subject.

[0063] While the present invention has been described with reference to the embodiments, it will be easily recognized that the present invention may be practiced with several modifications without changing the spirit and scope thereof. For example, on the display device **6**, a B-mode image and a contrast image may be displayed side by side. In this case, for example, the operator may define a region of interest in the B-mode image; moreover, a time intensity curve at a position in the contrast image corresponding to the position of the region of interest may be created.

We claim:

1. A method of ultrasound imaging comprising:

displaying a first ultrasonic image based on a subject on a display device, where the first ultrasonic image is based on ultrasonic data;

receiving an operator's input through an input device for defining a region of interest in the first ultrasonic image;

creating a first time intensity curve for the first ultrasonic image in the region of interest;

displaying the first time intensity curve on the display device with the first ultrasonic image;

storing information on a position of the region of interest in a non-transitory storage medium;

displaying a second ultrasonic image of the subject on the display device, where the second ultrasonic image is based on the ultrasonic data;

reading the information on the position from the non-transitory storage medium;

creating a second time intensity curve for the second ultrasonic image in the region of interest, where the position of the region of interest is based on the information read from the non-transitory storage medium; and

displaying the second time intensity curve on the display device with the second ultrasonic image.

2. The method of claim **1**, further comprising displaying an image display control section on the display device.

3. The method of claim **1**, further comprising receiving an input to modify the region of interest in the second ultrasonic image.

4. The method of claim **1**, further comprising receive an input for defining a new region of interest in the second ultrasound image.

5. The method of claim **1**, further comprising simultaneously displaying both the first time intensity curve and the second time intensity curve on the display device.

6. The method of claim **1**, wherein the ultrasonic data comprises a plurality of frames and further comprising tracking the position of the region of interest in the plurality of frames.

7. The method of claim **1**, where the ultrasonic data comprises raw data.

8. The method of claim **1**, where the ultrasonic data is obtained by scan-converting the raw data.

9. The method of claim **1**, further comprising storing conditions for creating the first time intensity curve in the non-transitory storage medium.

10. The method of claim **9**, further comprising reading the conditions for creating the first time intensity curve from the non-transitory storage medium, and wherein said creating the second time intensity curve comprises creating the second time intensity curve under the conditions for creating the first time intensity curve stored in the non-transitory storage medium.

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专利名称(译)	超声成像方法		
公开(公告)号	US20180214132A1	公开(公告)日	2018-08-02
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摘要(译)

一种超声成像方法，包括显示第一超声图像，接收定义感兴趣区域的操作者输入，为第一超声图像中的感兴趣区域创建第一时间强度曲线，在显示设备上显示第一时间强度曲线。第一超声图像，并将关于感兴趣区域的位置的信息存储在非暂时性存储介质中。该方法包括显示第二超声图像，从非暂时性存储介质读取关于位置的信息，为第二超声图像中的感兴趣区域创建第二时间强度曲线;用第二超声波图像在显示装置上显示第二时间强度曲线。