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(54) Ultrasound diagnostic apparatus

(57) An ultrasound diagnostic apparatus which forms a three-dimensional bloodstream image by reference to volume data obtained from a three-dimensional space within a living organism. Binarization processing (26) and three-dimensional labeling processing (30) are applied to velocity volume data, to thereby generate three-dimensional mask data (34). At this time, because a bloodstream object has a larger volume size than a noise object, this difference in volume size is utilized to discriminate between a bloodstream portion and a noise portion. Bloodstream volume data are then generated from the velocity volume data and by reference to the three-dimensional mask data. Then, a three-dimensional bloodstream image (40) is formed by reference to the bloodstream volume data.

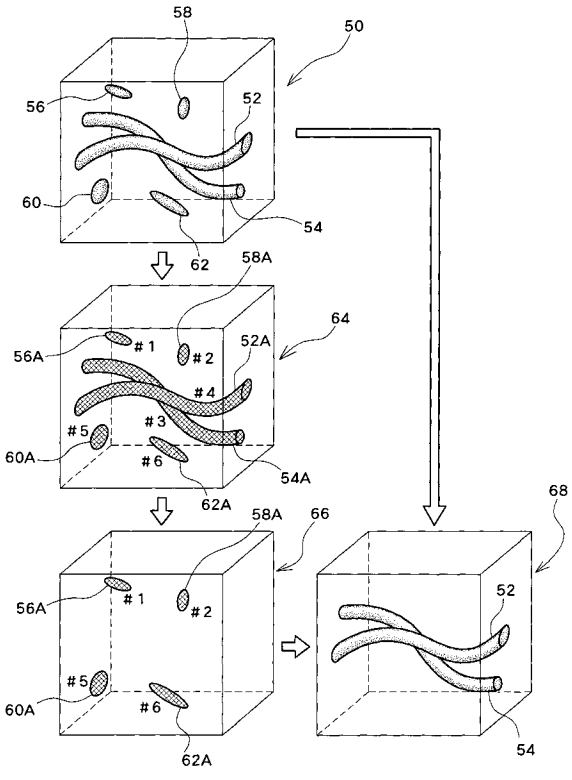

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 08 01 2536

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 6 503 202 B1 (HOSSACK JOHN A [US] ET AL) 7 January 2003 (2003-01-07) * column 2, line 66 - column 8, line 45; figures 1,3,4 * * column 10, line 17 - line 21 * * column 12, line 35 - column 14, line 10 * -----	1-7,10, 11,15,17 8,9,12, 13,16	INV. A61B8/06
X	US 6 352 509 B1 (KAWAGISHI TETSUYA [JP] ET AL) 5 March 2002 (2002-03-05) * column 5, line 10 - column 8, line 4; figures 1,8,9,10,22 * -----	1	
Y	EP 1 189 074 A2 (GE MED SYS GLOBAL TECH CO LLC [US]) 20 March 2002 (2002-03-20) * paragraphs [0036] - [0038] * -----	8,9	
Y	US 6 423 006 B1 (BANJANIN ZORAN [US]) 23 July 2002 (2002-07-23) * paragraphs [0003], [0022]; figures 1A,3 * -----	16	TECHNICAL FIELDS SEARCHED (IPC)
Y	BULLITT E ET AL: "Volume Rendering of Segmented Tubular Objects" LECTURE NOTES IN COMPUTER SCIENCE, SPRINGER, DE, vol. 2208, 1 January 2001 (2001-01-01), pages 161-168, XP002579462 ISSN: 0302-9743 * page 162, line 18 - page 166, line 5 * * page 344, left-hand column, line 55 - right-hand column, line 36 * * page 348, right-hand column, line 31 - page 349, left-hand column, line 9 * * page 349, right-hand column, line 40 - line 42 * ----- -/--	12,13	A61B G06T

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 August 2010	Daoukou, Eleni

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

Application Number
EP 08 01 2536

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	MCINERNEY T ET AL: "Deformable models in medical image analysis" PROCEEDINGS OF THE IEEE WORKSHOP ON MATHEMATICAL METHODS INBIOMEDICAL IMAGE ANALYSIS, XX, XX, 21 June 1995 (1995-06-21), pages 171-180, XP001179897 * paragraphs [0003], [03.1], [03.3], [03.4] *	1	
A	WO 2006/086442 A2 (UNIV CASE WESTERN RESERVE [US]; HAAGA JOHN R [US]; STOWE NICHOLAS [US]) 17 August 2006 (2006-08-17) * paragraphs [0044], [0047], [0109] *	5	
A	MROZ L ET AL: "Maximum intensity projection at warp speed" COMPUTERS AND GRAPHICS, ELSEVIER, GB LNKD-DOI:10.1016/S0097-8493(00)00030-3, vol. 24, no. 3, 1 June 2000 (2000-06-01), pages 343-352, XP004201697 ISSN: 0097-8493 * abstract * * page 344, left-hand column, line 55 - right-hand column, line 36 * * page 348, right-hand column, line 31 - page 349, left-hand column, line 9 * * page 349, right-hand column, line 40 - line 42 *	12,13	TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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Application Number
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 08 01 2536

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-11, 14-17

   Method for de-noising bloodstream volume data acquired via ultrasound apparatus, based on the size of objects identified in the data.

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2. claims: 12, 13

   First Maximum Intensity Projection technique for 3D rendering of bloodstream volume data acquired via ultrasound apparatus.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 01 2536

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-08-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 6352509 B1	05-03-2002	JP 2010148897 A	08-07-2010
EP 1189074 A2	20-03-2002	DE 60122991 T2	03-05-2007
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US 6423006 B1	23-07-2002	NONE	
WO 2006086442 A2	17-08-2006	US 2010080757 A1	01-04-2010

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

专利名称(译)	超声诊断仪		
公开(公告)号	EP2016905A3	公开(公告)日	2010-10-06
申请号	EP2008012536	申请日	2008-07-10
[标]申请(专利权)人(译)	日立阿洛卡医疗株式会社		
申请(专利权)人(译)	ALOKA CO.，LTD.		
当前申请(专利权)人(译)	日立ALOKA MEDICAL.，LTD.		
[标]发明人	MURASHITA MASARU		
发明人	MURASHITA, MASARU		
IPC分类号	A61B8/06		
CPC分类号	G06T7/0012 A61B8/06 A61B8/13 A61B8/483 G06T7/215 G06T2207/10136 G06T2207/30104 Y10S128/916		
优先权	2007185565 2007-07-17 JP		
其他公开文献	EP2016905B1 EP2016905A2		
外部链接	Espacenet		

摘要(译)

一种超声波诊断装置，其通过参考从生物体内的三维空间获得的体积数据形成三维血流图像。将二值化处理（26）和三维标记处理（30）应用于速度体数据，从而生成三维掩模数据（34）。此时，因为血流对象具有比噪声对象更大的体积大小，所以利用该体积大小的差异来区分血流部分和噪声部分。然后根据速度体积数据并参考三维掩模数据生成血流体积数据。然后，通过参考血流体数据形成三维血流图像（40）。

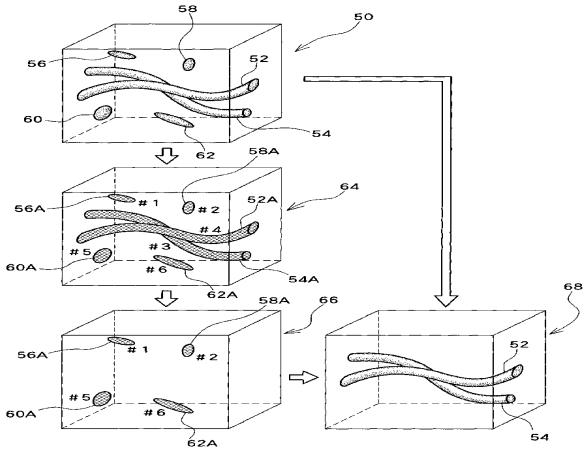

FIG. 2