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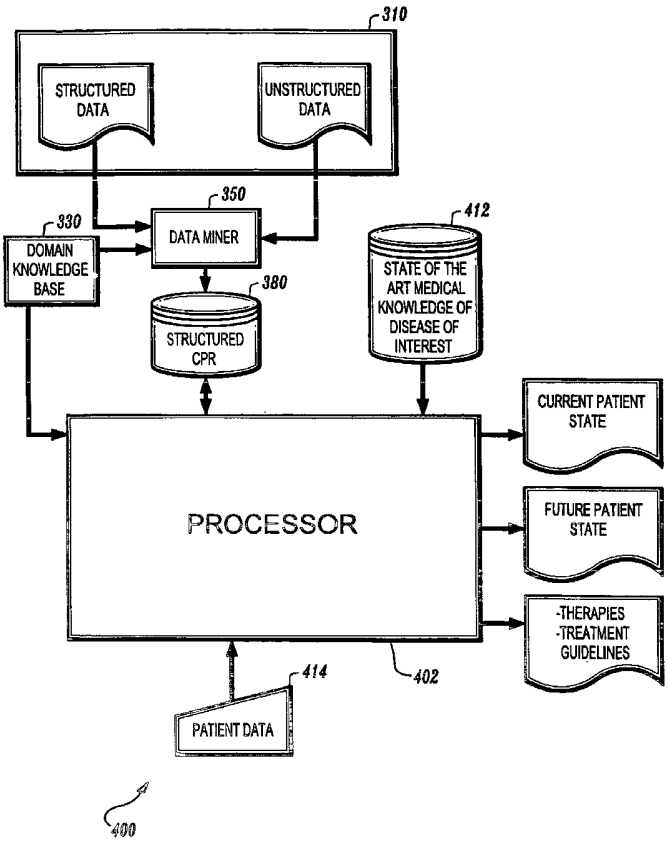
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(54) Title: PATIENT DATA MINING FOR DIAGNOSIS AND PROJECTIONS OF PATIENT STATES



(57) Abstract: A method and system for determining patient states is provided. The method includes the steps of data mining a patient record using a domain knowledge base relating to a disease of interest (502); inputting the mined data into a model of the disease of interest (512); and determining a state of the patient based on the model (514). The system includes a data miner (350) for mining information from a patient record (310) using a domain knowledge base (330) relating to a disease of interest; and a processor (402) for creating a patient model of the disease of interest, processing the mined data in the model to determine a current state of the patient and future states for different courses of treatment, and recommending a therapy based on the determined future state.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30 G06F19/00

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

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

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/023419 A1 (DESIENO DUANE ET AL) 20 September 2001 (2001-09-20) abstract paragraphs '0005!-'0015! paragraphs '0021!-'0041! paragraphs '0056!-'0059! paragraphs '0108!-'0123! paragraphs '0215!-'0219! ---	1-24
X	US 6 067 466 A (GRIFFITH JOHN L ET AL) 23 May 2000 (2000-05-23) the whole document --- -/--	1-24

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
23 October 2003	12/11/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Denoual, M

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International Application No
PCT/US 02/35306

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	MITCHELL T M: "Machine learning and data mining" COMMUNICATIONS OF THE ACM, NOV. 1999, ACM, USA, 'Online! vol. 42, no. 11, November 1999 (1999-11), pages 30-36, XP002258895 ISSN: 0001-0782 Retrieved from the Internet: <URL:http://portal.acm.org/ft_gateway.cfm?id=319388&type=pdf&coll=portal&dl=ACM&CFID=3957717&CFTOKEN=38351001> 'retrieved on 2003-10-23! the whole document	1-24
X	KLEISSNER C: "Data mining for the enterprise" SYSTEM SCIENCES, 1998., PROCEEDINGS OF THE THIRTY-FIRST HAWAII INTERNATIONAL CONFERENCE ON KOHALA COAST, HI, USA 6-9 JAN. 1998, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 6 January 1998 (1998-01-06), pages 295-304, XP010262792 ISBN: 0-8186-8255-8 the whole document	1-24
X	EP 0 641 863 A (NIPPON STEEL CORP) 8 March 1995 (1995-03-08) the whole document	1-24

INTERNATIONAL SEARCH REPORT

mation on patent family members

International Application No
PCT/US 02/35306

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001023419 A1	20-09-2001	AU 9104798 A	08-03-1999
		US 2003004906 A1	02-01-2003
		WO 9909507 A1	25-02-1999
		US 6556977 B1	29-04-2003
		US 2003105731 A1	05-06-2003
		AU 2316297 A	28-08-1997
		CA 2244913 A1	14-08-1997
		EP 0879449 A2	25-11-1998
		JP 2000501869 T	15-02-2000
		WO 9729447 A2	14-08-1997
US 6067466 A	23-05-2000	EP 1133256 A1	19-09-2001
		JP 2002529873 T	10-09-2002
		WO 0028893 A1	25-05-2000
EP 0641863 A	08-03-1995	JP 2166204 A	26-06-1990
		JP 7009008 B	01-02-1995
		JP 1909124 C	09-03-1995
		JP 2166205 A	26-06-1990
		JP 6037647 B	18-05-1994
		JP 1932767 C	26-05-1995
		JP 2182815 A	17-07-1990
		JP 6063009 B	17-08-1994
		JP 1932768 C	26-05-1995
		JP 2182812 A	17-07-1990
		JP 6063005 B	17-08-1994
		JP 2197510 A	06-08-1990
		JP 7009010 B	01-02-1995
		EP 0542717 A1	19-05-1993
		EP 0641863 A1	08-03-1995
		AU 612531 B2	11-07-1991
		AU 4688489 A	19-07-1990
		CN 1043745 A ,B	11-07-1990
		EP 0375282 A2	27-06-1990
		ES 2085285 T3	01-06-1996
		ES 2097936 T3	16-04-1997
		ES 2157233 T3	16-08-2001
		US 4976780 A	11-12-1990