(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 18 April 2002 (18.04.2002)

PCT

(10) International Publication Number WO 02/031765 A3

(51) International Patent Classification⁷: G06N 3/04, G06F 19/00

- (21) International Application Number: PCT/US01/31655
- (22) International Filing Date: 10 October 2001 (10.10.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 09/686,112 10 October 2000 (10.10.2000) US
- (71) Applicant (for all designated States except US): HRL LABORATORIES, LLC [US/US]; 3011 Malibu Canyon Road, Malibu, CA 90265 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): LOVE, Brad [US/US]; 3703 Cedar Street, Austin, TX 78705 (US).
- (74) Agent: TOPE-MCKAY, Cary, B.; Tope-McKay & Associates, 23852 Pacific Coast Highway #311, Malibu, CA 90265 (US).

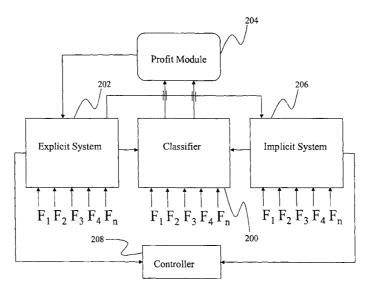
- (81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR INCORPORATING DECISION MAKING INTO CLASSIFIERS



(57) Abstract: A method and a system are presented, which assist classifiers in gathering information in a cost-effective manner by determining which piece of information, if any, to gather next. The system includes an explicit system, an implicit system, a classifer, and aprofit module. A feature set is inputted into the explicit system, which uses the feature set to determine tests to perform to gather information useful for classifying the system state. The relative profit of each test performed is determined by the profit module and the profit determined is used to determine which test or tests to select for a particular feature set. The results of the explicit system, which is generally an exhaustive or semi-exhaustive search algorithm, are used to train the implicit system. The implicit system is then able to process decisions much faster than the explicit system when circumstances require time-critical operation.



VO 02/031765 A3

WO 02/031765 A3



(88) Date of publication of the international search report: 4 September 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Internati Application No PCT/US 01/31655

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06N3/04 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) IPC 7 - G06F - G06N

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, IBM-TDB, INSPEC

	ENTS CONSIDERED TO BE RELEVANT				
Category °	Citation of document, with indication, where appropriate, of the	e relevant passages	Relevant to claim No.		
Х	WO 97 29447 A (ADEZA BIOMEDICAL ;DESIENO DUANE D (US); LAPOINTE (US)) 14 August 1997 (1997-08-1	1-3, 8-12, 18-22,			
Υ	page 5, line 15 -page 18, line	27,28 4,5, 13-15,			
Α	page 47, line 3 -page 48, line	23,24 6,7,16, 17,25,26			
Y	WO 98 22884 A (SORAGHAN JOHN JA;HUSSAIN AMIR (GB); UNIV STRATH 28 May 1998 (1998-05-28) abstract	4,13,23			
Y	US 5 303 328 A (MASUI HIRONARI 12 April 1994 (1994-04-12) column 2, line 52 -column 3, li	5,14,15, 24			
χ Furt	her documents are listed in the continuation of box C.	Patent family members are listed	in annex.		
"A" docume consid "E" earlier filing o "L" docume which citatio "O" docume other "P" docume	ategories of cited documents: ent defining the general state of the art which is not dered to be of particular relevance document but published on or after the international late ent which may throw doubts on priority claim(s) or is cited to establish the publication date of another n or other special reason (as specified) ent referring to an oral disclosure, use, exhibition or means ent published prior to the international filing date but han 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. "&" document member of the same patent family			
Date of the	actual completion of the international search	Date of mailing of the international sea			
1	6 June 2003	24/06/2003			
Name and ı	mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2	Authorized officer			
	NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl,	Schenkels, P			

INTERNATIONAL SEARCH REPORT

Internatural Application No
PCT/US 01/31655

C/Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	FC1/03 01/31055		
Category °		Relevant to claim No.		
А	WO 99 09506 A (BRIGHAM & WOMENS HOSPITAL) 25 February 1999 (1999-02-25) page 2, line 10 - line 29	1,10,20		
A	US 4 731 725 A (SUTO YASUZO ET AL) 15 March 1988 (1988-03-15) abstract	1,10,20		

INTERNATIONAL SEARCH REPORT

In nation on patent family members

Internation No
PCT/US 01/31655

	Publication date		Patent family member(s)		Publication date
A	14-08-1997	AU CA EP JP US WO	2244913 0879449 2000501869 2003004906 9729447	A1 A2 T A1 A2	28-08-1997 14-08-1997 25-11-1998 15-02-2000 02-01-2003 14-08-1997
Α	 28-05-1998	US DE EP WO JP US	69719058 0938711 9822884 2001504258	D1 A1 A1 T	20-09-2001
A	12-04-1994	JP	4160463	A	03-06-1992
A	25-02-1999	US AT DE DK EP JP WO	231633 69810945 1012773 1012773 2001516087	T D1 T3 A1 T	22-02-2000 15-02-2003 27-02-2003 19-05-2003 28-06-2000 25-09-2001 25-02-1999
Α	15-03-1988	JP JP JP	3080496	В	14-12-1992 25-12-1991 25-12-1982
	A A A	A 12-04-1994 A 25-02-1999	A 14-08-1997 AU CA EP JP US WO US A 28-05-1998 DE EP WO JP US A 12-04-1994 JP US AT DE DK EP JP WO A 15-03-1988 JP JP	A 14-08-1997 AU 2316297 CA 2244913 EP 0879449 JP 2000501869 US 2003004906 WO 9729447 US 2001023419 A 28-05-1998 DE 69719058 EP 0938711 WO 9822884 JP 2001504258 US 6453206 A 12-04-1994 JP 4160463 A 25-02-1999 US 6029138 AT 231633 DE 69810945 DK 1012773 EP 1012773 JP 2001516087 WO 9909506 A 15-03-1988 JP 1717927 JP 3080496	A 14-08-1997 AU 2316297 A CA 2244913 A1 EP 0879449 A2 JP 2000501869 T US 2003004906 A1 WO 9729447 A2 US 2001023419 A1 A 28-05-1998 DE 69719058 D1 EP 0938711 A1 WO 9822884 A1 JP 2001504258 T US 6453206 B1 A 12-04-1994 JP 4160463 A A 25-02-1999 US 6029138 A AT 231633 T DE 69810945 D1 DK 1012773 T3 EP 1012773 A1 JP 2001516087 T WO 9909506 A1 A 15-03-1988 JP 1717927 C JP 3080496 B