

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 March 2007 (08.03.2007)

PCT

(10) International Publication Number
WO 2007/028013 A1

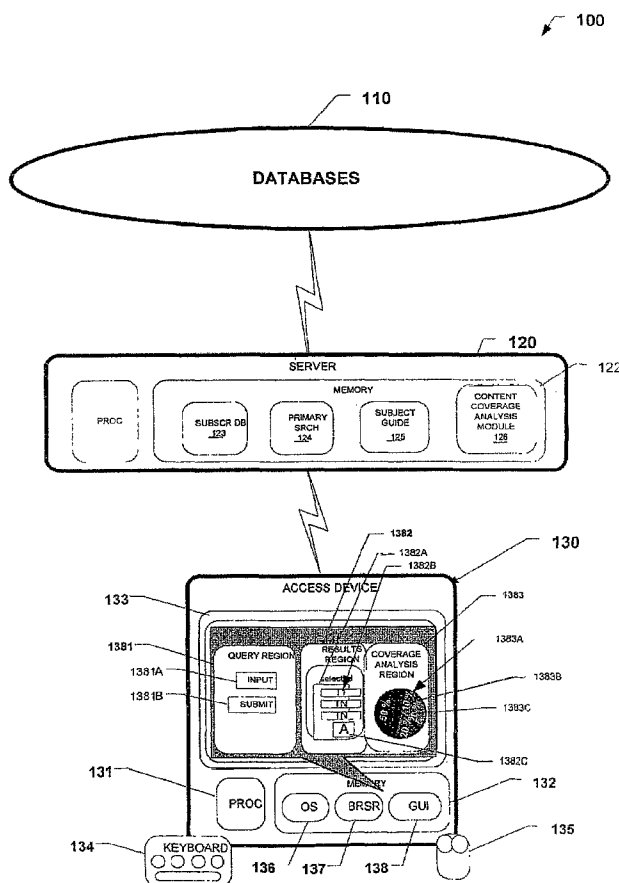
- (51) International Patent Classification:
G06F 17/30 (2006.01)
- (21) International Application Number:
PCT/US2006/034220
- (22) International Filing Date: 31 August 2006 (31.08.2006)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/713,115 31 August 2005 (31.08.2005) US
- (71) Applicant (for all designated States except US): THOMSON GLOBAL RESOURCES [IE/CH]; Landis + Gyr-Str. 3, CH-6300 Zug (CH).
- (72) Inventor: BREI, James, E. [US/US]; 1520 Pinewood Drive, Milford, Michigan 48381 (US).
- (74) Agents: STEFFEY, Charles, E. et al.; Schwegman Lundberg Woessner & Kluth, PA, P.O. Box 2938, Minneapolis, MN 55402 (US).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: SYSTEM AND METHOD PRESENTING SEARCH RESULTS IN A TOPICAL SPACE



(57) Abstract: The present inventor devised, among other things, information retrieval systems, methods, software, and related interfaces that help users assess and if necessary bolster the quality of their manual selections from search results. One exemplary system receives a set of documents selected from search results for an input query, identifies key subjects in the selected documents, and outputs a graphic, such as a pie chart, that shows not only how well these selected documents relate to the query, but also whether there are gaps in the topical scope of the selected documents related to the input query.

WO 2007/028013 A1



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.

SYSTEM AND METHOD PRESENTING SEARCH RESULTS IN A TOPICAL SPACE

5

Copyright Notice and Permission

One or more portions of this patent document contain material subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent files or records, but otherwise reserves all copyrights whatsoever. The following notice applies to this document: Copyright © 2005, Thomson Global Resources

Technical Field

Various embodiments of the present invention concern methods of presenting search results in information retrieval systems, particularly online information retrieval systems.

Copyright Notice and Permission

One or more portions of this patent document contain material subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent files or records, but otherwise reserves all copyrights whatsoever. The following notice applies to this document: Copyright © 2005, Thomson Global Resources

25

Cross-Reference to Related Applications

This application claims priority to U.S. provisional application 60/713,115 which was filed on August 31, 2005, and which is incorporated herein by reference.

30

Technical Field

Various embodiments of the present invention concern information
5 retrieval systems, particularly online information retrieval systems.

Background

The growth in popularity of the Internet and other computer networks has
fueled not only an increasing availability, but an increasing appetite among
10 consumers for digital information. Consumers typically seek access to this
information using an access device, such a computer, to communicate with an
online information retrieval system. The information retrieval system typically
includes a graphical user interface for entering and submitting requests for
information, known as queries, to a remote search engine. The search engine
15 identifies relevant information, typically in the form of documents, and returns a
results list to the access device, enabling the user to access one or more of the
listed documents.

One problem that the present inventor recognized in conventional
information retrieval systems concerns the identification of information within
20 search results. Conventional systems are generally focused on presenting the
user with any and all results that match their queries, leaving users to figure out
which documents among thousands or millions of documents best meet their
needs. Users typically browse the results, select some for use, and discard the
vast majority. This process is typically manual and the users generally have
25 little or no sense of how good their selections are or even how good their initial
set of search results were. Indeed, users typically take it on faith that the search
technology provided quality results in relation to their search term(s).

Accordingly, the inventor has identified a need for tools that assist users
in assessing and improving the quality of the documents they select from search
30 results.

Summary

To address this and/or problems, the present inventor devised, among other things, information retrieval systems, methods, software, and related interfaces that help users assess and if necessary bolster the quality of their manual selections from search results. One exemplary system receives a set of documents selected from search results for an input query, identifies key subjects in the selected documents, and outputs a graphic, such as a pie chart, that shows not only how well these selected documents relate to the query, but also whether there are gaps in the topical scope of the selected documents related to the input query. Moreover, in some embodiments, the graphic serves as a user interface, with each coverage gap selectable to initiate a query for documents to fill the gap.

Brief Description of the Drawings

Figure 1 is a block diagram of an exemplary information retrieval system which corresponds to one or more embodiments of the invention.

Figure 2 is a flow chart of an exemplary method of operation which corresponds to one or more embodiments of the invention.

Figure 3 is a facsimile of a graphical user interface which corresponds to one or more embodiments of the invention.

Figure 4 is a facsimile of a graphical user interface which corresponds to one or more embodiments of the invention.

Figure 5 is a facsimile of a graphical user interface which corresponds to one or more embodiments of the invention.

Detailed Description of Exemplary Embodiment(s)

This description, which not only references and incorporates the above-identified Figures, but also incorporates the appended claims, describes one or more specific embodiments of an invention. These embodiments, offered not to limit but only to exemplify and teach the invention, are shown and described in sufficient detail to enable those skilled in the art to implement or practice the

invention. Thus, where appropriate to avoid obscuring the invention, the description may omit certain information known to those of skill in the art.

Exemplary Information-Retrieval System

5 Figure 1 shows an exemplary online information-retrieval system 100, which may be adapted to incorporate the capabilities or functions described above. System 100 includes one or more databases 110, one or more servers 120, and one or more access devices 130.

10 Databases 110 includes one or more separate databases, which take the exemplary form of one or more electronic, magnetic, or optical data-storage devices, include or are otherwise associated with respective indices (not shown). Each of the indices includes terms and phrases in association with corresponding document addresses, identifiers, and other conventional information. In some embodiments, databases 110 includes documents related
15 to caselaw, statutes, financial, scientific, health-care information. Still other embodiments provide public or private databases, such as those made available through INFOTRAC. Databases 110 are coupled or couplable via a wireless or wireline communications network, such as a local-, wide-, private-, or virtual-private network, to server 120.

20 Server 120, which is generally representative of one or more servers for serving data in the form of webpages or other markup language forms with associated applets, ActiveX controls, remote-invocation objects, or other related software and data structures to service clients of various "thicknesses." More particularly, server 120 includes a processor module 121, a memory module 122,
25 a subscriber database 123, a search module 124, subject guide module 125, and a coverage analysis module 126.

Processor module 121 includes one or more local or distributed processors, controllers, or virtual machines. In the exemplary embodiment, processor module 121 assumes any convenient or desirable form.

30 Memory module 122, which takes the exemplary form of one or more electronic, magnetic, or optical data-storage devices, stores subscriber database 123, primary search module 124, and subject guide module 125, and coverage

analysis module 126. (In some embodiments, one or more of the contents of memory 122, for example, subject guide module 125 and/or coverage analysis module 126, may be replicated or stored exclusively in access device 130.)

Subscriber database 123 includes subscriber-related data for controlling, administering, and managing pay-as-you-go or subscription-based access of databases 110. In some database 123 includes user-specific information regarding passwords and user preferences.

Search module 124 includes one or more search engines and related user-interface components, for receiving and processing user queries against one or more of databases 110. In the exemplary embodiment, one or more search engines associated with search module 124 provide Boolean, tf-idf, natural-language search capabilities.

Subject guide module 125 includes subject guide data representative of the contents of one or more of databases 110. In the exemplary embodiment, subject matter data includes one or more subject area identifiers for each of the documents in one or more of databases 110. Additionally, some embodiments provide primary and secondary subject area identifiers for the documents, indicating relative degree of importance of the corresponding subject areas in the corresponding documents.

Coverage-analysis module 126 includes machine readable and/or executable instruction sets for identifying the key subjects in a set of selected documents and defining a graphical user interface that shows quantitatively how well these selected documents relate to the topical scope defined by the query. The graphical user interface, which is described further below, is transmitted over a wireless or wireline communications network on one or more access devices, such as access device 130.

Access device 130 is generally representative of one or more access devices. In the exemplary embodiment, access device 130 takes the form of a personal computer, workstation, personal digital assistant, mobile telephone, or any other device capable of providing an effective user interface with a server or database. Specifically, access device 130 includes a processor module 131 one or

more processors (or processing circuits) 131, a memory 132, a display 133, a keyboard 134, and a graphical pointer or selector 135.

Processor module 131 includes one or more processors, processing circuits, or controllers. In the exemplary embodiment, processor module 131
5 takes any convenient or desirable form. Coupled to processor module 131 is memory 132.

Memory 132 stores code (machine-readable or executable instructions) for an operating system 136, a browser 137, and a graphical user interface (GUI)138. In the exemplary embodiment, operating system 136 takes the form
10 of a version of the Microsoft Windows operating system, and browser 137 takes the form of a version of Microsoft Internet Explorer. Operating system 136 and browser 137 not only receive inputs from keyboard 134 and selector 135, but also support rendering of GUI 138 on display 133. Upon rendering, GUI 138 presents data in association with one or more interactive control features (or
15 user-interface elements). (The exemplary embodiment defines one or more portions of interface 138 using applets or other programmatic objects or structures from server 120 to implement the interfaces shown above or elsewhere in this description.)

In the exemplary embodiment, each of these control features takes the
20 form of a hyperlink or other browser-compatible command input, and provides access to and control of a query region 1381, a search-results region 1382, and a coverage analysis region 1383. Although Figure 1 shows region 1381, 1382, and 1383 as being simultaneously displayed, some embodiments present them at separate times.

25 Query region 1381 includes a query input or definition region 1381A and a query submission feature 1381B. Query input region 1381A enable a user to input a query, for example in the form of one or more key words or phrases with or without Boolean operators. Query submission feature 1381B is user operable to initiate submission of the query defined in input region 1381A to a
30 server, such as server 120, for handling.

Search-results region 1382 includes a search result listing 1382A of one or more documents, each of which is associated with a user operable selection

feature (not visible), such as a check box or radio button. Activation of the selection features for one or more of the documents in search result listing 1382A defines a selected set of search result documents 1382B. User selection of the control features in region 1382 result in retrieval and display of at least a
5 portion of the corresponding document within a region of interface 138 (not shown in this figure.) Search-results region 1382 also includes a coverage analysis feature 1382C which is selectable to invoke analysis of the coverage afforded by selected set of search result documents 1382B and display of coverage analysis region 1383.

10 Coverage analysis region 1383 includes an interactive pie-type coverage analysis graphic 1383A, which depicts the key topics covered by the selected documents in relation to the topical space defined by the input query, as well as areas that are not covered. Uncovered topical subspaces are selectable via a single click to initiate searches of databases 110 (or other the unselected search
15 results documents) for documents that match the missing key topics. Further description of the interactivity of the graphic and the coverage analysis module is provided below.

Exemplary Method(s) of Operation

20 Figure 2 shows a flow chart 200 of one or more exemplary methods of operating an information-management system, such as system 100. Flow chart 200 includes blocks 210-260, which are arranged and described in a serial execution sequence in the exemplary embodiment. However, other
25 embodiments execute two or more blocks in parallel using multiple processors or processor-like devices or a single processor organized as two or more virtual machines or sub processors. Other embodiments also alter the process sequence or provide different functional partitions to achieve analogous results. For
30 example, some embodiments may alter the client-server allocation of functions, such that functions shown and described on the server side are implemented in whole or in part on the client side, and vice versa. Moreover, still other
embodiments implement the blocks as two or more interconnected hardware modules with related control and data signals communicated between and

through the modules. Thus, the exemplary process flow applies to software, hardware, and firmware implementations.

In block 210, the method begins with collecting subject matter information from documents in one or more databases. In the exemplary embodiment, this entails building a master subject matter guide for databases 110 based on conventional indexing and classification or categorization techniques. Category or subject matter data is stored in both the document and in the master subject guide which is stored in server 120. Execution continues at block 220.

Block 220 entails receiving a user query. In the exemplary embodiment, this entails a user using a browser application to couple her access device to server 120, logging into the system using appropriate login credentials. With successful login, server 120 outputs one or more instructional or programmatic elements to define a graphical use interface, such as interface 138, on a display associated with the access device. The user then defines and submits a query, such as “piezoelectric transducer” via interface 138 to server 120. Execution then proceeds to block 230.

Block 230 entails presenting search results. In the exemplary embodiment, presentation of the search results entails server 120 searching one or more of databases 110 based on the received user query and transmitting the search results to access device 130. The search results are then rendered as part of interface 138, specifically search results region 1382.

Figure 3 shows an exemplary interface 300, which includes a portion of the search results for “piezoelectric transducer.” Interface 300 includes a search result listing 310, selection features 320, selection command feature 330. Search result listing 310 includes document listings 311, 312, 313, and 314 which have been selected via respective selection features 321, 322, 323, and 324. In the exemplary embodiment each of these selection features take the form of check box. Selection command feature 330 is user operable to isolate and present the selected search results in a separate interface, such as interface 400 in Figure 4, which shows the selected search results in a region 410 and includes an analyze-

coverage command feature 420 that initiates communication of the selected results to server 120.

Next, as Figure 2 shows, the exemplary method executes block 240, which entails receiving the selected search results. To this end, the exemplary embodiment receives the selected results at server 120. Execution continues at block 250.

Block 250 entails presenting a coverage analysis graphic based on the selected search result documents. In the exemplary embodiment, this entails server 120, or more precisely coverage analysis module 126, extracting and analyzing key subjects from the selected documents. In some instances, the documents themselves may include the key subject information embedded as metadata or appended to the document. In other instances, the key subject information may be included as part of a subject guide data structure that is logically associated with a document identifier for each document in databases 110. In yet other instances, the key subject information may be extracted on the fly in response to receipt of the request for a coverage analysis.

Once the key subject or topics are extracted, they can be analyzed in relation to the master subject guide and/or the input query, facilitating presentation of the subject areas represented by the selected documents in the context of a topical or subject map for the input query. For example, there are six subject areas for Heart Attack (Cardiac Arrest): Coronary Vasospasm, Coronary Pulmonale, Myocardial Ischemia, Myocardial Infarction, Cardiogenic Shock, Angina Pectoris. In one embodiment, this means that the pie or other graphic has six sectors or regions, one for each subject matter. If the input query is Heart Attack, and five of the selected search results documents have Coronary Pulmonale as the primary term and one of the selected documents has Myocardial Infarction as a secondary term, then the coverage analysis graphic would identify that Coronary Pulmonale is covered well, Myocardial Infarction is nominally covered (1/6 or 1/12 depending how one chooses to score a secondary mention) and that four potential subject areas are not covered at all (0/6).

Figure 5 shows an exemplary interface 500 which includes an interactive coverage analysis pie graphic 510 for the selected results of the piezoelectric transducer search. Graphic 510 includes a transducer region 511 (50%), a telescoping microactuator region 512 (10%), a c-block microactuator region 513 (20%), and a rainbow microactuator region 514 (20%), indicating that the selected results provide full coverage of the topic space defined by the piezoelectric transducer query. In some embodiment, one or more sectors of the pie graph are color coded, for example, red to indicate that there is zero or less than some threshold amount of coverage for the corresponding subject area.

Figure 2 shows that after block 250, execution continues at block 260 with presentation of additional search results to fill coverage gaps identified in the coverage analysis graphic. In the exemplary embodiment, this entails a user clicking on or selecting a portion of a coverage analysis graph that indicates zero or less than some threshold amount of subject area coverage in a selected set of results. This selection activates an associated hyperlink that has an embedded query command with the underrepresented subject area term(s). The hyperlink targets server 120, which in turn responds by executing a search based on the query and returns search results to access device 130.

In many cases, users do not fully read their selected documents (or articles), nor do they necessarily understand the differences between terms in the articles. To help the user understand the concepts of coverage a graphical approach such as a split Pie Chart showing the areas of coverage with a quality indication and the areas of non-coverage where the user can simply click on the slice to launch a targeted search for that area. The search technology promises to aid both novice and expert users who wish to quickly analyze content for applicability as well as completeness.

Other Visualization Approaches

The exemplary embodiment is generally directed to helping users quickly assimilate large quantities of content and select the best, most relevant, content to apply to their work. Although the exemplary embodiment presents a pie chart as a visual tool for quickly assessing topical coverage, many different visual

techniques for assessing topical coverage are feasible. Indeed, some embodiments include several selectable visualization options for users to select, including defining one of the options as a default preference. Other visualization options include: decomposing the key topics from the selected documents and
5 displaying them in relation to each other in a tree structure; displaying various abstracts of the text, such as 25 word abstract, 5 most significant words, 3 most significant sentences, etc.; decomposing the key topics from the selected documents, prompting the user for a topic word (other than the search term), and then showing the key topics in relationship to the user-provided topic word; and
10 displaying the selected articles and their key topics or themes in time orientation.

Conclusion

The embodiments described above are intended only to illustrate and teach one or more ways of making and using the present invention, not to restrict its breadth or scope. The actual scope of the invention, which embraces all ways
15 of practicing or implementing the teachings of the invention, is defined only by one or more issued patent claims and their equivalents

CLAIMS

1. An information retrieval system comprising:
means for receiving a query;
means for receiving a user selected portion of search results for the
5 received query; and
means for graphically representing the selected search results in context
of a topical map having regions corresponding to subject areas
associated with the query.
- 10 2. The system of claim 1, wherein one or more of the regions is user
selectable to initiate a search for content that is not represented in the
selected portion of the search results.
3. The system of claim 1, wherein the topical map has the form of a pie
15 graph.
4. The system of claim 3, wherein the user selected portion of the search
results omits content corresponding to at least one of the subject areas
associated with the query and wherein a region in the topical map
20 corresponding to the one of the subject areas is user selectable to initiate
a search for the omitted content.
5. The system of claim 1, wherein the means resides on a server in a client-
server architecture and includes one or more portions which can be
25 downloaded for execution on one or more client access devices.
6. The system of claim 1, wherein the means includes a machine-readable
medium comprising instructions or software objects.
- 30 7. A method of operating an information retrieval system, comprising:
receiving a query;

receiving a user selected portion of search results based on the received query; and

providing a graphical user interface that represents the selected search results in context of a topical map having regions corresponding

5 to subject areas associated with the query.

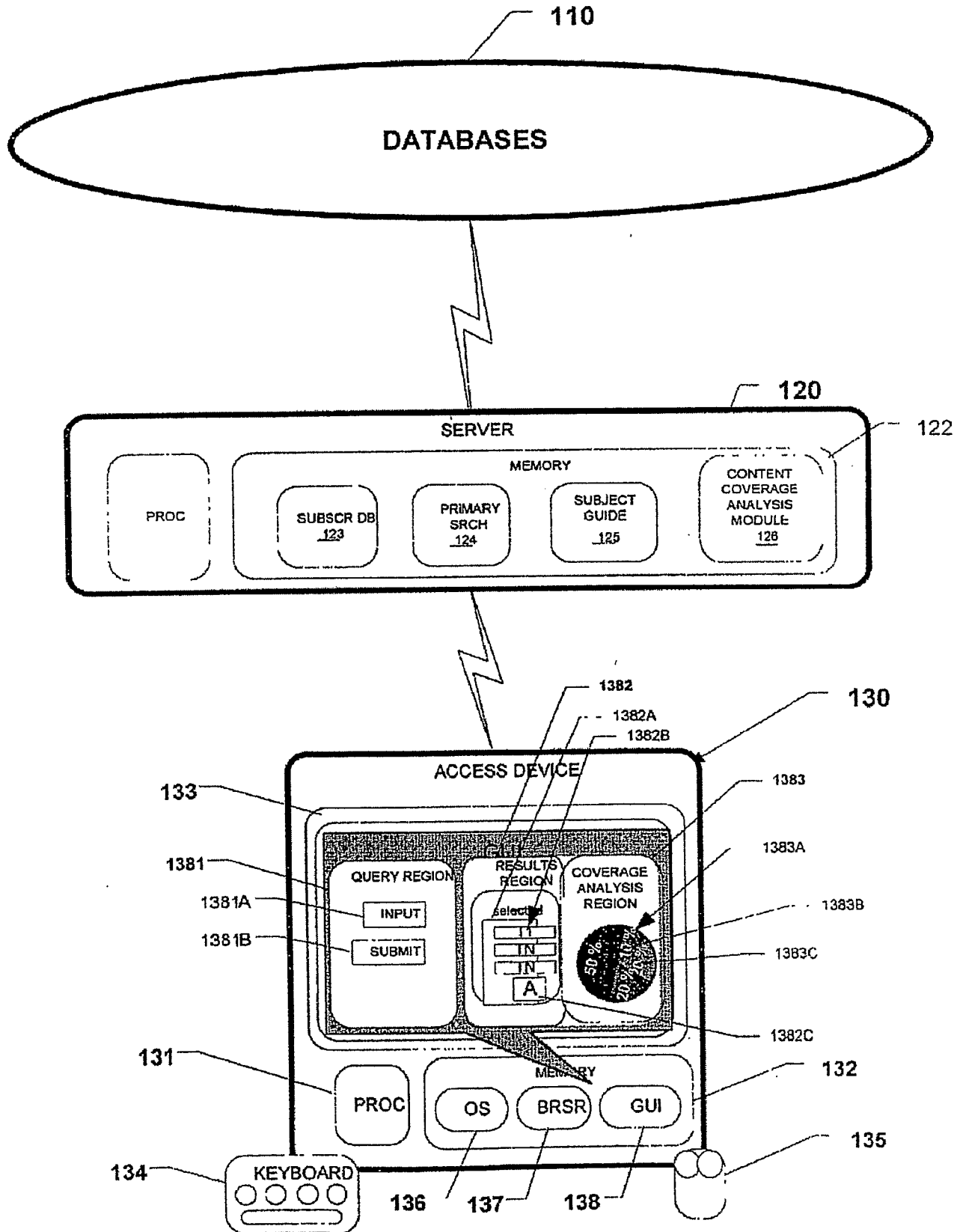


FIG. 1
SUBSTITUTE SHEET (RULE 26)

↙ 200

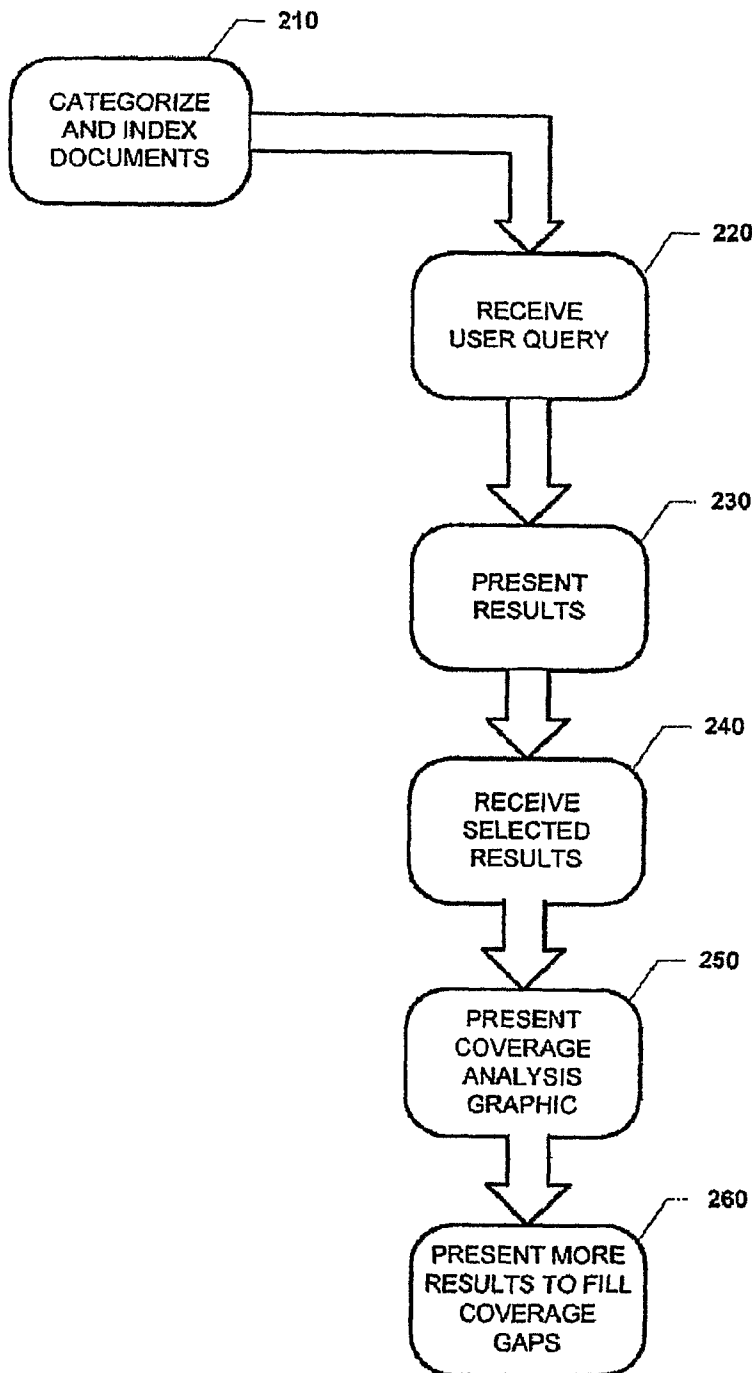


FIG. 2

300

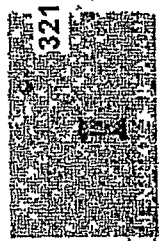
Keyword search (in title, citation, abstract): Piezoelectric Limited by: full text

[Click here to search for additional results from image search. Citations 1 to 20 \(of 263\)](#)

- [Piezoelectric work pushes transducers.](#) **311**
Electronics Weekly Sept 10, 2003 p20 (279 words)
- [Ziptronix Announces Temperature Compensated Piezoelectric Substrates; Engineered Substrates Improve Performance of a Wide Range of Devices.](#) **312**
Business Wire Sept 9, 2003 p5215 (648 words)
- [Scientists uncover basis of material oddball. \(Electric Foam\)\(piezoelectric materials\) P. Weiss.](#) **313**
Science News August 9, 2003 v164 i6 p86(1) (363 words)
- [Xaar: using piezoelectric technology allowed digital printhead developer to claim place among the world's top players. \(Company Profile\) Andrew Lee.](#) **314**
The Engineer July 11, 2003 v292 i7631 p17(1) (392 words)
- [Piezoelectric sensor: 6-mm button-style unit. \(Product News\)](#) **315**
Instrumentation & Automation News August 2003 v51 i8 p21(1) (80 words)
- [Integrated Piezoelectric Accelerometers. \(Sensors & Actuators\).](#)
ECN-Electronic Component News July 2003 v47 i8 p14(1) (136 words)
- [Piezoelectric Pump For Notebook PC.](#) **316**
High Tech Ceramics News July 2003 v15 i2 p0 (502 words)
- [Piezoelectric accelerometer. \(Product News\). \(from Columbia Research Laboratories Inc.\) \(Brief Article\) Melanie Martella.](#) **317**
Sensors Magazine July 2003 v20 i7 p48(1) (73 words)
- [Squeals on wheels: US researchers use piezoelectric system to suppress vibrations that cause noisy brakes. \(News\). Julia Pierce.](#)
The Engineer June 27, 2003 v292 i7630 p11(1) (489 words)
- [Piezoelectric positioning. \(Motion Spotlight Positioning Devices\).](#)
Designfax June 2003 v25 i6 p32(1) (68 words)
- [High-capacity torque transducer transmits via digital telemetry. \(Components\). \(PCB Piezotronics Series 5310\) \(Brief Article\)](#)
Electronic Design May 26, 2003 v51 i11 p75(1) (131 words)

Citations 1 to 20 (of 263)

320



321

322

References

Thomas Directory

Smart Material Bulletin

Journals

Journal of Micro Electrical Mechanical Systems (MEMS)

Smart Materials and Structures

Best of the Web

Piezoelectric Transducers

Polymer PZT for Hearing Aids

FIG. 3

400

MyMarked List

Email List

410

Show Citations

420

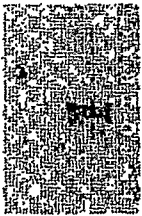


Piezoelectric work pushes transducers.
Electronics Weekly Sept 10, 2003 p20 (279 words)

Scientists uncover basis of material oddball. (Electric Foam)(piezoelectric materials) P. Weiss.
Science News August 9, 2003 v164 i6 p86(1) (363 words)

Piezoelectric sensor: 6-mm button-style unit. (Product News)
Instrumentation & Automation News August 2003 v51 i8 p21(1) (80 words)

Piezoelectric accelerometer. (Product News). (from Columbia Research Laboratories Inc.)(Brief Article) Melanie Martella.
Sensors Magazine July 2003 v20 i7 p48(1) (73 words)



References

Thomas Directory

Smart Material Bulletin

Journals

Journal of Micro Electrical Mechanical Systems (MEMS)

Smart Materials and Structures

Best of the Web

Piezoelectric Transducers

Polymer PZT for Hearing Aids

500

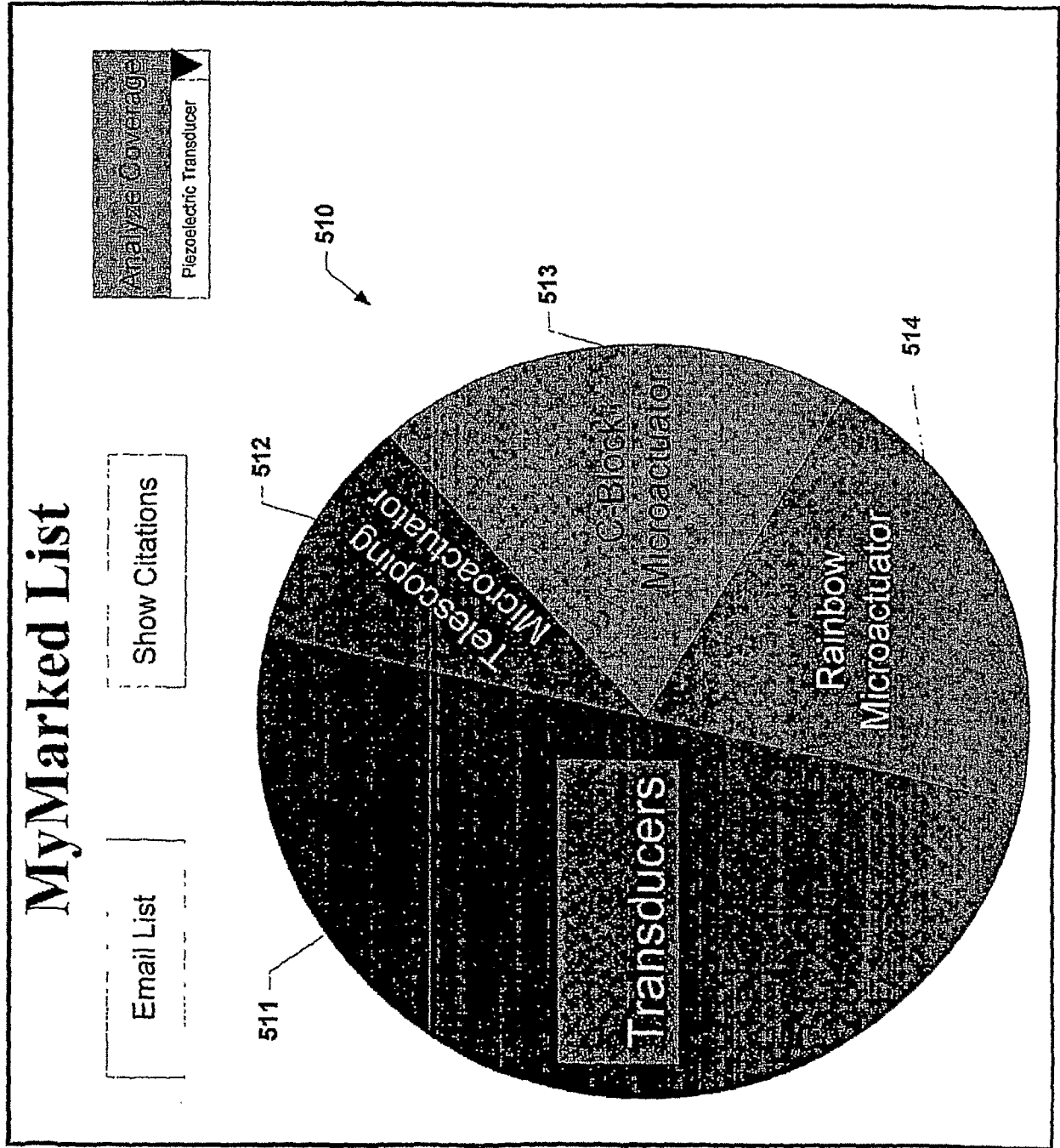


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2006/034220

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F17/30

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)
G06F

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, COMPENDEX, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 385 602 B1 (TSO MICHAEL [US] ET AL) 7 May 2002 (2002-05-07) column 2 - column 11	1-7
X	WO 98/49637 A (NORTHERN LIGHT TECHNOLOGY LLC [US]) 5 November 1998 (1998-11-05) page 6 - page 18	1-7
A	WO 02/41190 A2 (HOLBROOK DAVID M [US]) 23 May 2002 (2002-05-23) page 10 - page 43	1-7
A	US 6 460 049 B1 (BECKER BARRY G [US] ET AL) 1 October 2002 (2002-10-01) abstract	1-7
A	US 2003/050927 A1 (HUSSAM ALI A [US]) 13 March 2003 (2003-03-13) abstract	1-7

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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.

"&" document member of the same patent family

Date of the actual completion of the international search

22 November 2006

Date of mailing of the international search report

04/12/2006

Name and mailing address of the ISA/

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

Authorized officer

Korkuzas, Valdas

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2006/034220

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6385602	B1	07-05-2002	NONE
<hr style="border-top: 1px dashed black;"/>			
WO 9849637	A	05-11-1998	AU 736428 B2 26-07-2001
			AU 7271798 A 24-11-1998
			CA 2288745 A1 05-11-1998
			EP 0979470 A1 16-02-2000
			JP 2001522496 T 13-11-2001
			US 5924090 A 13-07-1999
<hr style="border-top: 1px dashed black;"/>			
WO 0241190	A2	23-05-2002	AU 2017202 A 27-05-2002
<hr style="border-top: 1px dashed black;"/>			
US 6460049	B1	01-10-2002	NONE
<hr style="border-top: 1px dashed black;"/>			
US 2003050927	A1	13-03-2003	NONE
<hr style="border-top: 1px dashed black;"/>			