



[54] **METHOD FOR ORGANIZING INFORMATION**

[76] Inventor: **Gary Culliss**, 9737 Larsen St., Overland Park, Kans. 66214

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**Related U.S. Application Data**

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[51] **Int. Cl.<sup>6</sup>** ..... **G06F 17/30**

[52] **U.S. Cl.** ..... **707/5; 707/10**

[58] **Field of Search** ..... **707/5, 3, 10, 2, 707/1**

[56] **References Cited**

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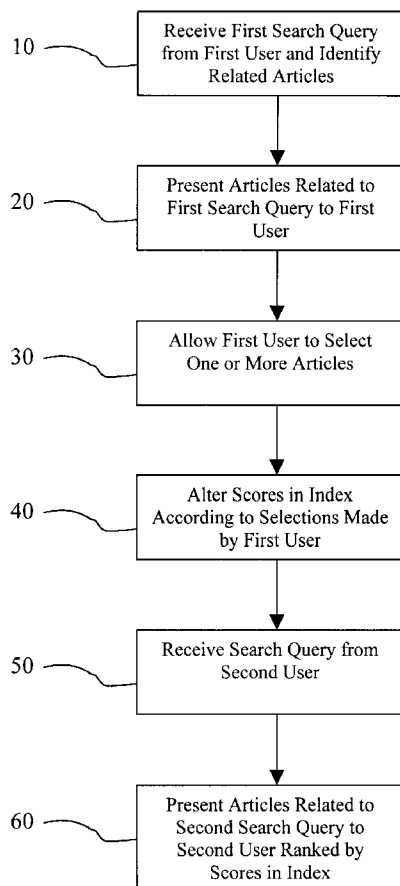
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*Primary Examiner*—Jack M. Choules  
*Attorney, Agent, or Firm*—Gary Culliss

[57] **ABSTRACT**

A method of organizing information in which the search activity of a user is monitored and such activity is used to organize articles in a subsequent search by the same or another user who enters a similar search query. The invention operates by assigning scores to articles under the key terms in the index. As users enter search queries and select articles, the scores are altered. The scores are then used in subsequent searches to organize the articles that match a search query. As millions of people use the Internet, type in millions of search queries, and display or select from the many articles available over the Internet, the ranks the information available over the Internet through an evolutionary process. The invention includes additional embodiments which incorporate category key terms and rating key terms.

**46 Claims, 1 Drawing Sheet**



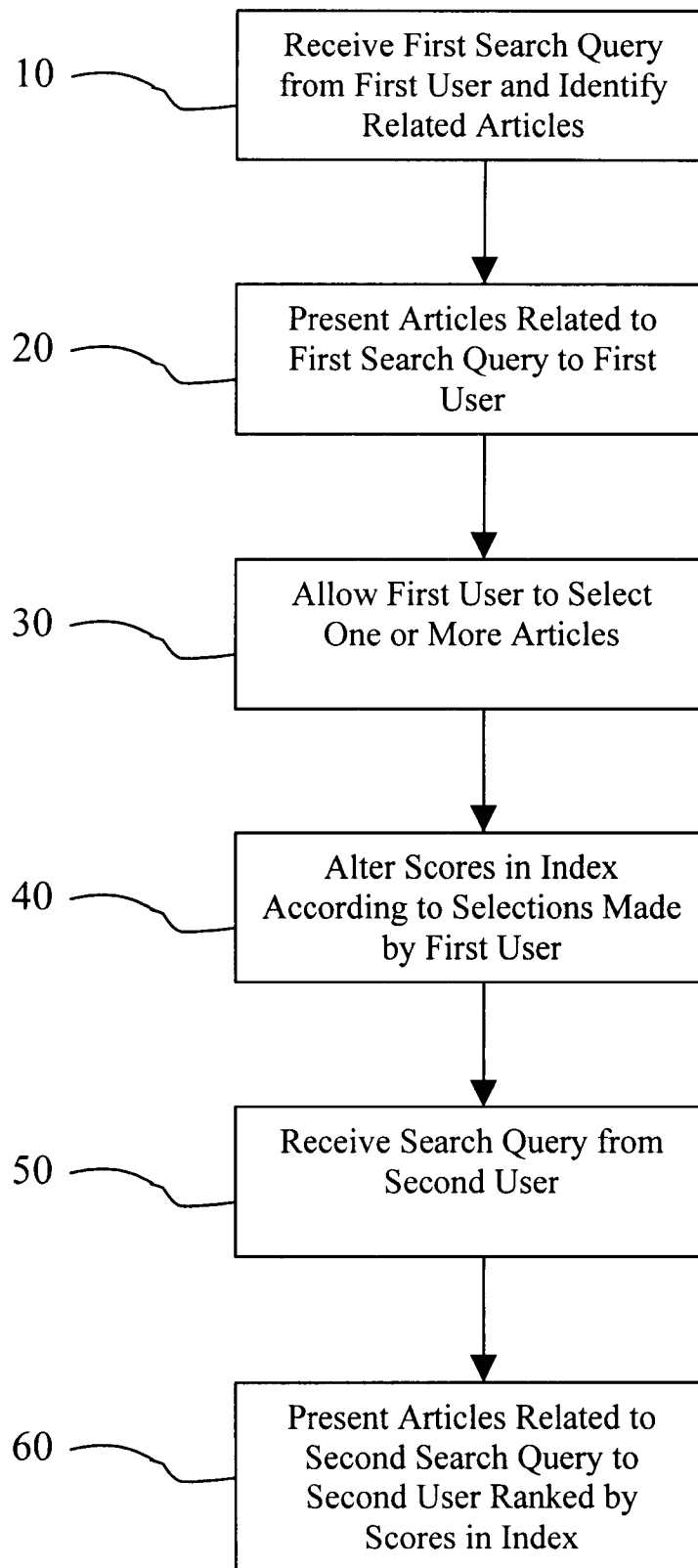


FIGURE 1

**METHOD FOR ORGANIZING INFORMATION**

**RELATED APPLICATION**

This patent application is a continuation-in-part of co-pending patent application, Ser. No. 08/840,922, filed Apr. 25, 1997, also entitled "Method for Organizing Information."

**BACKGROUND OF THE INVENTION**

**1. Related Disclosures**

This patent application contains subject matter disclosed in Disclosure Document Numbers 411,887; 417,369 and 417,458.

**2. Field of the Invention**

The present invention relates to search engines, and more particularly pertains to a method for organizing information by monitoring the search activity of users.

**3. Description of the Prior Art**

The Internet is an extensive network of computer systems which allows a user to connect with various computer servers or systems. The Internet permits users to send and receive data between computers connected to this network. This data may include web sites, home pages, databases, text collections, audio, video or any other type of information made available over the Internet (collectively referred to as "articles") from a computer server connected to the Internet. The articles may also include key terms representing selected portions of the information contained in the article. These key terms are available over the Internet to other computers and permit these other computers to locate the article.

To locate articles on the Internet, a user of a remote computer searches for the key terms using a search program known as a search engine. Examples of search engines currently available on the Internet include "Yahoo!" (TM), "Excite" (TM), and "Alta Vista" (TM). These programs allow the remote user to type in one or more search terms, typically as a combination of English words. The search terms may be connected by Boolean logic operators or may be truncated and combined with wild card terms to form a search query. The search engine then compares the search query with the key terms from the articles and retrieves at least a portion of the articles having key terms which match the search query. The search engine will then display to the user the portion of the article such as the title. The user can then scroll through these retrieved portions of the articles and select a desired article.

Conventional key word searching and various prior art methods of accomplishing such key word searching are disclosed in at least the following patents:

U.S. Pat. No.	Title
5,588,060	METHOD AND APPARATUS FOR A KEY-MANAGEMENT SCHEME FOR INTERNET PROTOCOLS;
5,546,390	METHOD AND APPARATUS FOR RADIX DECISION PACKET PROCESSING;
5,528,757	ROUTING SYSTEM FOR RETRIEVING REQUESTED PROGRAM BY DISCARDING RECEIVED PROGRAM IDENTICAL WITH STORED PROGRAMS AND TRANSFERRING THE RECEIVED PROGRAM NOT IDENTICAL WITH STORED PROGRAMS;

-continued

U.S. Pat. No.	Title
5,377,355	METHOD AND APPARATUS FOR AUTOMATED PROCEDURE INITIATION IN A DATA PROCESSING SYSTEM INCLUDING SOLICITING AN EVALUATION VOTE FROM USERS AUTOMATICALLY DETERMINED IN RESPONSE TO IDENTIFICATION OF A FUNCTIONAL AREA ASSOCIATED WITH A DOCUMENT;
5,404,507	APPARATUS AND METHOD FOR FINDING RECORDS IN A DATABASE BY FORMULATING A QUERY USING EQUIVALENT TERMS WHICH CORRESPOND TO TERMS IN THE INPUT QUERY;
5,408,586	HISTORICAL DATABASE TRAINING METHOD FOR NEURAL NETWORKS;
5,408,655	USER INTERFACE SYSTEM AND METHOD FOR TRAVERSING A DATABASE;
5,371,676	APPARATUS AND METHOD FOR DETERMINING DATA OF COMPOUND WORDS;
5,185,888	METHOD AND APPARATUS FOR DATA MERGING/SORTING AND SEARCHING USING A PLURALITY OF BIT-SLICED PROCESSING UNITS;
4,967,341	METHOD AND APPARATUS FOR PROCESSING DATA BASE;

A person who places an article on the Internet typically intends for it to be available to all people who type in search terms that are even remotely related to the subject matter of the article. This increases the exposure of the article to the public searching the Internet. Such increased exposure can potentially increase product sales or advertising revenue for the owner of the article, especially if advertising revenue is related to the number of visits to the article or web site. Thus, there is an incentive to use as many search terms as are possibly related to the article. In fact, some articles or search engines use every word in the article as key terms. As a result, search engines will retrieve many articles which are unrelated to the subject matter which the user desires to find through a combination of search terms.

Further, some Internet users are not skilled in selecting and connecting key word search queries. These users will often type in a single word or two words connected by an "AND" operator. These searches are extremely broad and often retrieve thousands of articles which the user must manually search through by examining the title or other brief information about each article to find the desired information or advertisement.

As the total number of articles posted on the Internet continues to increase, there is an increasing number of articles retrieved with each search query. To find an article, the user must manually search through the retrieved articles and/or repeatedly modify the search query.

**OBJECTS AND SUMMARY OF THE INVENTION**

Accordingly, it is an object of the invention to organize articles available on the Internet.

It is another object of the present invention to monitor searching activity to organize articles in accordance with the searching activity of one or more users.

To accomplish these and other objects, the present invention generally comprises a method of organizing information in which the search activity of a user is monitored and such

activity is used to organize articles displayed in the search results. The invention operates by assigning scores to key terms and categories for articles. As users enter search queries and select articles, the scores are altered. The scores are then used in subsequent searches to organize the articles that match a search query. The method allows the search activity of a large number of Internet users to organize the information available over the Internet through an evolutionary process.

This brief description sets forth rather broadly the more important features of the present invention in order that the detailed description thereof that follows may be better understood, and in order that the present contributions to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will be for the subject matter of the claims appended hereto.

In this respect, before explaining a preferred embodiment of the invention in detail, it is understood that the invention is not limited in its application to the details of the method set forth in the following description. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood, that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which disclosure is based, may readily be utilized as a basis for designing other methods and systems for carrying out the objects and purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

#### DESCRIPTION OF THE DRAWING

FIG. 1 illustrates in flow diagram form the operational steps taken by the system.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

The Internet is an extensive network of computer systems which allows a user to connect with various computer servers or systems. The Internet permits users to send and receive data between the computers connected to this network. The data can be read, viewed or listened to on a browser or other software program from over the Internet on a remote user's computer. This data may comprise articles, databases, data collections, web sites, web pages, graphics, encryption, audio, video or any other type of information collectively referred to as articles and designated herein by the generic labels A1, A2, A3, etc.

The present invention maintains an index of key words, terms, data or identifiers in English or other languages, computer code, or encryption which are collectively referred to as key terms and represented herein by the generic labels Alpha, Beta, Gamma, Delta, Epsilon, etc.

The articles are each associated with one or more of these key terms by any conceivable method of association, such as through indexing all words or through meta-tag headers containing key words selected by the author or editor. Further, a key term score is associated with each article for each of the key terms. For example, an initial index setting may look like this:

<u>Index</u>				
Alpha	Beta	Gamma	Delta	Epsilon
A1 - 1	A1 - 1	A1 - 1	A2 - 1	A1 - 1
A2 - 1		A3 - 1	A3 - 1	A3 - 1
A3 - 1				

The invention will accept a search query from a user and a search engine will identify key terms which match the search query. These key terms which match the search query are called matched key terms. The search engine then identifies in any conceivable manner the articles which are associated with the matched key terms. This can be done by comparing all or part of the search query, or terms equivalent to those in the search query with the key terms in the index to identify the key terms which match the search query. The search engine may account for Boolean logic operators in the search query.

In the example above, and as illustrated at **10** in FIG. 1, a search query of "Alpha AND Gamma" would identify articles A1 and A3 because they are both associated with the matched key terms Alpha and Gamma. Because articles A1 and A3 are associated with the matched key terms, these articles are called matched articles.

As shown in FIG. 1 at **20**, the search engine will then display a squib of each of the matched articles. The squib may comprise any portion, hypertext link to or representation of the matched article, such as the title, headings, first few lines of text, audio, video or any other type of information. As shown in FIG. 1 at **30**, the user can then scroll through the squibs of the articles and select a desired one of the matched articles by opening, retrieving, reading, viewing, listening to or otherwise closely inspecting the article from over the Internet or from any other storage area. The matched article selected by the user is called the selected matched article.

Once the user has selected a matched article, and as shown in FIG. 1 at **40**, the index can be altered such that the key term scores for the selected matched article under the matched key terms are altered relative to other key term scores. This indicates that the user believes that the matched key terms for that selected matched article are properly associated with the selected matched article. To alter the key term scores, a positive score such as (+1) can be added to the key term scores, for example, although any other possible indication can be used and the key term scores can be altered by any possible type of operation, mathematical or otherwise, to alter the key term scores for the selected matched article under the matched key terms relative to other key term scores.

Thus, after executing the search query "Alpha AND Gamma," the search engine would display the squib of matched articles A1 and A3. If the user selected only article A3, the index could be altered such that the key term scores for the selected matched article A3 under the matched key terms Alpha and Gamma are altered relative to the other key term scores. The index would then look like this:

<u>Index</u>				
Alpha	Beta	Gamma	Delta	Epsilon
A1 - 1	A1 - 1	A1 - 1	A2 - 1	A1 - 1
A2 - 1		A3 - 2	A3 - 1	A3 - 1
A3 - 2				

For the next search by either the same or a different user, the invention could then rank the matched articles by using

the key term scores, as shown in FIG. 1 at 50 and 60. To this end, the key term scores of each matched article under each of the matched key terms of the new search could then be associated in any possible manner to create a comparison score for each matched article. For example, the key term scores could be added, multiplied together or averaged to create the comparison score for that matched article. The matched articles can then be displayed to the user in order of comparison score superiority, such as by displaying the matched article with the highest comparison score first.

For example, the search query “Alpha AND Epsilon” would again identify matched articles A1 and A3. By multiplying the key term scores of each matched article under each matched key term together to get the comparison score, the comparison score for article A1 would equal 1, whereas the comparison score for article A3 would be 2. The invention would then display the matched article A3 to the user in a superior position to matched article A1.

#### DISPARATE SEARCH ACTIVITY

To compensate for disparate search activity for certain articles relative to other articles, the invention may include a key term total score for each key term score of each article under each key term. After each search query is entered or after any other event occurs, the index could then be altered such that the key term total score of each matched article under each matched key term is altered relative to other key term total scores. The index could be altered in this manner after each search query is entered or after any other event, such as after the user has selected one or more articles or has read a matched article for a predetermined length of time.

For example, the index could have an initial setting such as is shown here where the key term scores are separated from the key term total scores by a backslash (/) and given an initial value of one.

		Index		
Alpha	Beta	Gamma	Delta	Epsilon
A1 - 1/1	A1 - 1/1	A1 - 1/1	A2 - 1/1	A1 - 1/1
A2 - 1/1		A3 - 1/1	A3 - 1/1	A3 - 1/1
A3 - 1/1				

As illustrated above, if the user selected only article A3 after executing the search query “Alpha AND Gamma,” the key term score for article A3 under the matched key terms Alpha and Gamma would be altered relative to other key term scores. Further, the key term total scores for both article A1 and article A3 under the matched key terms could also be altered. If the positive score is added to the key term scores for the selected matched article A3 under the matched key terms Alpha and Gamma, and the positive score is added to the key term total scores for the matched articles A1 and A3 (regardless of whether they were selected or not) under the matched key terms, the index would then look like this:

		Index		
Alpha	Beta	Gamma	Delta	Epsilon
A1 - 1/2	A1 - 1/1	A1 - 1/2	A2 - 1/1	A1 - 1/1
A2 - 1/1		A3 - 2/2	A3 - 1/1	A3 - 1/1
A3 - 2/2				

For the next search, the invention could then organize or rank the articles by first comparing the key term scores as

related to the respective key term total scores for each of the matched articles under each matched key term to create a key term probability score for that matched article under each respective matched key term from the new search. To this end, the key term scores of each matched article under each of the matched key terms could be compared or associated with their respective key term total score in any known manner to create the key term probability scores for that matched article under the respective matched key terms. For example, the key term scores of each matched article under the matched key terms could be divided by their respective key term total score to create the key term probability score of that matched article under that matched key term.

The key term probability scores of each matched article under each of the matched key terms could then be associated in any known manner to create the comparison score for each matched article identified in the search. For example, the key term probability scores could be added, multiplied or averaged together to create the comparison score for that matched article. The articles can then be displayed to the user in order of superiority, such as by displaying the article with the highest comparison score first.

For example, the new and different search query “Alpha AND Epsilon” would again identify matched articles A1 and A3. The key term probability score for matched article A1 under the key term Alpha would equal the key term score of 1 divided by the key term total score of 2, for a key term probability score of 0.5. Similarly, the key term probability score for matched article A2 under the key term Alpha would equal the key term score of 2 divided by the key term total score of 2, for a key term probability score of 1. Under the key term Epsilon, the key term probability score for matched article A1 would be 1, and the key term probability score for matched article A3 would also be 1, as neither of these scores has been altered from the initial setting in this example.

By multiplying the key term probability scores of each matched article under each matched key term together to get the comparison score, for example, the comparison score for article A1 would equal 0.5, whereas the comparison score for article A3 would be 1. The invention could then display the article A3 to the user in a superior position to article A1 because the comparison score for matched article A3 is higher.

#### Increased Resolution:

To provide for increased resolution in search ranking, the index may include matching associations of two or more key terms. For example, in the index illustrated below, each key term is grouped with one or more other key terms in a matrix format. Single key terms can be represented by a grouping of identical terms. Using the same initial settings from above, articles are listed in the boxes formed at the intersection of the rows and columns of the matrix to indicate that such articles are associated with the intersecting key terms. Although the index is shown in pair groupings, the index can be extended to include triplicate or other associations as well, i.e. separate boxes for Alpha-Beta-Gamma combinations, etc.

The index shown below has empty boxes because some intersecting groupings are substantially equivalent to other intersecting groupings. As such, one of these intersecting groupings, i.e. Alpha-Beta or Beta-Alpha, can be left blank. Alternatively, the equivalent groupings could be used to record and distinguish between the order of key terms in a search query. In other words, a search query of “Alpha AND Beta” could include the grouping Alpha-Beta, whereas the

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