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(54) **LOCATION EXTRACTION**

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(57) **ABSTRACT**

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A system receives a search query that includes a set of search terms, determines whether at least one of the search terms corresponds to the name of a geographic area, and determines whether the geographic area corresponds to an unambiguous geographic area when at least one of the search terms corresponds to the name of the geographic area. The system performs a local search, based on one or more of the search terms, to identify documents associated with the geographic area when the geographic area corresponds to an unambiguous geographic area.

(21) Appl. No.: **11/024,977**

(22) Filed: **Dec. 30, 2004**

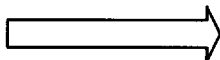
Publication Classification

(51) **Int. Cl.**
G06F 17/30 (2006.01)

**USER ENTERED THE
SEARCH QUERY**

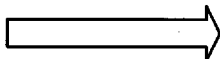
**USER INTENDED RESULTS
ASSOCIATED WITH**

(A) **PIZZA RESTAURANT
ALEXANDRIA VA**



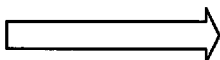
PIZZA RESTAURANTS IN ALEXANDRIA VA

(B) **PIZZA RESTAURANT
ARLINGTON**



**PIZZA RESTAURANTS IN ARLINGTON VA
OR
PIZZA RESTAURANTS IN ARLINGTON TX**

(C) **CRIB MOBILE**



**BUSINESSES THAT SELL/RENT CRIBS IN
MOBILE AL
OR
INFORMATION RELATING TO MOBILES FOR
CRIBS**

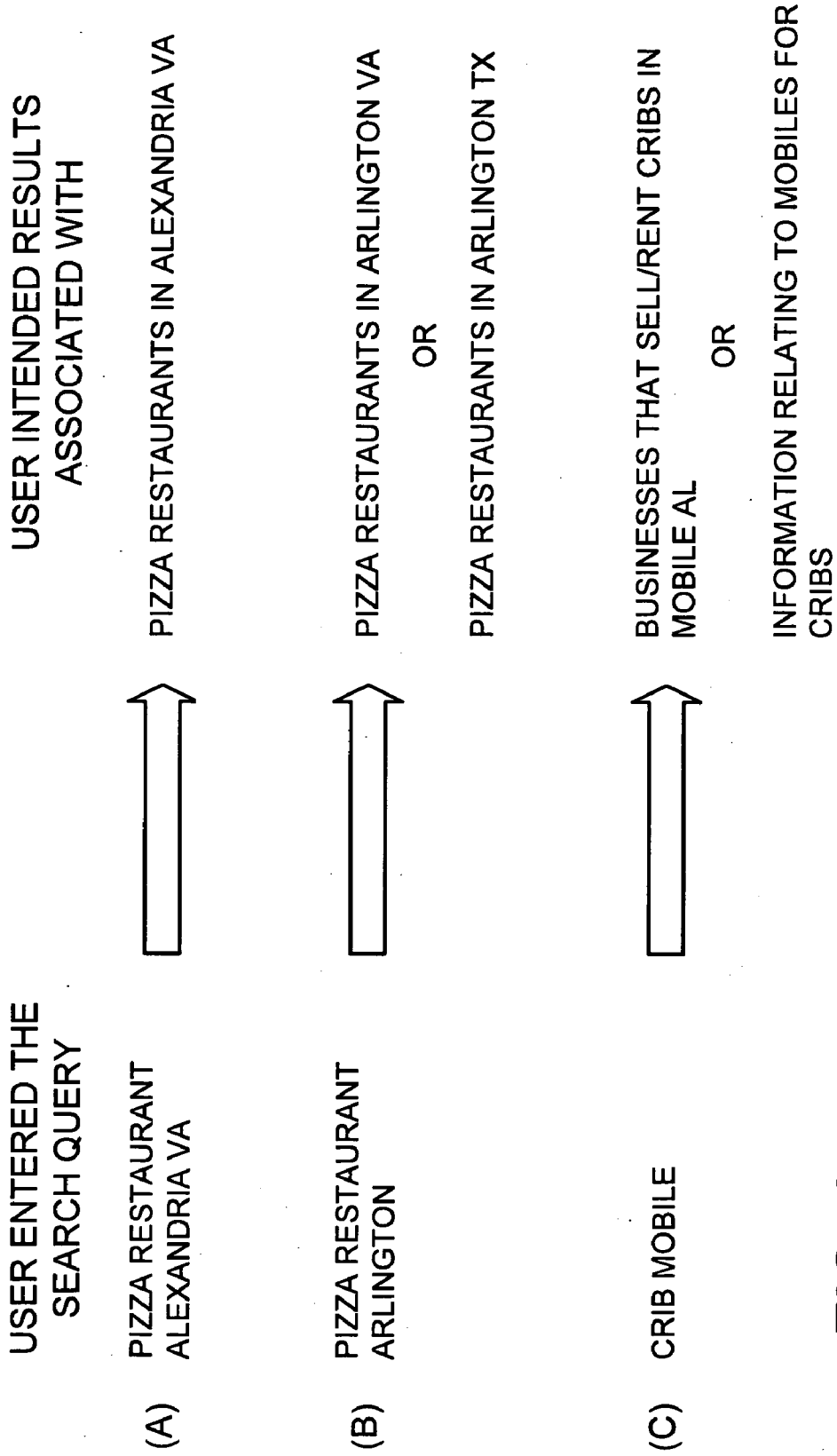


FIG. 1

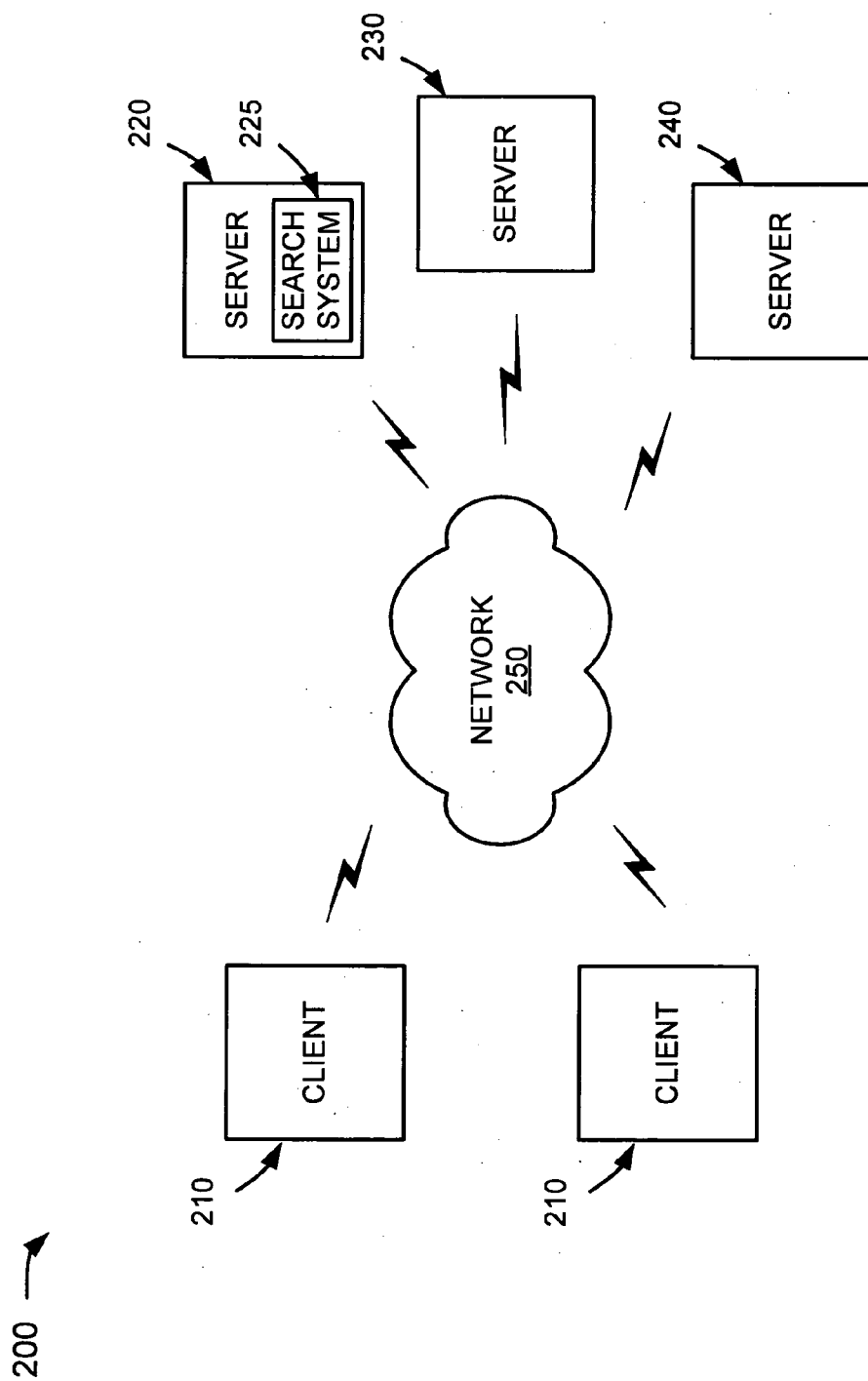


FIG. 2

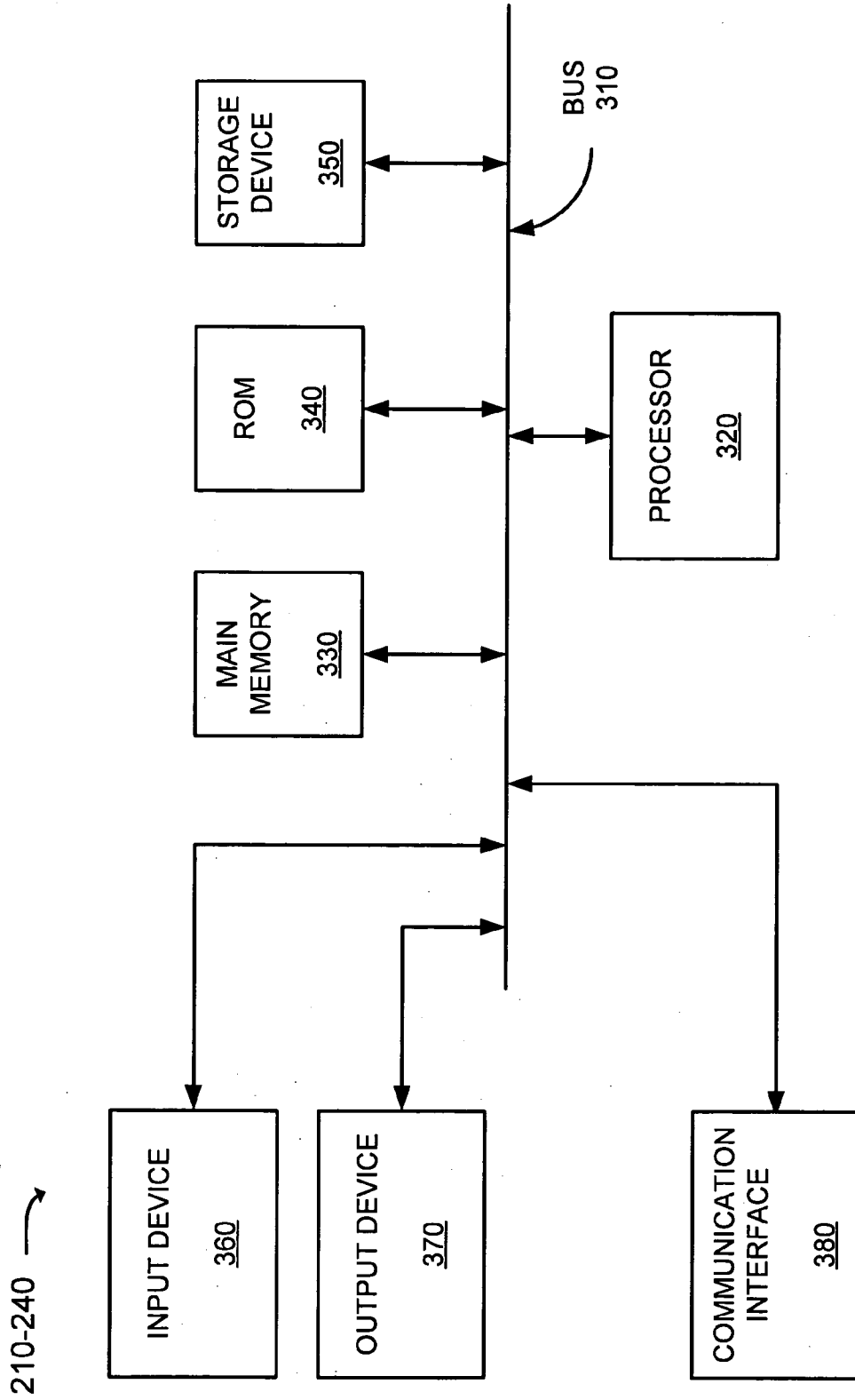


FIG. 3

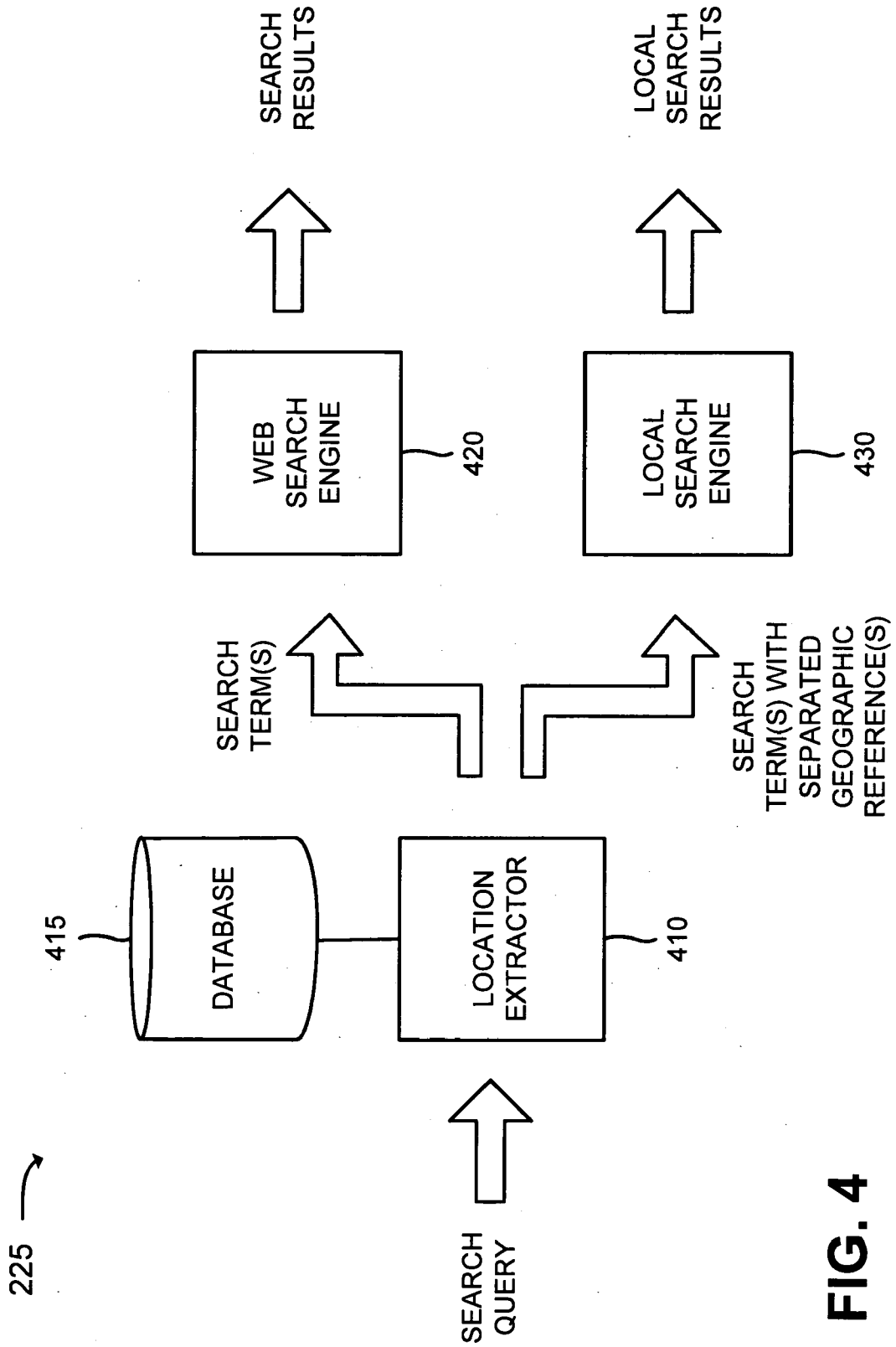


FIG. 4

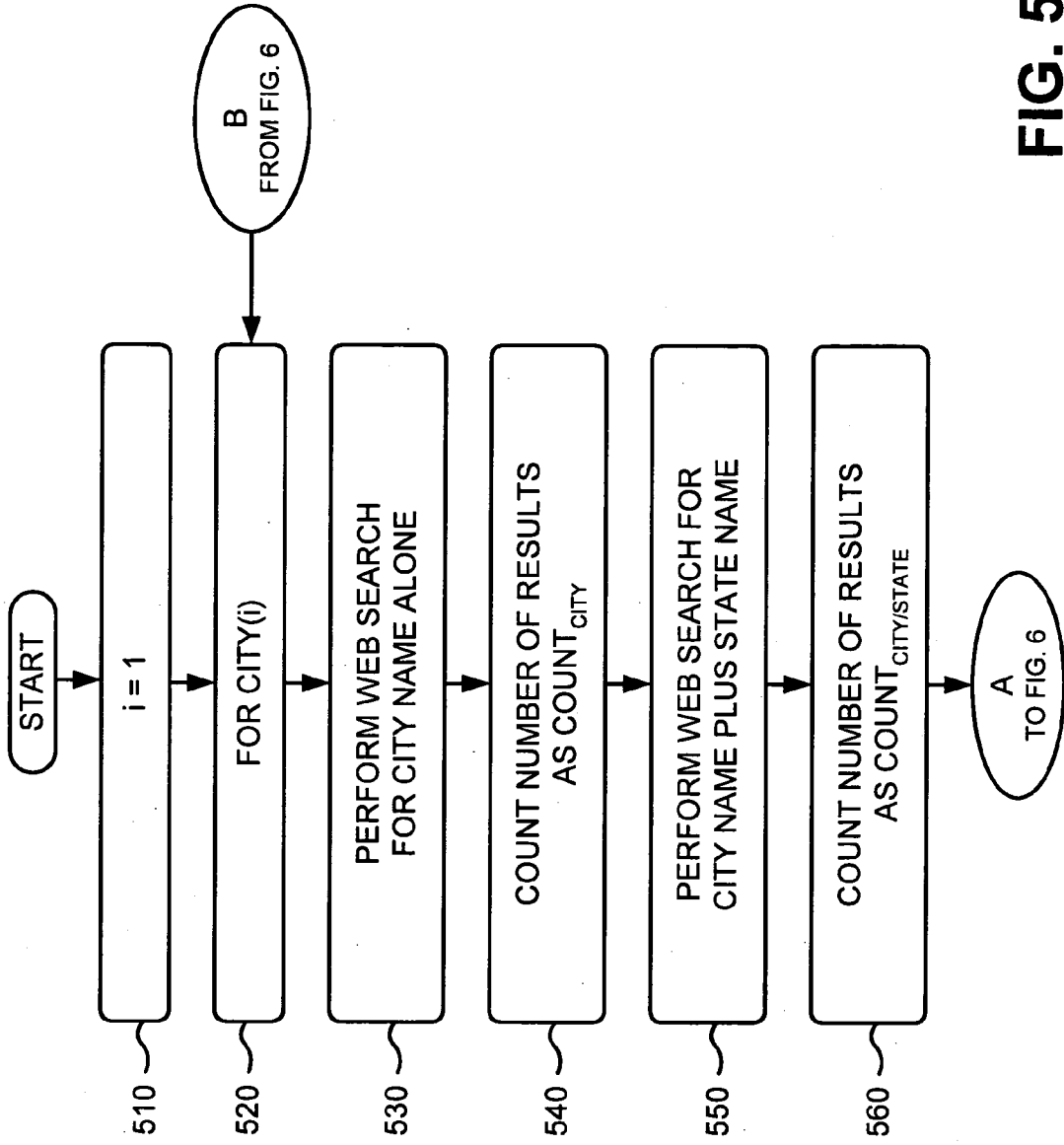
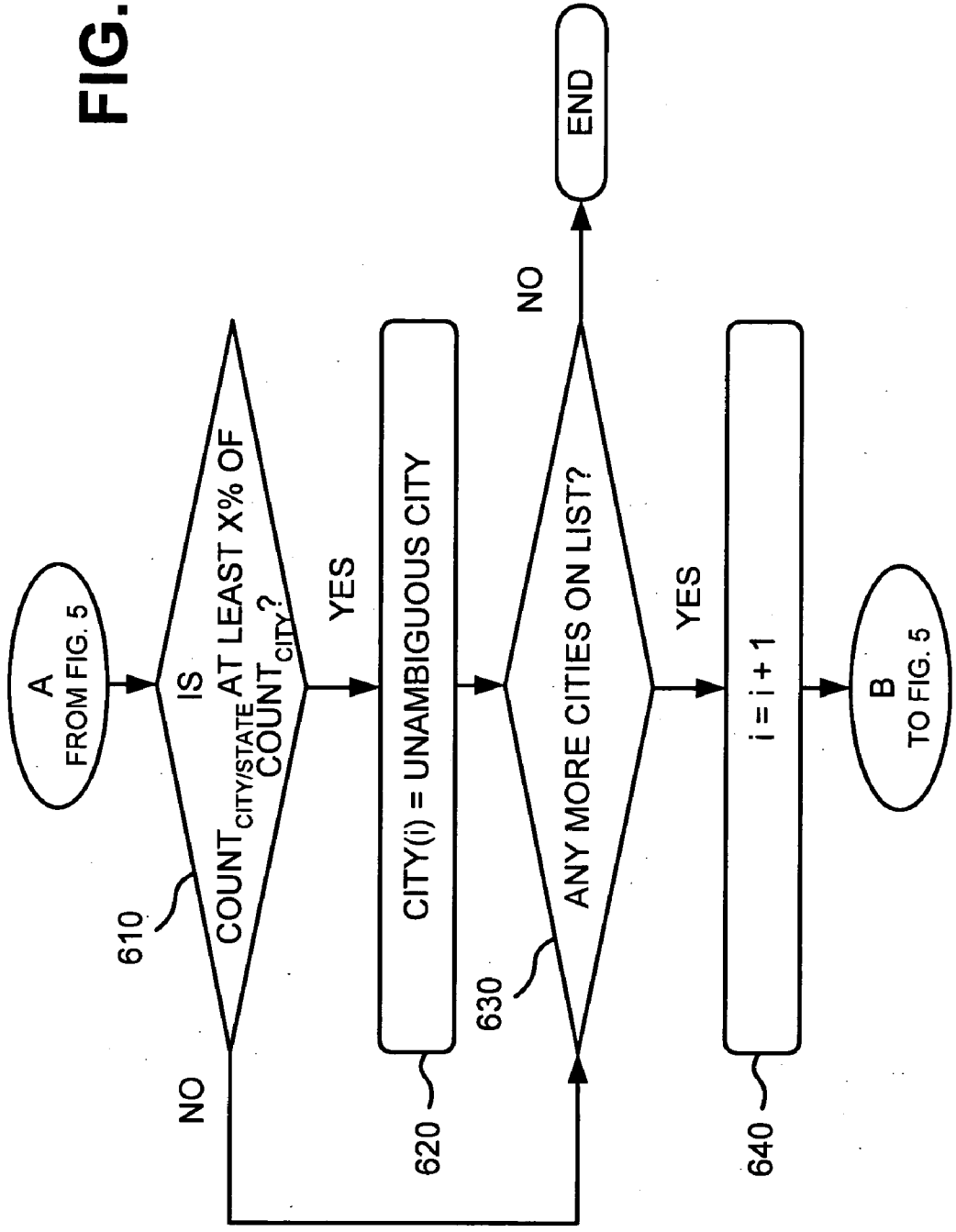


FIG. 5

FIG. 6



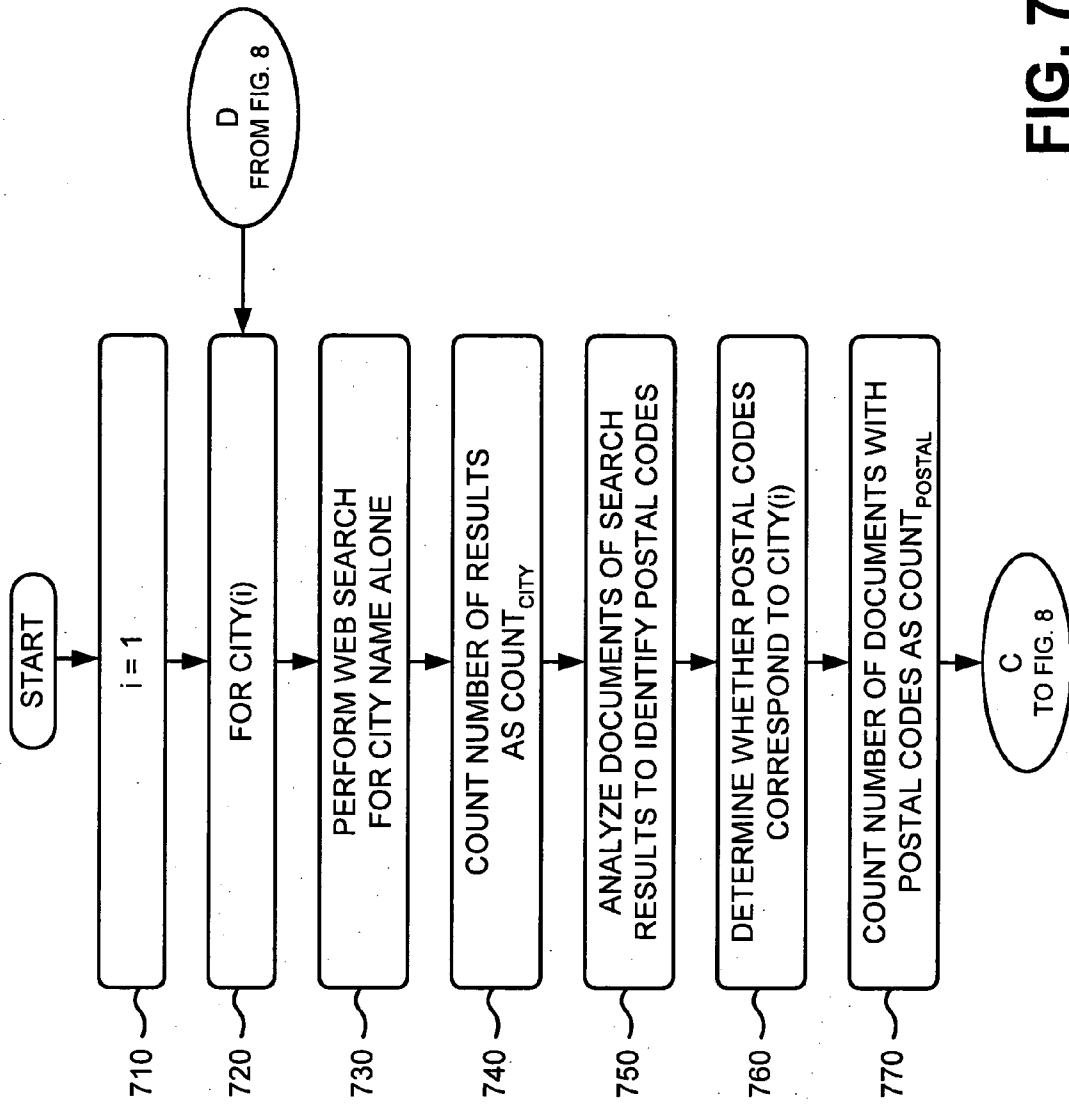


FIG. 7

FIG. 8

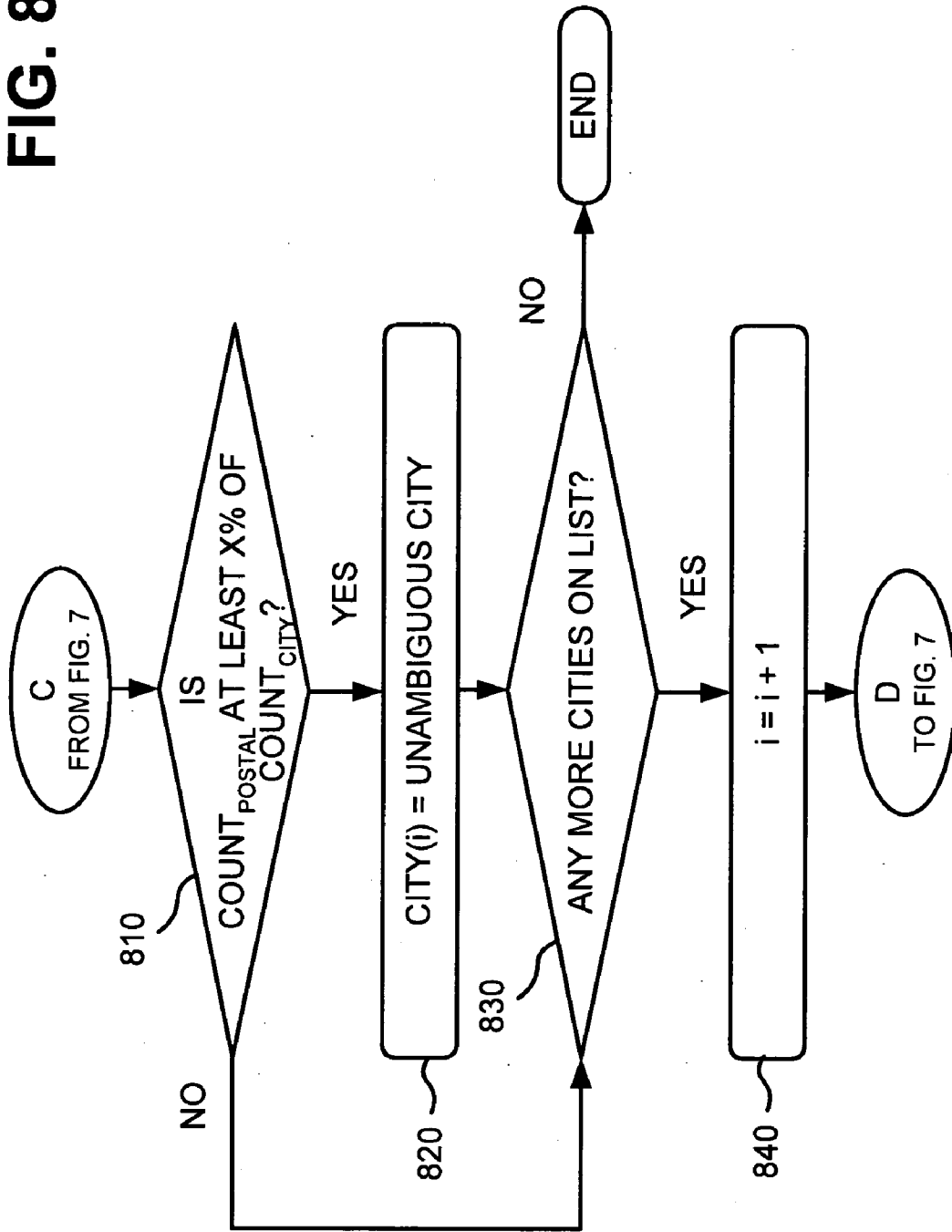


FIG. 9

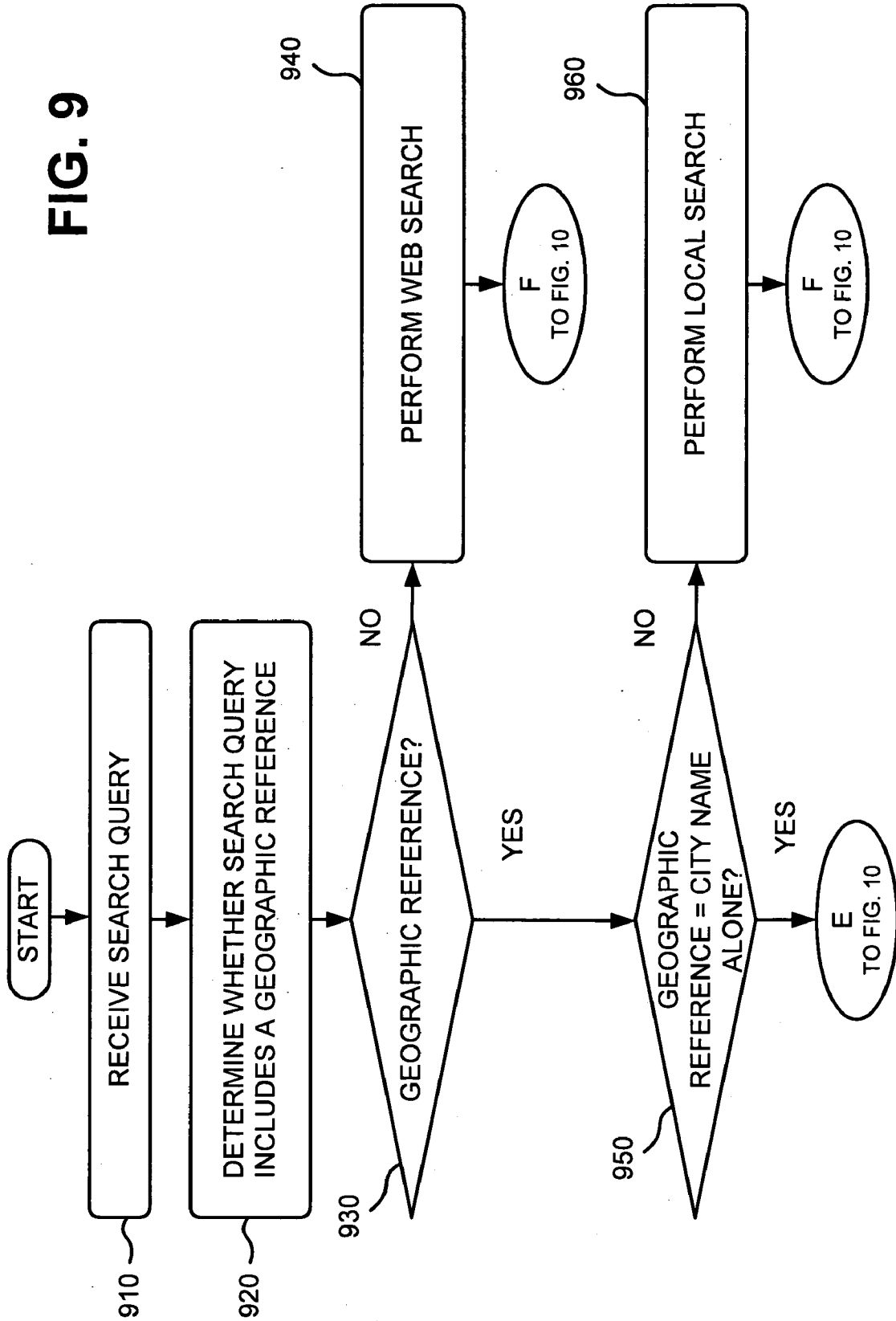


FIG. 10

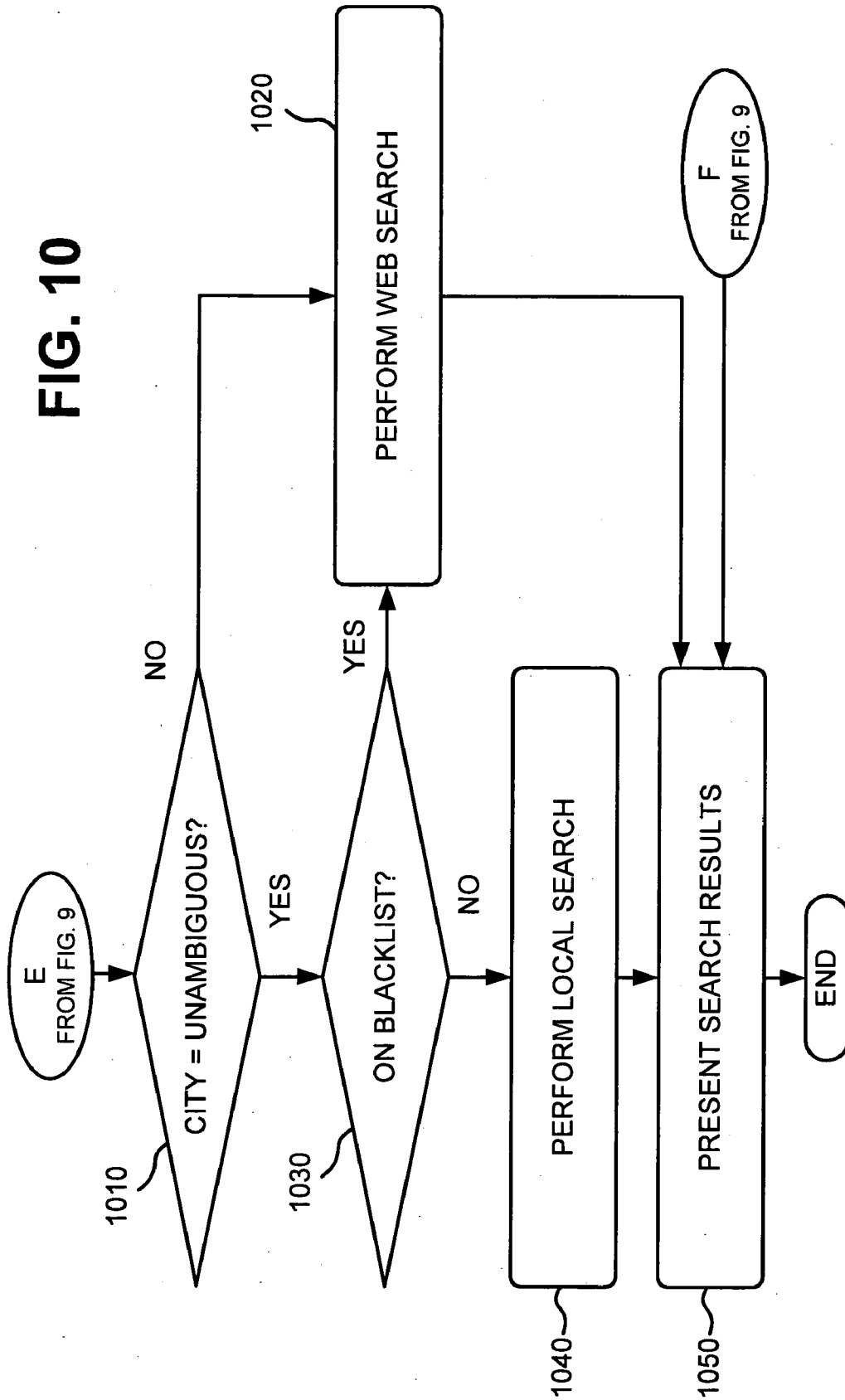


FIG. 11

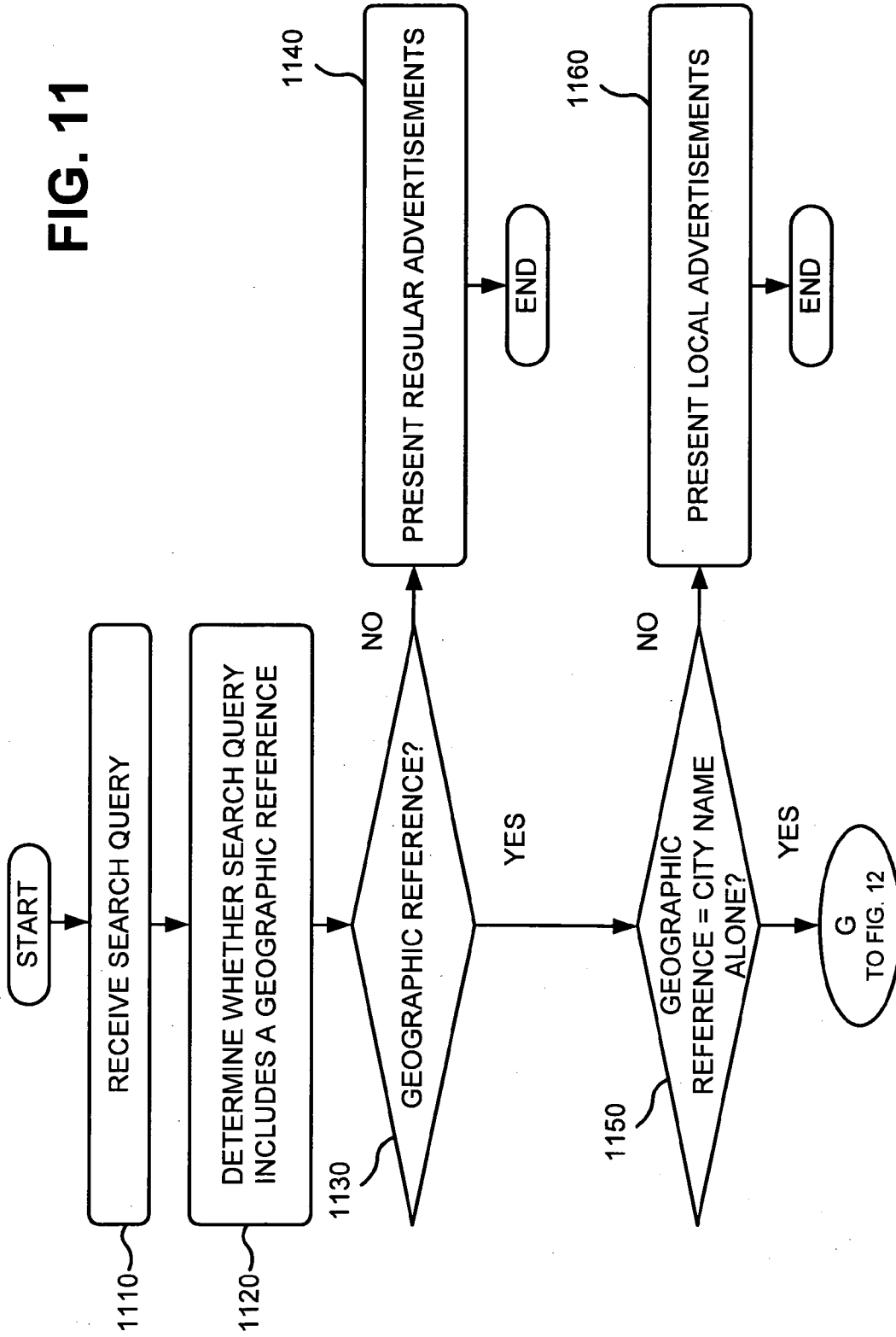
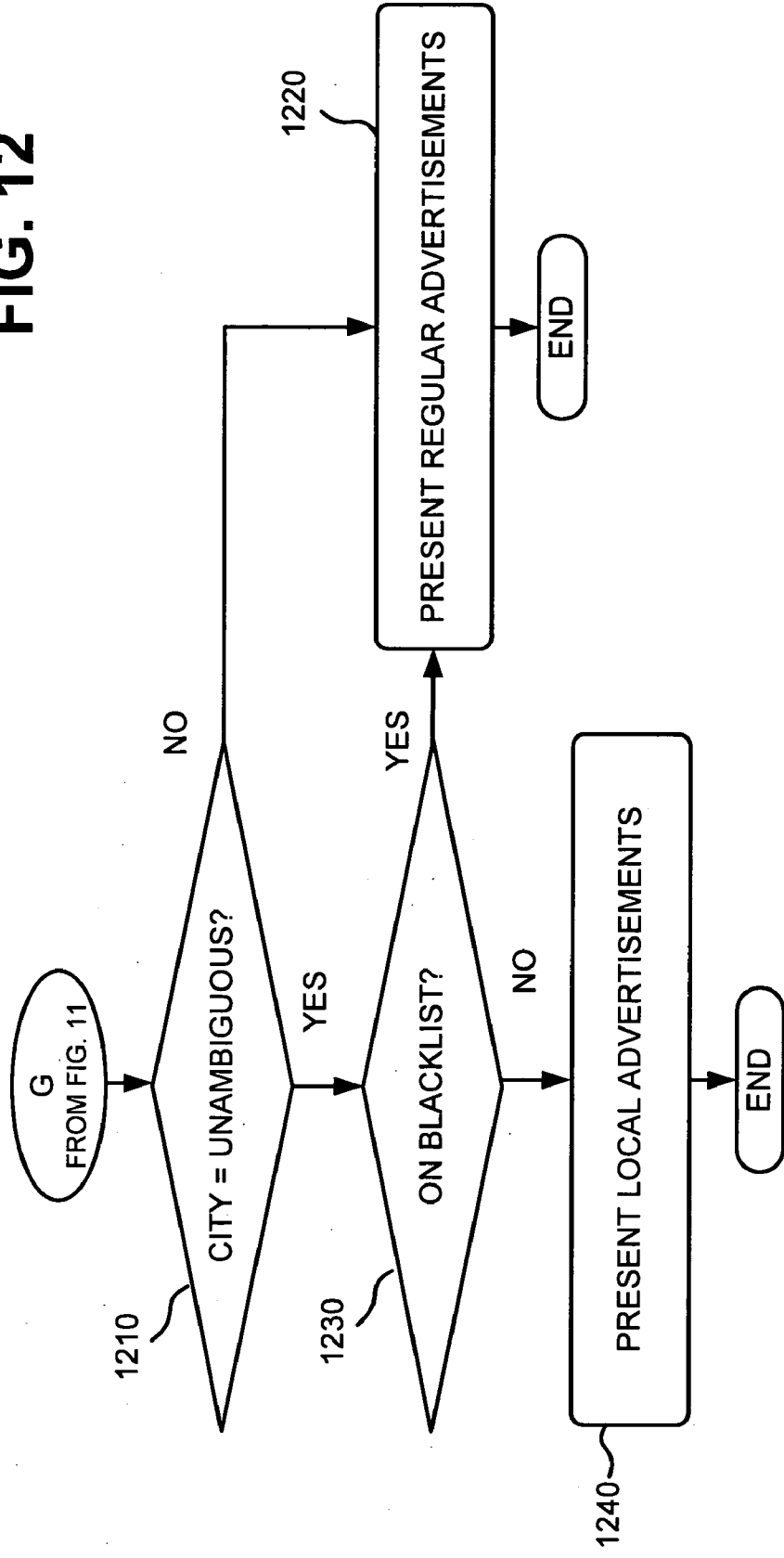


FIG. 12



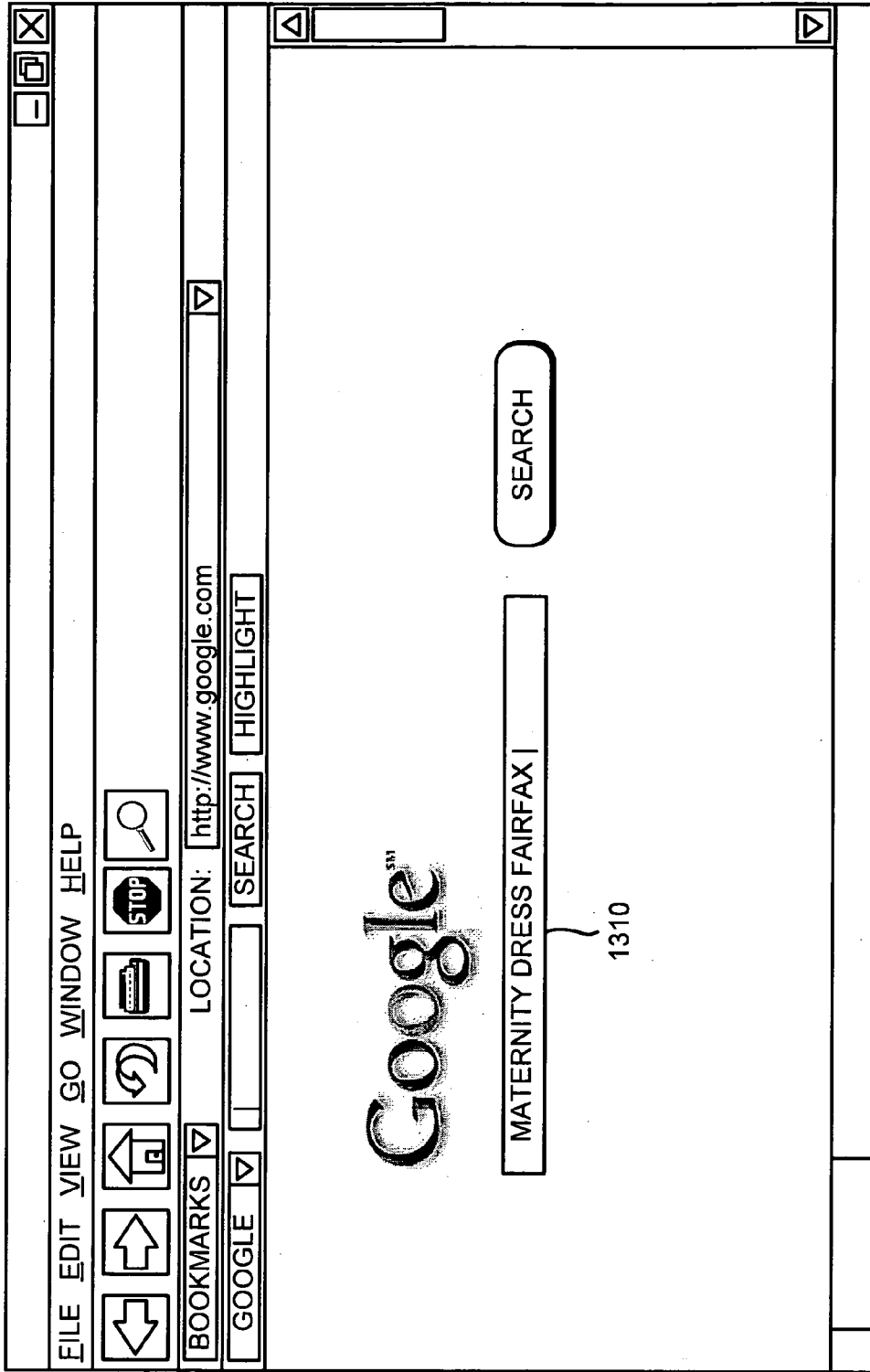
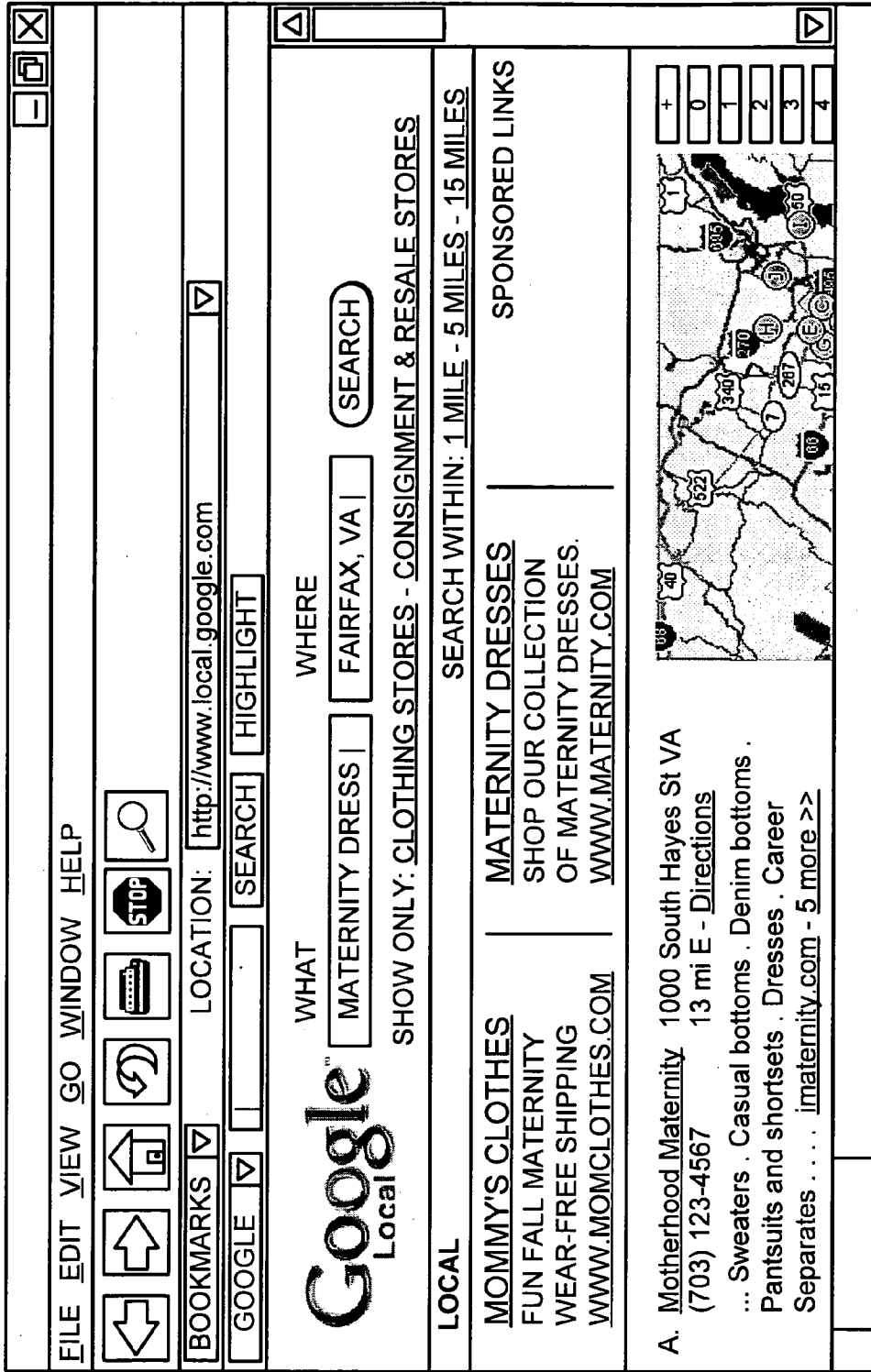


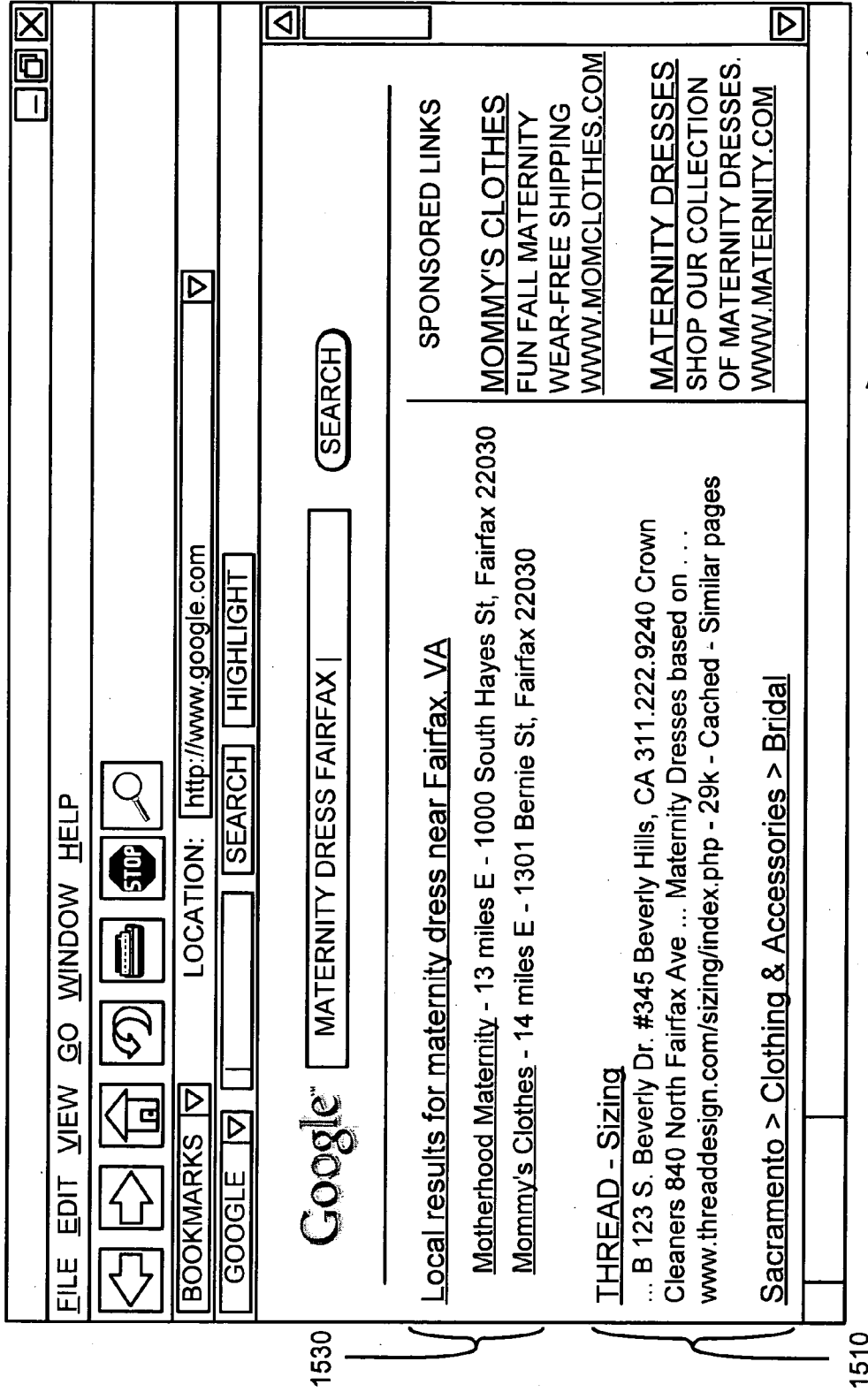
FIG. 13



1420

1410

FIG. 14



1520

FIG. 15

LOCATION EXTRACTION

BACKGROUND

[0001] 1. Field of the Invention

[0002] Implementations described herein relate generally to information retrieval and, more particularly, to the identification of a geographic reference in a search query to assist in local searching.

[0003] 2. Description of Related Art

[0004] The World Wide Web (“web”) contains a vast amount of information. Locating a desired portion of the information, however, can be challenging. This problem is compounded because the amount of information on the web and the number of new users inexperienced at web searching are growing rapidly.

[0005] Search engines attempt to return hyperlinks to web pages in which a user is interested. Generally, search engines base their determination of the user’s interest on search terms (called a search query) entered by the user. The goal of the search engine is to provide links to high quality, relevant results (e.g., web pages) to the user based on the search query. Typically, the search engine accomplishes this by matching the terms in the search query to a corpus of pre-stored web pages. Web pages that contain the user’s search terms are “hits” and are returned to the user as links.

[0006] Local search engines are search engines that attempt to return relevant web pages and/or business listings within a specific geographic area. For a local search, a user may enter a search query and specify a geographic area near which the search query is to be performed. The local search engine may return relevant results, such as relevant web pages pertaining to the geographic area or listings of businesses in the geographic area, to the user.

SUMMARY

[0007] According to one aspect, a method may include receiving a search query that includes a set of search terms, determining whether at least one of the search terms corresponds to the name of a geographic area, and determining whether the geographic area corresponds to an unambiguous geographic area when at least one of the search terms corresponds to the name of the geographic area. The method may also include performing a local search, based on one or more of the search terms, to identify documents associated with the geographic area when the geographic area corresponds to an unambiguous geographic area.

[0008] According to another aspect, a method may include receiving a search query that includes a set of search terms, determining whether at least one of the search terms corresponds to the name of a geographic area, and determining whether the geographic area corresponds to an unambiguous geographic area when at least one of the search terms corresponds to the name of the geographic area. The method may also include presenting an advertisement associated with a business located near or within the geographic area when the geographic area corresponds to an unambiguous geographic area.

[0009] According to yet another aspect, a computer-readable medium may store computer-executed instructions, including instructions for performing a first web search

based on the name of a city in a list of cities to identify a first set of search results, instructions for counting the number of the first set of search results, instructions for performing a second web search based on the name of the city and the name of a state in which the city is located to identify a second set of search results, and instructions for counting the number of the second set of search results. The computer-readable medium may also include instructions for identifying the city as an unambiguous city when the number of the second set of search results is at least X % of the number of the first set of search results, where X is a number greater than zero.

[0010] According to a further aspect, a computer-readable medium may store computer-executable instructions, including instructions for performing a web search based on the name of a city in a list of cities to identify a set of search results, instructions for counting the number of the set of search results, and instructions for counting the number of documents in the set of search results that include postal codes associated with the city. The computer-readable medium may also include instructions for identifying the city as an unambiguous city when the number of documents in the set of search results that include postal codes associated with the city is at least X % of the number of the set of search results, where X is a number greater than zero.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate an embodiment of the invention and, together with the description, explain the invention. In the drawings,

[0012] **FIG. 1** is a diagram of example search queries that may include geographic references;

[0013] **FIG. 2** is an exemplary diagram of a network in which systems and methods consistent with the principles of the invention may be implemented;

[0014] **FIG. 3** is an exemplary diagram of a client or server of **FIG. 2** according to an implementation consistent with the principles of the invention;

[0015] **FIG. 4** is an exemplary diagram of a portion of the search system of **FIG. 2** according to an implementation consistent with the principles of the invention;

[0016] **FIGS. 5 and 6** are flowcharts of exemplary processing for determining unambiguous cities according to an implementation consistent with the principles of the invention;

[0017] **FIGS. 7 and 8** are flowcharts of exemplary processing for determining unambiguous cities according to another implementation consistent with the principles of the invention;

[0018] **FIGS. 9 and 10** are flowcharts of exemplary processing for performing a search according to an implementation consistent with the principles of the invention;

[0019] **FIGS. 11 and 12** are flowcharts of exemplary processing for presenting advertisements according to an implementation consistent with the principles of the invention; and

[0020] **FIGS. 13-15** are exemplary diagrams of user interfaces that may be presented to a user according to an implementation consistent with the principles of the invention.

DETAILED DESCRIPTION

[0021] The following detailed description of the invention refers to the accompanying drawings. The same reference numbers in different drawings may identify the same or similar elements. Also, the following detailed description does not limit the invention.

OVERVIEW

[0022] Sometimes a search query is ambiguous as to whether the user desires documents associated with a local search or a regular web search. It is also sometimes unclear which geographic area the user desires for a local search. To further complicate matters, the names of some geographic areas correspond to common words (e.g., Mobile).

[0023] FIG. 1 is a diagram of example search queries that may include geographic references. In (A), the search query is relatively unambiguous—the user provided the search query “PIZZA RESTAURANT ALEXANDRIA VA.” In this case, it can be assumed that the user desires local search documents relating to pizza restaurants in Alexandria, Va. In (B), the search query is more ambiguous than in (A)—the user provided the search query “PIZZA RESTAURANT ARLINGTON.” In this case, it can be assumed that the user desires local search documents relating to pizza restaurants, but it may be unclear whether the user desires local search documents for Arlington, Va. or Arlington, Tex. In (C), the search query is even more ambiguous than in (A) or (B)—the user provided the search query “CRIB MOBILE.” In this case, it is unclear whether the user desires local search documents or regular web search documents. For example, the user may desire local search documents relating to businesses that sell or rent cribs in Mobile, Alabama or web search documents relating to mobiles for cribs.

[0024] Systems and methods consistent with the principles of the invention may identify a geographic reference in a search query and determine whether that geographic reference should be used to retrieve local search documents.

[0025] A “document,” as the term is used herein, is to be broadly interpreted to include any machine-readable and machine-storable work product. A document may include, for example, an e-mail, a web site, a business listing, a file, a combination of files, one or more files with embedded links to other files, a news group posting, a blog, a web advertisement, etc. In the context of the Internet, a common document is a web page. Web pages often include textual information and may include embedded information (such as meta information, images, hyperlinks, etc.) and/or embedded instructions (such as Javascript, etc.). A “link,” as the term is used herein, is to be broadly interpreted to include any reference to/from a document from/to another document or another part of the same document.

Exemplary Network Configuration

[0026] FIG. 2 is an exemplary diagram of a network 200 in which systems and methods consistent with the principles of the invention may be implemented. Network 200 may include multiple clients 210 connected to multiple servers 220-240 via a network 250. Two clients 210 and three servers 220-240 have been illustrated as connected to network 250 for simplicity. In practice, there may be more or fewer clients and servers. Also, in some instances, a client

may perform the functions of a server and a server may perform the functions of a client.

[0027] Clients 210 may include client entities. An entity may be defined as a device, such as a wireless telephone, a personal computer, a personal digital assistant (PDA), a lap top, or another type of computation or communication device, a thread or process running on one of these devices, and/or an object executable by one of these devices. Servers 220-240 may include server entities that gather, process, search, and/or maintain documents in a manner consistent with the principles of the invention.

[0028] In an implementation consistent with the principles of the invention, server 220 may include a search system 225 usable by clients 210. Server 220 may crawl a corpus of documents (e.g., web documents), index the documents, and store information associated with the documents in a repository of documents. Servers 230 and 240 may store or maintain documents that may be crawled or analyzed by server 120.

[0029] While servers 220-240 are shown as separate entities, it may be possible for one or more of servers 220-240 to perform one or more of the functions of another one or more of servers 220-240. For example, it may be possible that two or more of servers 220-240 are implemented as a single server. It may also be possible for a single one of servers 220-240 to be implemented as two or more separate (and possibly distributed) devices.

[0030] Network 250 may include a local area network (LAN), a wide area network (WAN), a telephone network, such as the Public Switched Telephone Network (PSTN), an intranet, the Internet, a memory device, or a combination of networks. Clients 210 and servers 220-240 may connect to network 250 via wired, wireless, and/or optical connections.

Exemplary Client/Server Architecture

[0031] FIG. 3 is an exemplary diagram of a client or server entity (hereinafter called “client/server entity”), which may correspond to one or more of clients 210 and/or servers 220-240, according to an implementation consistent with the principles of the invention. The client/server entity may include a bus 310, a processor 320, a main memory 330, a read only memory (ROM) 340, a storage device 350, an input device 360, an output device 370, and a communication interface 380. Bus 310 may include a path that permits communication among the elements of the client/server entity.

[0032] Processor 320 may include a conventional processor, microprocessor, or processing logic that interprets and executes instructions. Main memory 330 may include a random access memory (RAM) or another type of dynamic storage device that may store information and instructions for execution by processor 320. ROM 340 may include a conventional ROM device or another type of static storage device that may store static information and instructions for use by processor 320. Storage device 350 may include a magnetic and/or optical recording medium and its corresponding drive.

[0033] Input device 360 may include a conventional mechanism that permits an operator to input information to the client/server entity, such as a keyboard, a mouse, a pen, voice recognition and/or biometric mechanisms, etc. Output

device **370** may include a conventional mechanism that outputs information to the operator, including a display, a printer, a speaker, etc. Communication interface **380** may include any transceiver-like mechanism that enables the client/server entity to communicate with other devices and/or systems. For example, communication interface **380** may include mechanisms for communicating with another device or system via a network, such as network **250**.

[0034] The client/server entity, consistent with the principles of the invention, may perform certain operations, as will be described in detail below. The client/server entity may perform these operations in response to processor **320** executing software instructions contained in a computer-readable medium, such as memory **330**. A computer-readable medium may be defined as a physical or logical memory device and/or carrier wave.

[0035] The software instructions may be read into memory **330** from another computer-readable medium, such as data storage device **350**, or from another device via communication interface **380**. The software instructions contained in memory **330** may cause processor **320** to perform processes that will be described later. Alternatively, hardwired circuitry may be used in place of or in combination with software instructions to implement processes consistent with the principles of the invention. Thus, implementations consistent with the principles of the invention are not limited to any specific combination of hardware circuitry and software.

Exemplary Search System

[0036] **FIG. 4** is an exemplary diagram of a portion of search system **225** according to an implementation consistent with the principles of the invention. The portion of search system **225** illustrated in **FIG. 4** may include location extractor **410** connected to a database **415**, web search engine **420**, and local search engine **430**. While web search engine **420** and local search engine **430** are shown as separate engines, in practice, web search engine **420** and local search engine **430** may be implemented as a single search engine. Also, location extractor **410** may be included as part of a search engine.

[0037] Database **415** may store geographic information, such as a list of geographic names (e.g., city names, state names, country names, etc.). The geographic information in database **415** may also include a list of valid postal codes (e.g., zip codes). Database **415** may also store information that interrelates the geographic information (e.g., that indicates which cities correspond to which states, which postal codes correspond to which cities, which states correspond to which countries, etc.).

[0038] Location extractor **410** may receive a search query and determine whether the search query includes a geographic reference. In one implementation, location extractor **410** may use the geographic information in database **415** to identify whether the search query contains a geographic reference. When the search query includes a geographic reference, location extractor **410** may separate the geographic reference from the search terms in the query and send them to local search engine **430**. When the search query does not include a geographic reference, location extractor **410** may forward the search terms to web search engine **420**.

[0039] Web search engine **420** may include a traditional web search engine that returns a set of documents related to

a search query. In operation, web search engine **420** may receive the search terms of a search query from location extractor **410**. Web search engine **420** may identify a set of documents that match the search query (i.e., documents that contain the set of search terms of the search query) by comparing the search terms to documents in a document corpus. Web search engine **420** might score the identified documents, sort them based on their scores, and output them as a list of search results.

[0040] Local search engine **430** may include a specialized search engine, such as a business listings search engine. In operation, local search engine **430** may receive the search terms and the geographic reference of a search query from location extractor **410**. Local search engine **430** may identify a set of documents that match the search query (i.e., documents that contain the set of search terms of the search query) by comparing the search terms to documents in a document corpus relating to the geographic area associated with the geographic reference. Local search engine **430** might score the identified documents, sort them based on their scores, and output them as a list of search results.

Exemplary Processing for Identifying Unambiguous Cities

[0041] **FIGS. 5 and 6** are flowcharts of exemplary processing for determining unambiguous cities according to an implementation consistent with the principles of the invention. The processing of **FIGS. 5 and 6** may be performed by server **220** or a device or group of devices separate from server **220**.

[0042] Processing may begin with the setting of a variable i equal to one (block **510**) (**FIG. 5**). Then for each city(i) in the list of cities contained, for example, in database **415** (block **520**), a web search may be performed for the name of the city (block **530**). The number of search results for this search may be counted as $\text{count}_{\text{city}}$ (block **540**). A web search may also be performed for the name of the city with the name of the corresponding state (block **550**), which may be identified, for example, in database **415**. The number of search results for this search may be counted as $\text{count}_{\text{city/state}}$ (block **560**).

[0043] It may then be determined whether $\text{count}_{\text{city/state}}$ is at least $X\%$ (where X is a number greater than zero, such as 5) of $\text{count}_{\text{city}}$ (block **610**) (**FIG. 6**). The theory is that when a document includes the name of a city, some fraction of the time the document will also include the name of the corresponding state (e.g., approximately 2-3% of the time). When $\text{count}_{\text{city/state}}$ is at least $X\%$ of $\text{count}_{\text{city}}$, then the city may be considered an “unambiguous” city (block **620**). An “unambiguous city” may refer to a city whose name can be used alone in a search query and it will be understood that the user intended the city and not something else. A label may be associated with the city in database **415** to identify the city as unambiguous.

[0044] To illustrate the above processing, suppose that a web search performed for “Chicago” resulted in a $\text{count}_{\text{city}}$ of 10,000 search results. Suppose further that a web search performed for “Chicago Illinois” resulted in a $\text{count}_{\text{city/state}}$ of 350 search results. If X is 5, then Chicago would not be considered an unambiguous city because $\text{count}_{\text{city/state}}$ (350) is not at least 5% of $\text{count}_{\text{city}}$ (10,000). By contrast, if the web search performed for “Chicago Illinois” resulted in a

$\text{count}_{\text{city}/\text{state}}$ of 550, then Chicago would be considered an unambiguous city because $\text{count}_{\text{city}/\text{state}}$ (550) is at least 5% of $\text{count}_{\text{city}}$ (10,000).

[0045] When $\text{count}_{\text{city}/\text{state}}$ is not at least X % of $\text{count}_{\text{city}}$, then it may be determined whether there are any more cities on the list (block 630). If there are more cities on the list, then the variable i may be incremented by one (block 640) and processing may return to block 520 (FIG. 5).

[0046] In some situations, there may be multiple unambiguous cities with the same name that are considered unambiguous. For example, when the above processing is performed for the city "Hollywood" in Florida, it may be determined that Hollywood, Fla. is an unambiguous city. When the above processing is performed for the city "Hollywood" in California, it may be determined that Hollywood, Calif. is also an unambiguous city. In situations like this, the city with the larger (or significantly larger) population may be labeled as an unambiguous city in database 415. Alternatively, the city with the largest $\text{count}_{\text{city}/\text{state}}$ to $\text{count}_{\text{city}}$ ratio may be labeled as an unambiguous city. Any unambiguous label already associated with any other city with the same name in database 415 may be removed.

[0047] In other situations, it may be beneficial to permit multiple cities with the same name to remain in database 415. For example, multiple cities with the same name may exist in two different countries and be determined to be unambiguous with regard to their respective country. When the above processing is performed for the city "Manchester" in New Hampshire, for example, it may be determined that Manchester, N.H. is an unambiguous city. When the above processing is performed for the city "Manchester" in England, it may be determined that Manchester, England is also an unambiguous city. In situations like this, distinctions between the cities may be made when processing a search query that includes the city name, as described below.

[0048] FIGS. 7 and 8 are flowcharts of exemplary processing for determining unambiguous cities according to another implementation consistent with the principles of the invention. The processing of FIGS. 7 and 8 may be performed by server 220 or a device or group of devices separate from server 220.

[0049] Processing may begin with the setting of a variable i equal to one (block 710) (FIG. 7). Then for each city(i) in the list of cities contained, for example, in database 415 (block 720), a web search may be performed for the name of the city (block 730). The number of search results for this search may be counted as $\text{count}_{\text{city}}$ (block 740).

[0050] The documents of the search results may be analyzed to identify any postal codes that they contain (block 750). The postal codes may be identified using a pattern matching technique and verified by comparing them to the list of postal codes in database 415. It may then be determined whether the postal codes correspond to postal codes associated with city(i). The number of documents that contain postal codes associated with city(i) may be counted as $\text{count}_{\text{postal}}$ (block 770). In another implementation, the value of $\text{count}_{\text{postal}}$ may be based on the ranking of the documents that contain postal codes associated with city(i). For example, the documents that contain postal codes associated with city(i) may be weighted based on their corresponding rank in the search results, where higher ranked

documents may be weighted more than lower ranked documents. The weight values may then be used to determine $\text{count}_{\text{postal}}$.

[0051] It may then be determined whether $\text{count}_{\text{postal}}$ is at least X % (e.g., 5%) of $\text{count}_{\text{city}}$ (block 810) (FIG. 8). The theory is that when a document includes the name of a city, some fraction of the time the document will also include a postal code associated with the city (e.g., approximately 2-3% of the time). When $\text{count}_{\text{postal}}$ is at least X % of $\text{count}_{\text{city}}$, then the city may be considered an unambiguous city (block 820). A label may be associated with the city in database 415 to identify the city as unambiguous.

[0052] To illustrate the above processing, suppose that a web search performed for "Chicago" resulted in a $\text{count}_{\text{city}}$ of 10,000 search result documents. Suppose that 350 of the search result documents contained a postal code associated with the city of Chicago; therefore, $\text{count}_{\text{postal}}$ equals 350. If X is 5, then Chicago would not be considered an unambiguous city because $\text{count}_{\text{postal}}$ (350) is not at least 5% of $\text{count}_{\text{city}}$ (10,000). By contrast, if 500 or more of the search result documents contained a postal code associated with the city of Chicago (i.e., $\text{count}_{\text{postal}} \geq 500$), then Chicago would be considered an unambiguous city because $\text{count}_{\text{postal}}$ (≥ 500) is at least 5% of $\text{count}_{\text{city}}$ (10,000).

[0053] When $\text{count}_{\text{postal}}$ is not at least X % of $\text{count}_{\text{city}}$, then it may be determined whether there are any more cities on the list (block 830). If there are more cities on the list, then the variable i may be incremented by one (block 840) and processing may return to block 720 (FIG. 7).

[0054] While the above processing uses postal codes, other types of geographic identifiers may alternatively be used. For example, telephone numbers may be used in alternate implementation consistent with the principles of the invention.

[0055] In some situations, there may be multiple cities with the same name that are considered unambiguous. For example, when the above processing is performed for the city "Hollywood" in Florida, it may be determined that Hollywood, Fla. is an unambiguous city. When the above processing is performed for the city "Hollywood" in California, it may also be determined that Hollywood, Calif. is also an unambiguous city. In situations like this, the city with the larger (or significantly larger) population may be labeled as an unambiguous city in database 415. Alternatively, the city with the largest $\text{count}_{\text{postal}}$ to $\text{count}_{\text{city}}$ ratio may be labeled as an unambiguous city. Any unambiguous label already associated with any other city with the same name in database 415 may be removed.

[0056] In other situations, it may be beneficial to permit multiple unambiguous cities with the same name to remain in database 415. For example, multiple cities with the same name may exist in two different countries and be determined to be unambiguous with regard to their respective country. When the above processing is performed for the city "Manchester" in New Hampshire, for example, it may be determined that Manchester, N.H. is an unambiguous city. When the above processing is performed for the city "Manchester" in England, it may be determined that Manchester, England is also an unambiguous city. In situations like this, distinctions between the cities may be made when processing a search query that includes the city name, as described below.

Exemplary Searching-Related Processing

[0057] **FIGS. 9 and 10** are flowcharts of exemplary processing for performing a search according to an implementation consistent with the principles of the invention. Processing may begin with server **220** receiving a search query (block **910**). In one implementation, a user may use a web browser associated with a client **210** to provide the search query to server **220**.

[0058] It may be determined whether the search query includes a geographic reference (block **920**). In one implementation, the search query may be parsed and analyzed against a set of templates of the form: query-city-state; query-city; query-postal code; query-city-state-postal code; city-state-query; city-query; postal code-query; city-state-postal code-query; etc. A search query that includes a geographic reference may match one of these templates.

[0059] When parsing and analyzing the search query, it is possible to encounter ambiguity. For example, when a user provides the search query “pizza in New York,” the user could intend a search for “pizza in New” in the city of York, Pa. or a search for “pizza” in the city of New York, N.Y. In one implementation, when there are two or more interpretations for geographical names in a search query (“New York” and “York”), the longer interpretation (i.e., “New York” rather than “York”) may be selected. In addition, if multiple geographical components are included in the search query (e.g., city, state, postal code), then the interpretation that is more consistent with the other geographical components may be selected.

[0060] If the search query does not include a geographic reference, then a regular web search may be performed based on the search term(s) of the query (blocks **930** and **940**). If, on the other hand, the search query includes a geographic reference, it may be determined whether the geographic reference corresponds to a city name alone (i.e., without any other geographic information, such as no state or postal code information) (block **950**). If the search query includes a geographic reference other than a city name alone, then a local search may be performed based on the search term(s) of the query and the geographic reference, if the geographic reference is not ambiguous (block **960**). For example, if the geographic reference includes a state name in addition to a city name or includes a postal code, then a local search may be performed based on the geographic reference. If the geographic reference includes a state name alone, then the geographic reference may be considered ambiguous. In this case, a regular web search may be performed based on the search term(s) of the query.

[0061] If the search query includes a geographic reference corresponding to a city name alone, then it may be determined whether the city corresponds to an unambiguous city (block **1010**) (**FIG. 10**). As explained above, an unambiguous city may include an appropriate label in database **415**. If the city does not correspond to an unambiguous city, then a regular web search may be performed based on the search term(s) of the query (block **1020**).

[0062] If the city corresponds to an unambiguous city, then it may be determined whether the city name together with one or more other search terms of the query appear on a blacklist (block **1030**). In one implementation, a blacklist may be maintained for unambiguous city names that, when

combined with one or more other words, mean something other than their respective cities. For example, assume that the city of Orlando, Florida is an unambiguous city. When Orlando appears in a search query with the word Bloom, however, the user likely desires information associated with the actor “Orlando Bloom” and not information concerning flower shops in the city of Orlando. If the city name together with one or more other search terms of the query appear on the blacklist, then a regular web search may be performed based on the search term(s) of the query (block **1020**).

[0063] If the city name together with one or more other search terms of the query does not appear on the blacklist, then a local search may be performed based on the search term(s) and the geographic reference of the query (block **1040**). In some situations, there may be multiple cities with the same name that are located in the same state (e.g., there are two Mountain Views in California). In situations like this, the city with the larger (or significantly larger) population may be identified as the city that the user intended. Alternatively, the user’s Internet Protocol (IP) address (or another indicator of the user’s location) may be used to identify where the user is located, as is known in the art, and select one of the cities based on this determination. In other situations, there may be multiple cities with the same name that are located in different countries (e.g., Manchester, N.H. and Manchester, England) and were identified as unambiguous, as described above. In these situations, the user’s IP address (or another indicator of the user’s location) may be used to identify where the user is located, as is known in the art, and select one of the cities based on this determination.

[0064] Search results, either web or local, may be formed based on the web or local search. For example, the documents identified based on the search may be scored and sorted based on their scores. The search results may then be presented to the user via client **210** (block **1050**).

[0065] It may be possible as a result of the city not corresponding to an unambiguous city (block **1010**) or the city name with one or more other search terms of the query appearing on the blacklist (block **1030**) to suggest a local search. For example, in addition to presenting the web search results, a link to local search results may be presented. If the link is selected, a local search may be performed. If two or more cities are equally appealing for the local search, then two or more local search links may be presented. For example, if the search query contained the word “Hollywood” and either Hollywood did not correspond to an unambiguous city or Hollywood appeared on the blacklist with another word in the query, then a local search link may be presented for a local search associated with Hollywood, Calif. and another local search link may be presented for a local search associated with Hollywood, Fla.

Exemplary Advertisement-Related Processing

[0066] **FIGS. 11 and 12** are flowcharts of exemplary processing for presenting advertisements according to an implementation consistent with the principles of the invention. Processing may begin with server **220** receiving a search query (block **1110**). In one implementation, a user may use a web browser associated with a client **210** to provide the search query to server **220**.

[0067] It may be determined whether the search query includes a geographic reference (block **1120**). In one imple-

mentation, the search query may be analyzed against a set of templates, as described above. A search query that includes a geographic reference may match one of these templates.

[0068] If the search query does not include a geographic reference, then regular advertisements may be presented (blocks 1130 and 1140). Many techniques are known in the art for selecting advertisements to present in relation to a search query. In another implementation, it may be determined whether an indicator of the user's location, such as the user's IP address, is available. When an indicator of the user's location is available, then local advertisements may be presented, as known in the art, based on the user's location.

[0069] If, on the other hand, the search query includes a geographic reference, it may be determined whether the geographic reference corresponds to a city name alone (i.e., without any other geographic information, such as no state or postal code information) (block 1150). If the search query includes a geographic reference other than a city name alone, then local advertisements may be presented, as known in the art, if the geographic reference is not ambiguous (block 1160). For example, if the geographic reference includes a state name in addition to a city name or includes a postal code, then local advertisements may be presented based on the geographic reference. If the geographic reference includes a state name alone, then the geographic reference may be considered ambiguous. In this case, regular advertisements may be presented.

[0070] If the search query includes a geographic reference corresponding to a city name alone, then it may be determined whether the city corresponds to an unambiguous city (block 1210) (FIG. 12). As explained above, an unambiguous city may include an appropriate label in database 415. If the city does not correspond to an unambiguous city, then regular advertisements may be presented (block 1220).

[0071] If the city corresponds to an unambiguous city, then it may be determined whether the city name with one or more other search terms of the query appear on a blacklist (block 1230). As explained above, a blacklist may be maintained for unambiguous city names that, when combined with one or more words, mean something other than their respective cities. If the city name with one or more other search terms of the query appear on the blacklist, then regular advertisements may be presented (block 1220).

[0072] If the city name with one or more other search terms of the query does not appear on the blacklist, then local advertisements may be presented based on the geographic reference of the query (block 1240). In some situations, there may be multiple cities with the same name that are located in the same state (e.g., there are two Mountain Views in California). In situations like this, the city with the larger (or significantly larger) population may be identified as the city that the user intended. Alternatively, the user's IP address (or another indicator of the user's location) may be used to identify where the user is located, as is known in the art, and select one of the cities based on this determination. In other situations, there may be multiple cities with the same name that are located in different countries (e.g., Manchester, N.H. and Manchester, England) and were identified as unambiguous, as described above. In these situations, the user's IP address (or another indicator of the user's

location) may be used to identify where the user is located, as is known in the art, and select one of the cities based on this determination.

[0073] When presenting local ("targeted") advertisements, information concerning the user's location, such as the user's IP address, may be used to determine whether that location is within a predetermined distance (e.g., 500 miles) of the location corresponding to the geographic reference. When the user's location is within the predetermined distance, then local advertisements may be presented. When the user's location is outside the predetermined distance, however, then regular advertisements may be presented.

EXAMPLE

[0074] FIGS. 13-15 are exemplary diagrams of user interfaces that may be presented to a user according to an implementation consistent with the principles of the invention. Assume that the user has accessed an interface associated with a search system, such as search system 225 (FIG. 2). As shown in FIG. 13, the user may enter one or more search terms of a search query via a single data entry field (e.g., a single search box) 1310. In this case, the user has entered the search terms "maternity dress fairfax."

[0075] As described above, the search system may perform template matching to determine whether the search query includes a geographic reference. In this case, the search system may determine that "Fairfax" corresponds to a geographic reference that corresponds to a city name alone. Initially, assume that the city of Fairfax, Va. is an unambiguous city that does not appear on a blacklist with the word "maternity" and/or the word "dress." Accordingly, the search system may perform a local search for documents relating to the search terms "maternity dress" in the Fairfax, Va. area.

[0076] As shown in FIG. 14, the search system, via a user interface, may present local search results 1410 and/or local advertisements 1420. For each document in local search results 1410 (or some subset of the documents in local search results 1410), the user interface may provide address information for the business associated with the document, a telephone number for the business, a snippet from the document or another document associated with the business, a link to more information associated with the business, a link to directions to the business, and/or a link to one or more documents that refer to the business. The user interface may also provide a map of the area covered by the search. The map may optionally include pointers to businesses associated with local search results 1410 (or some set of local search results 1410). For each local advertisement 1420, the user interface may provide a link to a document associated with the advertisement and perhaps a snippet from the document that includes one or more of the search terms.

[0077] Now assume that the city of Fairfax is not an unambiguous city or appears on a blacklist with the word "maternity" and/or the word "dress." Accordingly, the search system may perform a web search for documents relating to the search terms "maternity dress fairfax."

[0078] As shown in FIG. 15, the search system, via a user interface, may present web search results 1510, regular advertisements 1520, and optionally, a local search suggestion 1530. For each search result 1510, the user interface

may provide a link to a web document and perhaps a snippet from that document that includes one or more of the search terms. For each advertisement 1520, the user interface may provide a link to a document associated with the advertisement and perhaps a snippet from the document that includes one or more of the search terms.

[0079] For local search suggestion 1530, the user interface may provide a "Local results for maternity dress near Fairfax, VA" link that may cause a local search to be performed for documents relating to one or more of the search terms "maternity dress" in the Fairfax, Va. area. For local search suggestion 1530, the user interface may also provide individual links to one or more local documents that would be identified by the local search. In one implementation, one or more links corresponding to the highest scoring document(s) in the local search results may be presented.

Degrees of Unambiguous-ness

[0080] It has been described that an unambiguous city is identified when the number of search results corresponding to a search for the city with its corresponding state or the number of search results including postal codes associated with the city is at least X % of the number of search results for the city alone. In another implementation consistent with the principles of the invention, degrees of unambiguous-ness may be established.

[0081] For example, when, as described above, the number of search results corresponding to a search for the city with its corresponding state or the number of search results including postal codes associated with the city is at least X % (e.g., 5%) of the number of search results for the city alone, then the city may be regarded as unambiguous and a local search may be performed when it is included in a search query similar to that described above.

[0082] When, on the other hand, the number of search results corresponding to a search for the city with its corresponding state or the number of search results including postal codes associated with the city is less than X % (e.g., 5%) but greater than Y % (where Y is a number less than X, such as 3) of the number of search results for the city alone, then the city may be regarded as semi-unambiguous and a regular web search may be performed when it is included in a search query. In this case, a local search may be suggested similar to that described above with regard to FIG. 15.

[0083] When the number of search results corresponding to a search for the city with its corresponding state or the number of search results including postal codes associated with the city is less than Y % (e.g., 3%) of the number of search results for the city alone, then the city may be regarded as ambiguous and a regular web search may be performed when it is included in a search query. In this case, no local search may be performed or suggested.

CONCLUSION

[0084] Systems and methods consistent with the principles of the invention may identify a geographic reference in a search query and determine whether that geographic reference should be used to retrieve local search documents.

[0085] The foregoing description of preferred embodiments of the present invention provides illustration and

description, but is not intended to be exhaustive or to limit the invention to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention.

[0086] For example, while series of acts have been described with regard to FIGS. 5-12, the order of the acts may be modified in other implementations consistent with the principles of the invention. Further, non-dependent acts may be performed in parallel.

[0087] Also, the processing of FIGS. 5-12 has been described with regard to cities. The above processing may also be applicable to geographic areas other than cities, such as towns, counties, etc.

[0088] Further, exemplary user interfaces have been described with respect to FIGS. 13-15. In other implementations consistent with the principles of the invention, the user interfaces may include more, fewer, or different pieces of information.

[0089] It will be apparent to one of ordinary skill in the art that aspects of the invention, as described above, may be implemented in many different forms of software, firmware, and hardware in the implementations illustrated in the figures. The actual software code or specialized control hardware used to implement aspects consistent with the principles of the invention is not limiting of the invention. Thus, the operation and behavior of the aspects were described without reference to the specific software code—it being understood that one of ordinary skill in the art would be able to design software and control hardware to implement the aspects based on the description herein.

[0090] No element, act, or instruction used in the present application should be construed as critical or essential to the invention unless explicitly described as such. Also, as used herein, the article "a" is intended to include one or more items. Where only one item is intended, the term "one" or similar language is used. Further, the phrase "based on" is intended to mean "based, at least in part, on" unless explicitly stated otherwise.

What is claimed is:

1. A method, comprising:

receiving a search query that includes a plurality of search terms;

determining whether at least one of the search terms corresponds to a name of a geographic area;

determining whether the geographic area corresponds to an unambiguous geographic area when at least one of the search terms corresponds to the name of the geographic area; and

performing a local search, based on one or more of the search terms, to identify documents associated with the geographic area when the geographic area corresponds to an unambiguous geographic area.

2. The method of claim 1, wherein receiving a search query includes:

providing a single search box, and

receiving the plurality of search terms via the single search box.

3. The method of claim 1, further comprising:
performing a web search based on the plurality of search terms when none of the search terms corresponds to the name of a geographic area.
4. The method of claim 1, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:
analyzing the plurality of search terms against a set of templates to determine whether the search query includes the name of a geographic area.
5. The method of claim 1, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:
determining whether the search query includes two or more interpretations of names of geographic areas, and
selecting a longer one of the interpretations when the search query includes two or more interpretations of names of geographic areas.
6. The method of claim 1, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:
determining whether the search query includes two or more interpretations of names of geographic areas,
determining whether the search query includes multiple geographical components, and
selecting one of the interpretations that is more consistent with the geographical components.
7. The method of claim 1, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:
determining whether the plurality of search terms are associated with no geographic reference other than the name of the geographic area.
8. The method of claim 1, further comprising:
performing a web search based on the plurality of search terms when the geographic area does not correspond to an unambiguous geographic area.
9. The method of claim 1, further comprising:
determining whether the name of the geographic area together with one or more of the search terms are included on a blacklist; and
wherein the local search is performed when the name of the geographic area together with one or more of the search terms are not included on the blacklist.
10. The method of claim 1, further comprising:
determining whether the name of the geographic area together with one or more of the search terms are included on a blacklist; and
performing a web search based on the plurality of search terms when the name of the geographic area together with one or more of the search terms are included on the blacklist.
11. The method of claim 1, further comprising:
presenting a local advertisement that is associated with a business located in or near the geographic area when the geographic area corresponds to an unambiguous geographic area.
12. The method of claim 1, further comprising:
determining whether the name of the geographic area corresponds to a common name of multiple cities located in a single state; and
selecting one of the cities based on populations of the cities.
13. The method of claim 1, further comprising:
determining whether the name of the geographic area corresponds to a common name of multiple cities located in a single state; and
selecting one of the cities based on a location of a user who provided the search query.
14. The method of claim 1, further comprising:
determining whether the name of the geographic area corresponds to a common name of multiple cities located in multiple countries; and
selecting one of the cities based on a location of a user who provided the search query.
15. The method of claim 1, further comprising:
suggesting a local search based on one or more of the search terms to identify documents associated with the geographic area when the geographic area does not correspond to an unambiguous geographic area.
16. The method of claim 1, further comprising:
forming a list of search results based on the local search; and
providing the list of search results, where at least one of the search results includes at least one of:
address information for a business associated with the search result,
a telephone number for the business,
a snippet from a document mentioning the business,
a link to directions to the business, or
a link to one or more documents that refer to the business.
17. The method of claim 1, further comprising:
forming a list of search results based on the local search;
providing the list of search results;
providing a map of the geographic area; and
identifying a location associated with at least one of the search results on the map.
18. The method of claim 1, further comprising:
forming a list of search results based on the local search;
providing the list of search results; and
providing an advertisement associated with a business located in or near the geographic area.
19. The method of claim 1, wherein the geographic area corresponds to a city; and
wherein the method further comprises:
processing a list of cities to identify whether ones of the cities correspond to unambiguous cities; and

storing the list of cities and corresponding indications of whether the cities correspond to unambiguous cities in a database.

20. The method of claim 19, wherein determining whether the geographic area corresponds to an unambiguous geographic area includes:

analyzing the database to identify the corresponding city in the list of cities.

21. The method of claim 20, wherein determining whether the geographic area corresponds to an unambiguous geographic area further includes:

determining whether the corresponding indication indicates that the city corresponds to an unambiguous city.

22. The method of claim 19, wherein processing a list of cities includes:

performing a first web search based on the name of one of the cities in the list of cities to identify a first set of search results,

counting a number of the first set of search results,

performing a second web search based on the name of the one city and the name of a state in which the one city is located to identify a second set of search results,

counting a number of the second set of search results, and

identifying the one city as an unambiguous city when the number of the second set of search results is at least X % of the number of the first set of search results, where X is a number greater than zero.

23. The method of claim 19, wherein processing a list of cities includes:

performing a web search based on the name of one of the cities in the list of cities to identify a set of search results,

counting a number of the set of search results,

counting a number of documents in the set of search results that include postal codes associated with the one city, and

identifying the one city as an unambiguous city when the number of documents in the set of search results that include postal codes associated with the one city is at least X % of the number of the set of search results, where X is a number greater than zero.

24. A system, comprising:

means for receiving a search query;

means for determining whether the search query includes the name of a city;

means for determining whether the city corresponds to an unambiguous city when the search query includes the name of the city; and

means for performing a local search to identify documents associated with businesses in or near a geographic area associated with the city when the city corresponds to an unambiguous city.

25. A system, comprising:

a memory to store instructions; and

a processor to execute the instructions in the memory to:

receive a search query that includes one or more search terms and a geographic reference,

determine whether the geographic reference corresponds to a city,

determine whether the city corresponds to an unambiguous city when the geographic reference corresponds to a city, and

perform a search, based on the one or more search terms, for documents relating to businesses located near or within a geographic area associated with the city when the city corresponds to an unambiguous city.

26. A computer-readable medium that stores computer-executed instructions, comprising:

instructions for receiving a search query that includes a plurality of search terms via a single search box;

instructions for analyzing the search query to determine whether at least one of the search terms corresponds to the name of the geographic area;

instructions for determining whether the geographic area corresponds to an unambiguous geographic area when at least one of the search terms corresponds to the name of a geographic area; and

instructions for performing a local search, based on one or more of the search terms, to identify documents associated with the geographic area when the geographic area corresponds to an unambiguous geographic area.

27. A method, comprising:

receiving a search query that includes a plurality of search terms;

determining whether at least one of the search terms corresponds to the name of a geographic area;

determining whether the geographic area corresponds to an unambiguous geographic area when at least one of the search terms corresponds to the name of the geographic area; and

presenting an advertisement associated with a business located near or within the geographic area when the geographic area corresponds to an unambiguous geographic area.

28. The method of claim 27, wherein receiving a search query includes:

providing a single search box, and

receiving the plurality of search terms via the single search box.

29. The method of claim 27, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:

determining whether the plurality of search terms are associated with no geographic reference other than the name of the geographic area.

30. The method of claim 27, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:

determining whether the search query includes two or more interpretations of names of geographic areas, and

selecting a longer one of the interpretations when the search query includes two or more interpretations of names of geographic areas.

31. The method of claim 27, wherein determining whether at least one of the search terms corresponds to the name of a geographic area includes:

determining whether the search query includes two or more interpretations of names of geographic areas,

determining whether the search query includes multiple geographical components, and

selecting one of the interpretations that is more consistent with the geographical components.

32. The method of claim 27, further comprising:

determining whether the name of the geographic area together with one or more of the search terms are included on a blacklist; and

wherein the advertisement is presented when the name of the geographic area together with one or more of the search terms are not included on the blacklist.

33. The method of claim 27, further comprising:

determining whether the name of the geographic area corresponds to a common name of multiple cities located in a single state; and

selecting one of the cities based on populations of the cities.

34. The method of claim 27, further comprising:

determining whether the name of the geographic area corresponds to a common name of multiple cities located in a single state; and

selecting one of the cities based on a location of a user who provided the search query.

35. The method of claim 27, further comprising:

determining whether the name of the geographic area corresponds to a common name of multiple cities located in multiple countries; and

selecting one of the cities based on a location of a user who provided the search query.

36. The method of claim 27, wherein the geographic area corresponds to a city; and

wherein the method further comprises:

processing a list of cities to identify whether ones of the cities correspond to unambiguous cities; and

storing the list of cities and corresponding indications of whether the cities correspond to unambiguous cities in a database.

37. The method of claim 36, wherein determining whether the geographic area corresponds to an unambiguous geographic area includes:

analyzing the database to identify the corresponding city in the list of cities.

38. The method of claim 37, wherein determining whether the geographic area corresponds to an unambiguous geographic area further includes:

determining whether the corresponding indication indicates that the city corresponds to an unambiguous city.

39. The method of claim 36, wherein processing a list of cities includes:

performing a first web search based on the name of one of the cities in the list of cities to identify a first set of search results,

counting a number of the first set of search results,

performing a second web search based on the name of the one city and the name of a state in which the one city is located to identify a second set of search results,

counting a number of the second set of search results, and

identifying the one city as an unambiguous city when the number of the second set of search results is at least X % of the number of the first set of search results, where X is a number greater than zero.

40. The method of claim 36, wherein processing a list of cities includes:

performing a web search based on the name of one of the cities in the list of cities to identify a set of search results,

counting a number of the set of search results,

counting a number of documents in the set of search results that include postal codes associated with the one city, and

identifying the one city as an unambiguous city when the number of documents in the set of search results that include postal codes associated with the one city is at least X % of the number of the set of search results, where X is a number greater than zero.

41. The method of claim 27, wherein presenting an advertisement includes:

determining a location associated with a user who provided the search query, and

determining whether the location is within a predetermined distance of the geographic area, and

providing an advertisement associated with a business located near or within the geographic area when the location is within a predetermined distance of the geographic area.

42. A system, comprising:

means for receiving a search query;

means for determining whether the search query includes the name of a city;

means for determining whether the city corresponds to an unambiguous city when the search query includes the name of the city; and

means for providing an advertisement associated with a business located in or near a geographic area associated with the city when the city corresponds to an unambiguous city.

43. A system, comprising:

a memory to store instructions; and

a processor to execute the instructions in the memory to: receive a search query that includes one or more search terms and a geographic reference,

determine whether the geographic reference corresponds to a city,

determine whether the city corresponds to an unambiguous city when the geographic reference corresponds to the city, and

provide an advertisement relating to a business located near or within a geographic area associated with the city when the city corresponds to an unambiguous city.

44. A computer-readable medium that stores computer-executed instructions, comprising:

instructions for performing a first web search based on the name of a city in a list of cities to identify a first set of search results;

instructions for counting a number of the first set of search results;

instructions for performing a second web search based on the name of the city and the name of a state in which the city is located to identify a second set of search results;

instructions for counting a number of the second set of search results; and

instructions for identifying the city as an unambiguous city when the number of the second set of search results is at least X % of the number of the first set of search results, where X is a number greater than zero.

45. The computer-readable medium of claim 44, further comprising:

instructions for performing a search for documents associated with businesses located in or near the city when the city is identified as an unambiguous city and the name of the city is included in a search query.

46. The computer-readable medium of claim 44, further comprising:

instructions for identifying the city as a semi-unambiguous city when the number of the second set of search results is less than X % but greater than Y % of the number of the first set of search results, where Y is a number less than X; and

instructions for suggesting a search for documents associated with businesses located in or near the city when the city is identified as a semi-unambiguous city and the name of the city is included in a search query.

47. A computer-readable medium that stores computer-executable instructions, comprising:

instructions for performing a web search based on the name of a city in a list of cities to identify a set of search results;

instructions for counting a number of the set of search results;

instructions for counting a number of documents in the set of search results that include postal codes associated with the city; and

instructions for identifying the city as an unambiguous city when the number of documents in the set of search results that include postal codes associated with the city is at least X % of the number of the set of search results, where X is a number greater than zero.

48. The computer-readable medium of claim 47, further comprising:

instructions for performing a search for documents associated with businesses located in or near the city when the city is identified as an unambiguous city and the name of the city is included in a search query.

49. The computer-readable medium of claim 47, further comprising:

instructions for identifying the city as a semi-unambiguous city when the number of documents in the set of search results that include postal codes associated with the city is less than X % but greater than Y % of the number of the set of search results, where Y is a number less than X; and

instructions for suggesting a search for documents associated with businesses located in or near the city when the city is identified as a semi-unambiguous city and the name of the city is included in a search query.

50. The computer-readable medium of claim 47, wherein the instructions for counting a number of documents includes:

assigning weights to the documents based on a ranking associated with the documents, and

determining the number of documents that include postal codes associated with the city based on the weights assigned to the documents.

* * * * *