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Behavior of a Multi-Planetary Search Engine

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BEHAVIOR OF A MULTI-PLANETARY SEARCH ENGINE

Introduction

Traditionally, search engines require a significant digital and physical investment to store and retrieve search results, and as a result, have limited or slow access in remote areas. Further, the cost associated with sending search results to remote areas (e.g., other planets) may be prohibitively expensive for the search engines to function. Establishing a multi-tiered search engine breadth may allow for search engine access in remote areas by utilizing local hardware and locally cached data to return search results at little or no cost and providing a greater search breadth tier that utilizes remote hardware and data with an associated cost. In this manner, the search engine may provide results for simple or frequent searches using local resources and, when necessary, a user may pay to perform a larger breadth search using remote resources to eliminate prohibitive costs for the search engine.

Summary

Computer-implemented systems and methods for providing search results for simple or frequent searches and larger breadth searches to remote areas with the disclosed technology can provide users located in remote areas with access to information through a multi-tiered approach to searches. In some instances, a user located in a remote area can use a user computing device to initiate a search that is communicated over a network to a first server computing system (i.e., first server) associated with the remote area. The search request may be related to content that is obtainable through the index of the first server. When the first server determines that the requested content is obtainable through the index of the first server, the locally indexed content can be provided to the user as search results without associating a cost to the user for obtaining

the locally indexed content. For example, a user located on Planet X may use a user computing device to initiate a search request for content related to music, movies, or cars. Another user located on Planet X may have published content related to the search request, and such content may be stored on the search index of the first server. The first server need not retrieve search results related to the music, movies, or cars from a second search index located in a distant location (e.g., Earth) because relevant content is locally indexed. The first server may provide the locally indexed information to the user without requiring that the user pay for access to the content related to music, movies, or cars. The costs associated with retrieving the locally indexed information is lower than the costs associated with retrieving information from the second server, which may be located a certain distance from Planet X that makes retrieving such information cost prohibitive.

In some instances, the search index of the first server may contain pre-fetched content provided through a second server located significant distance away from the first server. The pre-fetched results may be determined based on profile criteria, allowing a user located in the remote area to access the pre-fetch results through the first server associated with the remote area without the first server requiring that the user pay to access the pre-fetched results.

The profile criteria may be associated with user profiles of the users living in the remote area. The user profiles may be aggregated into an aggregated profile and anonymized to protect the privacy of the individual users. The aggregated profile may be adjusted based on a frequency or pattern associated with the search history of each of the users stationed in the remote area. In this way the user profiles may be used to drive an aggregate, anonymized and frequency adjusted model used by a multi-tiered search engine to determine one or more subjects that may be of interest to all the users stationed in the remote area and a score may be associated to each of the

one or more subjects. A quality indicator associated with content related to the subject and the score associated with the subject may inform the first server to pre-fetch certain information or content from the second server located a significant distance away from the first server.

For example, a user located on Planet X may use a user computing device to initiate a search request that communicates over a network with a first server located on or associated with Planet X. The first server may retrieve search results that were either published from another user on Planet X or were pre-fetched from a second server located a significant distance from Planet X, such as Earth. The pre-fetched information may be associated with a subject such as music, movies, or cars. The subject of cars, for example, may have been requested from a plurality of users stationed on Planet X. Each of the plurality of users may have a user profile, which the first server (e.g., Planet X server) may use to aggregate into an aggregated profile. The aggregated profile may be adjusted based on a frequency or pattern with which the search history of the users. The Planet X server may determine that "cars" is frequently searched by all users on Planet X and, thus, may pre-fetch content related to the subject of cars and store such content on a search index of the Planet X server. A first search result (e.g., cached page, blog, or podcast) related to cars may have a first quality indicator and a second search result (e.g., cached page, blog, or podcast) related to cars may have a second quality indicator. The first quality indicator may be higher than the first quality indicator. The Planet X server may pre-fetch the first search result related to cars because the subject of cars is assigned a score that satisfies a threshold score and the first search result has a quality indicator that is greater than the second quality indicator of the second search result. Accordingly, a user stationed on Planet X who requests information related to cars may obtain the information without incurring additional costs by another user publishing related content or by the Planet X server pre-fetching such content.

In some instances, a search request (e.g., user query) may be associated with only a few results from Planet X or from pre-fetched content. In other instances, no results may be available through the search index of the Planet X server, as the users stationed on Planet X may have user profiles that do not relate to the subject of the search request. In such circumstances, users may be given an option to obtain results relevant to their search requests from a second server located on Earth, for example, at a cost, as retrieval of such results from the second server is otherwise cost prohibitive due to its relative distance. A user may choose to pay the fee to get relevant results or may decline to make such payment and rely on the local results or pre-fetched results, if any exist at all. In some instances, part of the fee incurred by the user, if any cost is incurred at all, may be returned to the user once other users stationed on Planet X also search from similar terms and are able to see those results.

In this way the search results in a remote area, such as Planet X, may show three types of results, which may be tagged in a user interface. The three results include: (1) results from that remote area (e.g., Planet X), (2) results pre-fetched from a second index (e.g., Earth), and (3) on-demand and paid search results.

Detailed Description

Figure 1 depicts an example computing system 100 in which systems and methods in accordance with the present disclosure can be executed. The computing system comprises a user computing device 102 containing one or more processors 112, memory 114 which may contain data 116 and instructions 118 configured to carry out the methods disclosed herein, and a user input component 122. The user input component can be, for example, a touch display or physical buttons within the user computing device 102. The computing system 100 further comprises a

network 180 and a server computing system 130. The server computing system 130 comprises one or more processors 132, and memory 134 which may contain data 136 and instructions 138 configured to carry out the methods disclosed herein. For example, a user may send a search query via the user input component 122 of the user computing device 102 and that query is sent over the network 180 to the server computing system 130. The server computing system 130 may then return search results relating to the search query, of which at least one or more is a localized search result. If the user selects content from the search results, the server computing system 130 will send the content to the user computing device 102 where it will be stored in memory 114. The server computing system 130 may be performing instructions 138 to generate a user profile associated with the search query initiated by the user to build a user profile based at least in part on the search history of the user. The server computing system may use the user profiles of all users located in a localized area to drive an aggregate and frequency adjusted model to determine one or more subjects that may be of interest to the plurality of users located in the localized area by performing the instructions 138. It should be appreciated that any combination or order of systems and methods disclosed herein can be performed on the user computing device, server computing system, or similar. For example, all processes can be performed on the user computing device 102 or the server computing system 130.

Figure 2 depicts an example embodiment of a multi-planetary computing system 200 in which systems and methods in accordance with the present disclosure can be executed. The multi-planetary computing system 200 comprises a first server computing system 260 located on a first planet 280 and a second server computing system 210 located on a second planet 220. The first server computing system 260 may have a first search index for hosting data. The data hosted by the first search index may be associated with cached pages and other online content generated

on the first planet 280, such as Planet X. The second server computing system 210 may have a second search index for hosting data. The data hosted by the second search index may be associated with cached pages and other online content generated on the second planet 220, such as Earth. The first server computing system (e.g., Planet X server) 260 may host pre-fetched data obtained via satellite 250 from the second server computing system (e.g., Earth server) 210. The Planet X server 260 may be configured to obtain data from the Earth server 210 upon request for a fee incurred by the user on Planet X 280.

Referring now to Figure 3, an example user interface in accordance with aspects of the present disclosure is provided. A search website 300, such as a Planet X search website associated with Planet X 280 of FIG. 2, may contain a search bar 302 comprising a search button 306. In some instances, a user enters search terms into the search bar 302 and provides input. The user may enter search terms into the search bar 302 and click the search button 306 resulting in display of multi-tier results. The multi-tier results may be based on a subject associated with the entered search terms. For example, if a user enters a search request (e.g., user query) relating to music, the local server computing system, such as the Planet X server 260 of FIG. 2, may determine that the search relates to the subject of music and that the subject of music includes search results hosted by the Planet X server 260. In another scenario, the Planet X server 260 may determine that a search topic is "cars" and that the subject of cars includes search results that were pre-fetched from a second server computing system, such as the Earth server 210 of FIG. 2. In another scenario, the Planet X server 260 may determine that a search topic is "movies" and that the subject of movies is either (a) available through the Planet X server 260 and can be obtained for a fee from the Earth server 210 or (b) is not available through the Planet X server 260 and only obtainable from the Earth server 210 for a fee. The search website 300 can

redirect the user to a results page having multi-tiered search results relating to whether the subject is associated with cached pages or content that is from the planet of the user, free of cost and from Earth, or from Earth for a fee.

Figure 4 depicts an example user interface 400 according to the present disclosure. A user may navigate to a primary search page 300 as shown in Figure 3, including a search bar 302, multi-tier button 304, and search button 306. In FIG. 4, a user located on Planet X has entered the query "Roadable aircraft rentals" into the search bar 302. The system determines a subject associated with the search (e.g., cars) and a list of multi-tier results for the determined subject is displayed (e.g., 410, 412, 414). Tier one 410 shows content retrieved from the search index associated with the Planet X server 260 and published from Planet X. Tier two 412 shows results from Earth which the Planet X server 260 pre-fetched from Earth based on the score associated with the subject and the quality of the content. Tier three 414 shows results from Earth that can be obtained for a fee to the user. The fees can be shared with the publishers on Earth or can be refunded to the user once more users from Planet X initiate the same search result or seek to obtain the same content. The user can select content associated with a tier and the selected content 416 can be displayed. For example, the selected content 416 can be a search result that the Planet X server 260 pre-fetched from the Earth server 210 based on the user-profile driven model associated with Planet X.
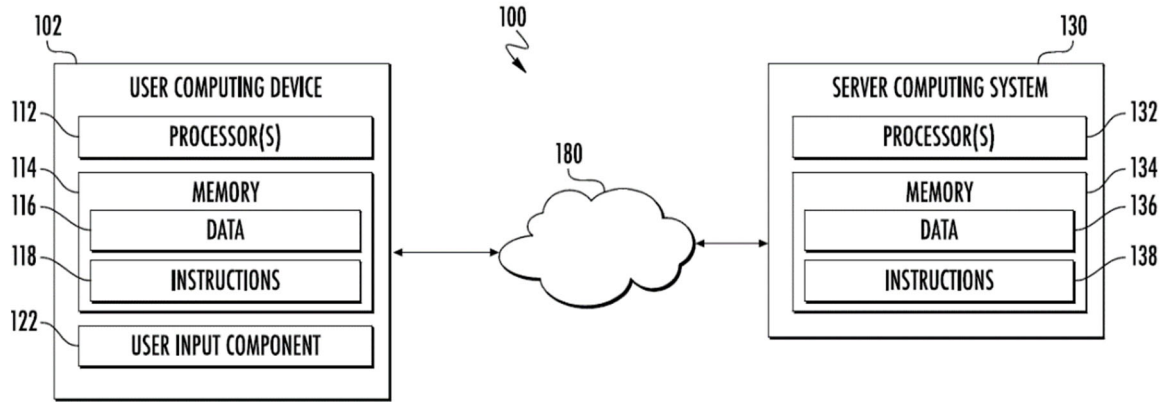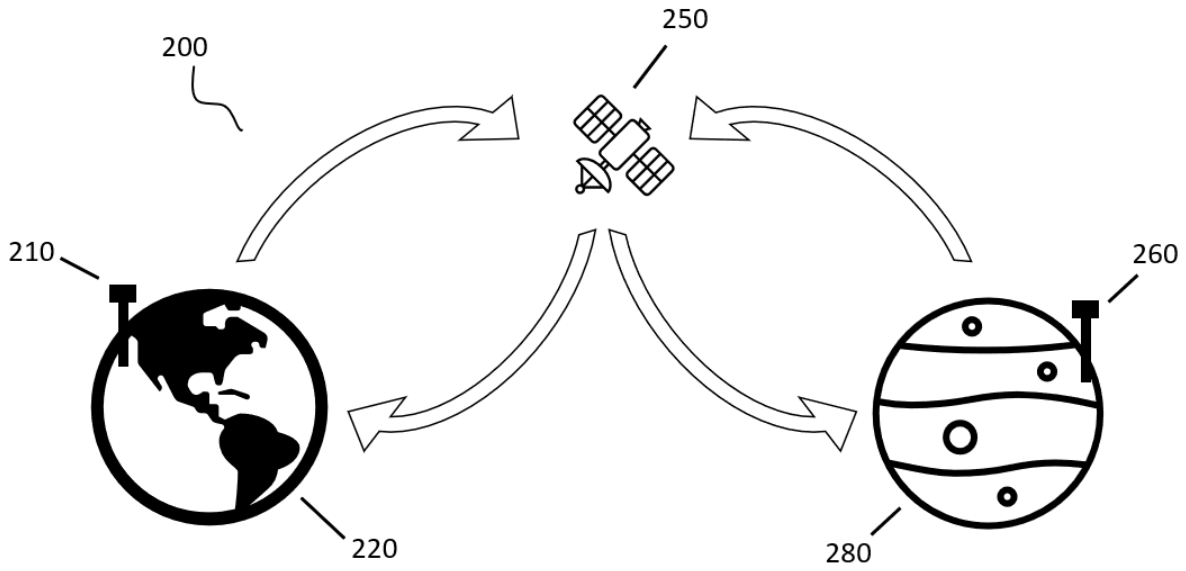
Figures

FIG. 1

FIG. 2

Planet X
Search Website

300

302

Enter Search Here...

Enter

306

FIG. 3

400

300

Planet X
Search Website

302
Roadable aircraft rentals

Enter

306

ROADABLE AIRCRAFT
MOTOR COMPANY

RAMC to provide vehicles to Planet X, read here!

416

410   Search

Planet X Results

412

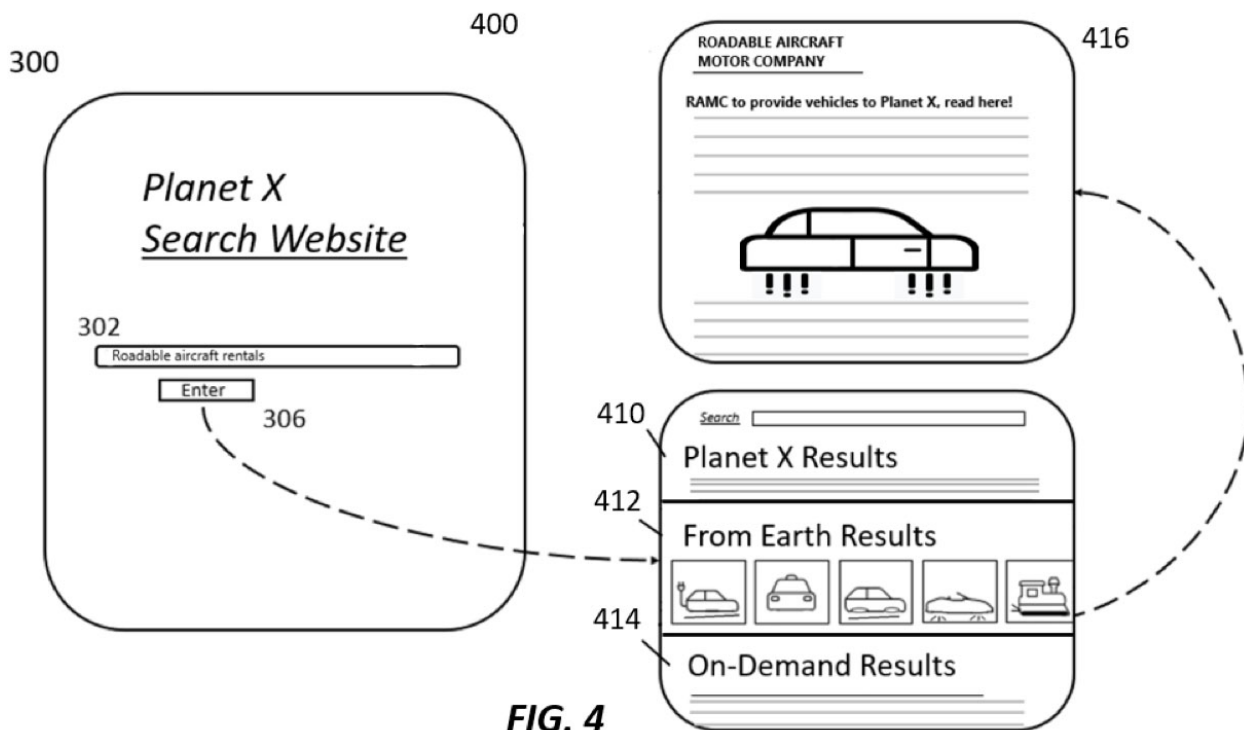From Earth Results

414

On-Demand Results

FIG. 4

Abstract

The present disclosure describes computer-implemented systems and methods for providing search results to users located in remote areas utilizing local hardware and locally cached data to return search results at little or no cost and providing a greater search breadth tier that utilizes remote hardware and data with an associated cost. User profiles associated with the users located in the remote areas may drive an aggregate, anonymized and frequency adjust model to determine subjects of interest to the plurality of users.