Sixearch.org 2.0
Peer Application for Collaborative Web Search

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ABSTRACT

Sixearch.org is a peer application for social, distributed, adaptive Web search, which integrates the Sixearch.org protocol, a topical crawler, a document indexing system, a retrieval engine, a P2P network communication system, and a contextual learning system. With a single click, the Sixearch.org application will build your personal Web collection. You can search not only your collection, but also other Sixearch peers. When you submit a query, your Sixearch agent will determine which peers are best suited to answer it based on previous interactions. Your agent will also learn from the results it receives, so that it can continuously improve.

Categories and Subject Descriptors

H.4 [**Information Systems Applications**]: Miscellaneous

Keywords

Peer collaborative search, adaptive query routing

1. OBJECTIVES

The goal of Sixearch.org is to provide an open-source platform for developing a context aware personalized peer-to-peer (P2P) distributed information retrieval system. The application currently supports collaborative Web search with scalablility.

To simplify development and integration of different functionalities and their corresponding user interfaces, the application is designed in a modular fashion with a Web based interface. We demonstrate modularity of the code base by creating two local search engine modules, one using Nutch (nutch.org) and the other using Google Custom Search Engine (google.com/coop/cse).

While traditional search engines such as Google and Yahoo provide access to very large document collections, the Sixearch.org application provides a complementary way for users to actively and collaboratively share their own document collections. However, the Sixearch.org framework allows traditional search engines to naturally be included as peers; such peers quickly emerge as reliable and general authority nodes [2].

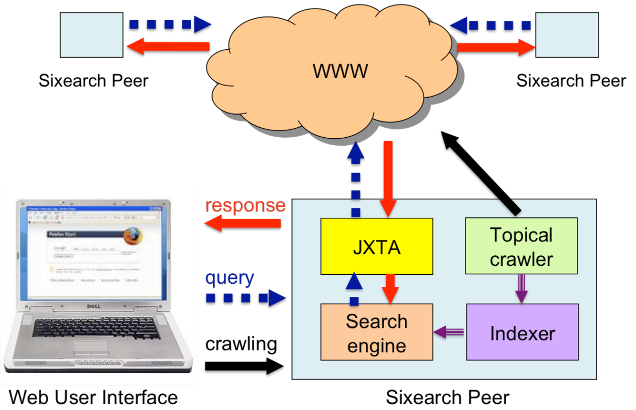


Figure 1: The architecture of the Sixearch.org application.

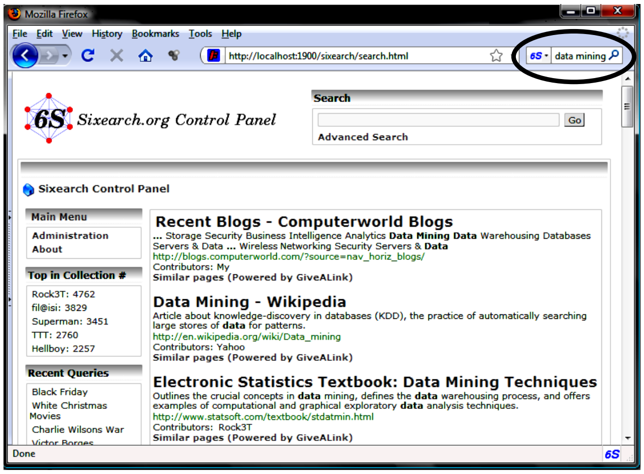
2. THE MACHINERY OF SIXEARCH.ORG

Sixearch.org uses a distributed, collaborative approach to Web search but without assuming the presence of special directory hubs. As shown in Fig. 1, each peer is a content provider; it employs a topical crawler guided by its user's information content, which supports a local search engine—typically but not necessarily a small one. In the current implementation, Sixearch.org relies on three open-source platforms: Nutch for one of the search engine modules, JXTA (jxta.org) for the P2P network communication, and Berkeley DB (oracle.com/database/berkeley-db) for the underlying database system. A detailed description of Sixearch.org's protocols and algorithms is out of the scope of this demo and can be found elsewhere [3].

Briefly, each Sixearch peer learns and stores profiles of other peers with a view to their potential for answering prospective queries. A user's query is first matched against the local engine, and then, by checking profile information, routed to neighbor peers to obtain more results. The Sixearch peer will also learn from the results it receives, so that it can continuously improve the probability of choosing the appropriate neighbors to route future queries. The peer network leads to the emergence of a clustered topology by intelligent collaboration between the peers [1].

3. FEATURES

The Sixearch.org application is implemented in Java to be a cross-platform system. It is designed to make it easy and transparent to use and manage the application without leaving a Web browser. From the user's perspective, the main features of Sixearch.org are peer search, personal Web index management (auto and manual), and a Firefox extension. The user can employ a wizard to create a personalized search engine and then use a Firefox extension to automatically route the query to the network from the browser's search box.



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TTT: 2760
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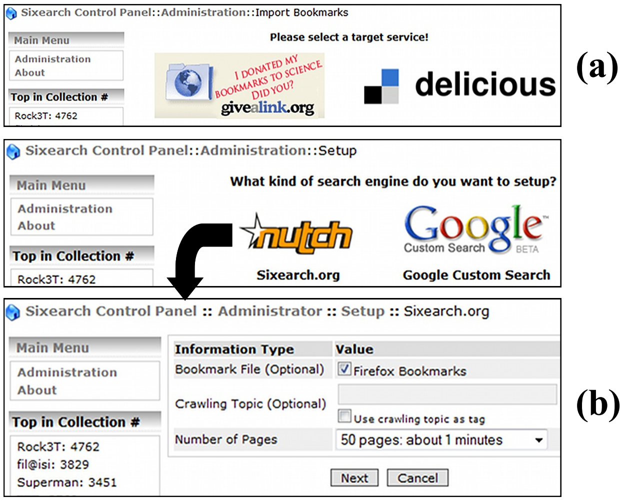
Figure 2: Sixearch.org Web user interface.

Peer Search: When a user submits a query through the Web interface (Fig. 2), in addition to getting results from the local engine, results from other peers are shown and updated in real time as they arrive. The results and queries are also recorded (but not shared) to help the user find past useful results.

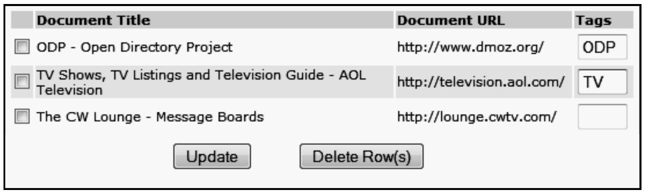

(a)
Sixearch Control Panel::Administration::Import Bookmarks
Main Menu
Administration
About
Top in Collection #
Rock3T: 4762
Please select a target service!
I DONATED MY BOOKMARKS TO SCIENCE DID YOU?
givealink.org
delicious
Sixearch Control Panel::Administration::Setup
Main Menu
Administration
About
Top in Collection #
Rock3T: 4762
What kind of search engine do you want to setup?
nutch
Google Custom Search BETA
Sixearch.org
Google Custom Search
(b)
Sixearch Control Panel :: Administrator :: Setup :: Sixearch.org
Main Menu
Administration
About
Top in Collection #
Rock3T: 4762
fil@isi: 3829
Superman: 3451
Next
Cancel

Information Type	Value
Bookmark File (Optional)	☑ Firefox Bookmarks
Crawling Topic (Optional)	☐ Use crawling topic as tag
Number of Pages	50 pages: about 1 minutes

Figure 3: Creating a personal Web index via (a) importing bookmarks, (b) topical crawler.

Personal Web Index Management: The application can automatically create a Web index by synchronizing with the user's bookmark file or importing from other resources, such as `del.icio.us` and `givealink.org` (Fig. 3.a). Users can also manually create or add to the personal index (Fig. 3.b) by running a topical crawler guided by a provided topic. The crawling results will then be indexed for keyword searching. At any time, the user can view, add, remove or tag any indexed document (Fig. 4). In addition to Nutch, Google's on-line custom search engine can be used as a local search engine.

Firefox Extension: The Firefox extension allows tighter integration with the Firefox browser. To search, a user can select the Sixearch option from the search box of the browser and type in a query (Fig 5.a). In addition, the user can quickly access the application's management Web page or view a live snapshot of the `Sixearch.org` query network by clicking on the Sixearch logo at the bottom right of the browser (Fig 5.b). To use the Firefox extension, the Sixearch application must be running as a background process.



	Document Title	Document URL	Tags
☐	ODP - Open Directory Project	http://www.dmoz.org/	ODP
☐	TV Shows, TV Listings and Television Guide - AOL Television	http://television.aol.com/	TV
☐	The CW Lounge - Message Boards	http://lounge.cwtv.com/	

Figure 4: Sixearch.org index management.

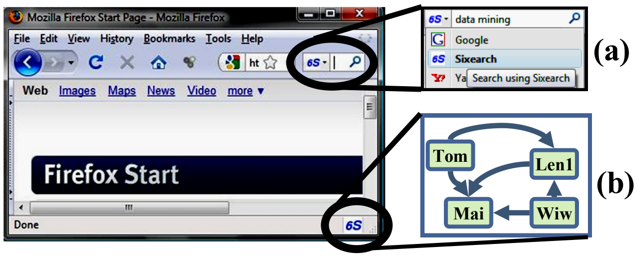

Mozilla Firefox Start Page - Mozilla Firefox
File Edit View History Bookmarks Tools Help
ht
6S
Web Images Maps News Video more ▾
Firefox Start
Done
6S
6S data mining
Google
Sixearch
Ya Search using Sixearch
(a)
Tom
Len1
Mai
Wiw
(b)

Figure 5: Sixearch.org Firefox extension.

4. FUTURE DIRECTIONS

There are many directions for future research. Two of our most immediate interests are trust management and adopting folksonomy concepts into `Sixearch.org`.

When `Sixearch.org` gains more users, it is inevitable that spammers will try to exploit the system to increase traffic to their spam sites. To avoid forwarding queries to spamming peers as well as colluders, intelligent trust management is required. Currently we are developing a promising trust management system, which leverages users' feedback and other information gathered from peers' interactions, for the next release of the application.

By switching to folksonomy concepts, peers will store and exchange information in the form of triples (peer, url, tag). Instead of relying on page content, new techiques from folksonomy research will be integrated to provide a community-driven way for the application to find relevant results.

5. REFERENCES

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