Semantic Web Support of Text Content for Distributed Information Retrieval of Business Knowledge in Mobile Apps

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ABSTRACT

We present a semantic search interface that has been intended for the use on mobile devices in order to give enhanced applicable retrieval of result sets. Other than automatic context switching, the interfaces give techniques to store prior search results in a structured way and to annotate documents with respect to user interests and the query. These methods empower a user to retrieve documents with lesser interactions and data traffic, which is particularly essential for mobile devices. The mobile apps usually search the web pages; filter the unnecessary pages by using the propelled algorithms. In the proposed approach, semantic search is used to deliver highly relevant search results. Here, the link content and the page content of the document are checked with the set of synonyms for the given keywords, so that the more relevant pages are retrieved. In most cases, the goal is to deliver the information queried by a user rather than have a user sort through a rundown of inexacty related keyword results.

KEYWORDS: Semantic search, Mobile Apps, Information Retrieval.

INTRODUCTION

Information presented on a mobile device has to be presented uniquely than on a desktop computer. We have to consider that mobile devices are compact in size and have additionally different attributes [6]. This is particularly vital if the user has to browse or interact with the information as in information retrieval applications, where the user is searching for specific content in a typically very large set of documents [3]. Furthermore, we have to consider issues, for example, transmitting and accepting huge amounts of data, the processing power, the restricted battery life and the conceivable intermittent connection of a wireless gadget to a net-work. Semantic search tries to enhance search exactness by comprehension searcher intent and the contextual meaning of terms as they appear in the searchable to produce more significant results. We present in the accompanying, an information retrieval interface, that has been especially intended and designed for use on mobile gadgets.

The traditional information retrieval process depends on the comparison of the keyword with the exact match of the words in the document. This strategy will recover the pages that are fractional significant to the user query. Web offers some chance to enhance the traditional search. One of the ways is with the invention of semantic search. Semantic search is the key technology of the Semantic web. Essentially, the search is a combination of the textual keyword search with the content of the page and the hyperlink of that page. One of the enhanced forms of the web search is semantic search [1]. In semantic search, the set of synonyms for the given keywords are considered. Based on these common words, the link content and the page content are

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checked for relevancy. If the weight is more for these common words, then that particular page is considered as a relevant page. Each and every out link of the parent page is computed for relevancy. Finally, the total relevancy score is calculated for each relevant URL.

This paper is organized as follows: Section 2 gives the related work to this proposed method. Section 3 describes the proposed method. Section 4 provides the performance evaluation of the proposed method and Section 5 gives the conclusion and the future work.

2. Related Work:

There are many algorithms planned and designed with the Semantic Search [1,6,7,8,10,11]. The relation between the keywords has been given significance in [11] to perform the search. An ontology-based IR model is discussed in [12]. A review on the search engine generations and the part of search engines in intelligent web and semantic pursuit advances is performed [7]. Discussion about the semantic search in [6]. Another semantic relatedness calculation method [1] is also undergone. Page rank and User rank algorithm [3] are being analyzed and resulted. Algorithm [2], tackling the problem of semantic input-output message structure matching to find the insignificant and minimal composition. Link Content is applied with division score [5] using focused crawling method is discussed. Content based ranking [4] gives the rank for the 10 input URL’s. The issues of the sparsely and relatively low quality [10] of implanted metadata are talked about. The TAP framework [8] and the semantics for text search are actualized. A latent semantic indexing classifier is talked about in [9].

3. The Proposed Approach In Adapting Retrieval Systems For Mobile Devices:

The need to get a good adaptively to user needs in order to enhance retrieval performance[18] ought to be founded on a appropriate user model in the retrieval system[19], since users expect individual information relying upon their interests and knowledge. With a specific end goal to accomplish this, need distinctive user profiles that cover practically all user needs, including the relations between the domain and its concepts that mean it covers domain and its concepts adaptively.

3.1 The Retrieval Framework:

Implementing our retrieval system [20][23], we chose to divide query results set processing - the information to be presented from the interface design in order to simplify the improvement of retrieval systems[24][25] for, e.g., distinctive desktop and also mobile gadgets. The focal part of the retrieval system is a meta search engine giving strategies to rebuild and annotate result sets of user queries [26][27]. Fig. 2 gives an overview of the Semantic Mobile app system architecture. Search engines e.g. Google and the user interfaces are associated with the system by Web services. Using this modular implementation, it is effortlessly conceivable to extend the framework by additional search engines or to coordinate distinctive interfaces.

Fig. 1 and 2: Overview of the Retrieval System in Mobile Apps

3.2 The Retrieval System Interface:

Since an information retrieval interface[28] that is developed taking into account on the meta search engine discussed above ought to accelerate the search process of a user, it is critical to outline the interface as easy to understand and user friendly as possible, considering the impediments of the mobile gadgets [29]. In light of the design of a desktop user interface [30], we built up an adapted version for use on mobile gadgets [34]. Particularly to provide an overview of accessible information is exceptionally troublesome because of the restricted screen size. We needed to consider that the user ought not to lost in navigating the content [31], and furthermore intuitively understand how to utilize interface. Keeping in mind the end goal to ensure an intuitive use, we implemented the functional groups of the desktop user interface [32] in three separate views. Since along these lines the data is exhibited in part on various screens, for instance, the drag and drop functionality of the desk-top system [33] gave keeping in mind the end goal to store or rebuilt the bookmarks had to be modified and revised.
The basic components of the system [34] includes: a) Domain Ontology b) Semantic Annotation and c) Search Interface and d) Retrieval Results.

Algorithm:
List of URL from SERP google
Preprocess the User Query and Extract Root words.
For each RW
Find the Synonym S for RW And Check for Duplicates D And S and RW to construct a
Domain repository without D of RW End for RW

//Link Content Relevancy:
For Each URL of link content compute Link Content Keyword Strength. \( S(LCKWi) = 1/ \Sigma LCKWi \) Compare each link keywords against Repository.
if match found grant the keyword strength the specific link content keyword
Else grant 0.
Calculate Total Strength for link content Keyword by summarizing strength of all link content keywords.
\( TLCKS(SRi) = \Sigma S(LCKWi) \) End for URL

//Page Content Relevancy:
For Each URL of page content calculate Page Content Keyword Strength.
\( S(PCKWi) = 1/ \Sigma PCKWi \)
Compare each page content keyword against Repository.
if match found grant the keyword strength to the specific page content keyword
Else grant 0.
Calculate Total Strength for page content Keyword by summarizing the strength of all page content keywords.
\( TPCKS(SRi) = \Sigma S(PCKWi) \) End for URL

//Relevancy Calculation:
Compute total relevancy for the particular SERP using damping factor \( d \)
\( TR = total strength of link content keywords \times d + total strength of page content keywords \times (1 - d) \)
\( TRI = TLCKS(SRi) \times (d) + TPCKS(SRi) \times (1 - d) \) where \( 0 < d < .1 \)
Re-rank the result based on \( TR \) in increasing order. The Topmost Search Result \( SRi \) is the most relevant and bottom most search result is the least relevant for the User query.

4. Experiments & Performance Evaluation:
The architecture and algorithm were tested using a standard input bench mark dataset and the system configuration of Android platform and used software during our first prototype of the system development such as: Android Studio for User Interface Development.
Our main goal is to provide Information Retrieval of relevant data accuracy and avoiding irrelevant data especially in the limited mobile screen by accessing Android Mobile App.
To extend the research work, by using Semantic Web and Mobile technologies, used other new languages and tools including: Android Studio, XML-eXtensible Markup Language, XML Schemas, RDF- Resource Definition Framework, RDF Schemas.

The Figure depicts for the standard input
domain : company (business knowledge)
name : cts
city : chennai
location : taramani
a) Domain Ontology

b) Semantic Annotation

c) Search Interface
d) Resultant page.

**Fig. 3:** Mobile User Interface: a) Domain Ontology, b) Semantic Annotation, c) Search Interface and d) Resultant page

Relevance ranking for performance evaluation for the proposed methodology depends on the Google SERP. The top most URL’s are brought from google SERP.

**Table 1:** Input Data Set

<table>
<thead>
<tr>
<th>SERP ID</th>
<th>Search Engine Results Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERP1</td>
<td>Cognizant Technology Solutions India Private Limited, Taramani ... <a href="http://www.asklaila.com">www.asklaila.com</a> › Chennai › IT Companies IT Companies, Airtel Payment Dropbox: Cognizant Technology Solutions India Private Limited, Taramani, Chennai, Tamil Nadu – Get contact address, mobile ...</td>
</tr>
<tr>
<td>SERP2</td>
<td>Cognizant in Jobs, recruitment in Taramani, Tamil Nadu</td>
</tr>
<tr>
<td>SERP3</td>
<td>Cognizant Technology Solutions Jobs, recruitment in Taramani ... <a href="http://www.indeed.co.in/Cognizant-Technology-Solutions-jobs-in-Taramani">www.indeed.co.in/Cognizant-Technology-Solutions-jobs-in-Taramani</a>... Jobs 1 - 10 of 31 – 31 Cognizant Technology Solutions Jobs available in Taramani, ... Cognizant IN 340 reviews - Chennai, Tamil Nadu ...</td>
</tr>
<tr>
<td>SERP4</td>
<td>Cognizant Technology Solutions <a href="http://www.cognizant.com/contactus/office-locations">www.cognizant.com/contactus/office-locations</a> Score: 24 / 30 · 22 Google reviews</td>
</tr>
<tr>
<td>SERP5</td>
<td>Cognizant Technology Solutions <a href="http://www.cognizant.com/">www.cognizant.com/</a></td>
</tr>
<tr>
<td>SERP6</td>
<td>Cognizant Technology Solutions Ltd. in Tharamani ... yellowpages.sulekha.com › ... › Software Companies in Tharamani Cognizant Technology Solutions Ltd. in Tharamani, Chennai - 600113 – Get Cognizant Technology ... Fill this Form and Software Companies will call you now.</td>
</tr>
<tr>
<td>SERP7</td>
<td>Cognizant in Jobs, recruitment in Taramani, Tamil Nadu ...</td>
</tr>
</tbody>
</table>
Proposed algorithm - Concept relevancy ranking is applied on the above SERP and results are recorded in TABLE 2.

From the TABLE 2 results, it is comprehended that if the total relevancy value is less, it is ranked as first and vice-verse.

Since there is no gauges measurements to quantify the quality of ranking ontology or instances in the semantic at present; assess the exactness of our proposed ranking; in correlation with search engine ranking and procedure based manual ranking.

Now we look at the rankings of the search engines Google on the domain specific user query (“company cts Chennai taramani”) around the same day – TABLE 2.

<table>
<thead>
<tr>
<th>SERP ID</th>
<th>SEARCH ENGINE</th>
<th>SEARCH PROPOSAL</th>
<th>PROCEDURE ENGINE</th>
<th>PROPOSED ENGINE</th>
<th>Mobile Apps Approach</th>
<th>Ranking Relevancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERP 5</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>SERP 4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>SERP 8</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>SERP 3</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>4.5</td>
<td>2.45</td>
<td></td>
</tr>
<tr>
<td>SERP 2</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>2.451</td>
<td></td>
</tr>
<tr>
<td>SERP 9</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SERP 10</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>3.01</td>
<td></td>
</tr>
<tr>
<td>SERP 7</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>3.45</td>
<td></td>
</tr>
<tr>
<td>SERP 6</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>3.451</td>
<td></td>
</tr>
<tr>
<td>SERP 1</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>3.8</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2 represents the coordinating of procedure based manual ranking against proposed approach ranking. Document SERP2, SERP3 represents the mismatching of procedure based manual ranking against proposed approach. As can observe from the experimental results; proposed methodology outperforms existing ranking results.
5. Conclusion And Future Work:
In this paper we have briefly talked about issues identified with portable mobile apps for information retrieval systems. We have introduced an adapted user interface for mobile apps that shows how diverse relevancy approaches can be used for mobile devices and the proposed approach gives obviously far better results when contrasted and predetermined search engines. From the experimental text results, it is demonstrated that using the semantic search, most significant and relevant pages are retrieved. This approach was assessed and verified with distinct queries, and the relevancy was proved. The future work will be based on any type of data sets, other than the text content.

REFERENCES