Discovering Deep Web Interfaces Using Data Mining Approach

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Abstract

The content hidden behind HTML forms, has long been Recognized as a significant gap in search engine coverage. It represents required contents of the data on the Web; accessing Deep-Web content is not an easy challenge for the database community. Indexing of the searched data is fundamental problem faced by web crawlers that has profound effect on search engine efficiency. Recent study about searching contents on the web shows that nearly 96% of data over internet is encapsulated as well as hidden i.e. not found to search engines. The challenge faced by the search engines is to retrieve and access hidden web data or contents at low cost. This composed system uses a machine learning approach that is highly scalable, completely automatic, and very efficient to use, that helps to improve data retrieval functionality at lower cost. This system uses focused crawling strategy for accessing accurate searched results related to query and selects only relevant information or data according to their similarity with respect to query. The algorithm used in this system intelligently selects only possible candidates rather than searching whole document for inclusion in too your web search index.

Keywords: *Deep Web, Inner Identifier, Free Candidate Attribute, Ontology Bulding, TF-IDF.*

I. INTRODUCTION:

Current-day web search engines (e.g., Google) do not efficiently search data and index a significant portion of the Web and, hence, web users relying on search engines are not able to discover and large amount of information which is sometimes not relevant to the user are accessed from the non-index able part of the Web. Specifically, dynamic pages generated based on parameters provided by a user via web search forms (or search interfaces)are non-indexed by search engines and difficult to found in searchers results. Current web search engines include in their indices only a selected portion of the Web. There are a number of reasons for this, including inevitable ones, but the most important point here is that the significant part of the Web is sometimes not recognised by the search engines. Such search interfaces provide web users with an online access to myriads of databases on the Web. To obtain some relevant information from a web database of interest, a user issues his/her data, specifies in the form of query in a search form and receives the result in the form of query , a set of dynamic pages that encapsulate required information from a web database. At the same time , accessing a query via an randomly search interface is an extremely difficult task for any kind of web user or whether it is web crawlers, which, at least up to the present day, do not even attempt to pass through web forms on a large scale. Our primary and key object of study is a large portion of the Web (hereafter referred as the deep Web) encapsulated in web search interfaces. We concentrate on three classes of problems around the deep Web: characterization of deep Web, finding and classifying deep web resources, and querying web databases.

The deep Web has been growing at a very fast pace. It has been estimated that there are lots of deep web sites. Due to large amount of information in the deep Web, there has been a significant interest to approaches that allow users and computer applications to access this information. Most approaches assumed that search interfaces to web databases of interest are already searched and recognized by the query systems of database. However, such assumptions fails mostly because of the large scale of the deep Web – indeed, for any given domain of interest there are too many web databases with relevant content.

Web forms are formidable barriers for any kind of automatic agents, e.g., web crawlers, which unlike human beings, have great difficulties in filling out forms and retrieving information from returned pages. Hereafter we refer to all web pages behind search interfaces as the deep Web. The deep Web is one of the only part of the Web, in which the searched contents are badly indexed by search engines.

II. ORGANIZATION:

The paper is organized as follows: Related work is presented in Section III. We present our proposed methodology in Section IV. The Scope and proposed architecture in section V. We conclude in section VII.

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III. RELATED WORK:

Search engine web sites are the most visited in the internet worldwide due to their significance in our daily life. Web crawler is the leading function or module in the entire World Wide Web (WWW) as it is the spirit of any search engine. Standard crawler is a commanding technique for traversing the web, but it is loud in terms of resource usage on both client and server. Thus, most of the researchers focus on the structural design of the algorithms that are able to collect the most relevant pages with the matching topic of interest. The term focused crawling was originally introduced by [9], which indicates the crawl of topic-specific web pages. In order to put aside hardware and network resources, a focused web crawler analyses the crawled pages to discover links that are likely to be most relevant for the crawl and pay no attention to the irrelevant clusters of the web.

In **[9],** descried a focused web crawler with three mechanism, a classifier to evaluate the web page significance to the chosen topic, a distiller to recognize the relevant nodes using few link layers, and a reconfigurable crawler that is govern by the classifier and distiller. They try to compel various features on the designed classifier and distiller: travel around links in terms of their sociology, extract specified web pages base on the given query, and explore removal communities (training) to improve the crawling ability with high excellence and less relevant web pages.

In **[8],** Web page credits difficulty was addressed, in which the crawl paths selected based on the number of pages and their values. They use context graph to imprison the link hierarchies within which valuable pages happen and provide reverse crawling capabilities for more comprehensive search. They also concluded that focused crawling is the future and replacement of standard crawling as long as large machine resources are available.

In **[7]**, described the architecture and implementation of optimized dispersed web crawler which runs on numerous work stations. Their crawler is crash resistant and capable of scaling up to hundreds of pages per second by growing the number of participating nodes.

In **[6],** CROSSMARC approach was introduced. CROSSMARC employs language techniques and machine learning for multi-lingual in sequence extraction and consists of three main mechanisms: site navigator to traverse web pages and forward the composed information to (Page filtering) and (Link scoring). Page filtering is to filter the in sequence based on the given queries and link scoring sets the threshold likelihood of the crawled links.

In **[5],** highlighted that crawlers in the search engine are in charge for generating the structured data and they are bright to optimize the retrieving process using focused web crawler for improved search results. Castillo (2005) designed a new model for web crawler, which was incorporated with the search engine project (WIRE) and provided a right of entry to metadata that enables the web crawling process. He emphasize on how to capture the most relevant pages as there are never-ending number of web pages in the internet with weak association and relationship. He also stated that traverse only five layers from the home page is enough to get overview photograph of the corresponding web site, hence it save more bandwidth and avoid network congestion.

In **[4],**attempt to enhance the crawling process by connecting knowledge bases to build the knowledge of learnable focused web crawlers. They show results of an optimized focused web crawler that study from the information collected by the knowledge base within one domain or group. They have proposed three kinds of information bases to help in collecting as many relevant web pages and recognize the keywords related to the topic of interest.

In **[3]**, presented a framework for focused web crawler based on Maximum Entropy Markov Models (MEMMs) that improved the working mechanism of the crawler to become in the middle of the best Best-First on web data mining based on two metrics, precision and maximum standard similarity. Using MEMMs, they were able to exploit multiple overlapping and correlated features, including anchor text and the keywords fixed in the URL. Through experiments, using MEMMs and combination of all features in the focused web crawler performs better than using Viterbi algorithm and dependent only on restricted number of features.

In **[2],**evaluated various existing approaches to web crawling such as Breadth-First, Best-First and Hidden Markov Model (HMM) crawlers. They planned focused web crawler based on HMM for learning, most important to relevant pages paths. They combined classic focused web crawler attributes with the ideas from text clustering to result in optimized relevant path analysis In [2], developed their previous framework [4], in which they proposed two probabilistic models to construct a focused crawler, MEMMs and Linear-chain Conditional Random Field (CRF). Their experiments demonstrate improvement on the focused crawling and gave benefit over context graph and their previous model.

IV. PROPOSED METHODOLOGY:

Current-day web search engines (e.g., Google) do not crawl and index a significant portion of the web and, hence, web users relying on search engines only are unable to discover and access a large amount of information from the non-indexable part of the Web. The key challenge is that huge portion of the Web (hereafter referred as the deep Web) hidden behind web search interfaces. As search engines having finite processing capacity, the results must be obtained at low cost and must have higher quality. Thus efficiency, quality and coverage on relevant deep web sources are challenging issues in crawling deep web interfaces.

V. PROPOSED ARCHITECTURE:

The Objective of this project:

- Relevant document extraction from hidden deep web, that are impossible to search using standard crawling techniques.
- To increase accuracy of deep web interface extraction.
- Minimizing irrelevant document extraction and searching.

VI. OVERALL FLOW OF THE PROPOSED SYSTEM:

The Fig.1.shows how proposed system will performs the operations.

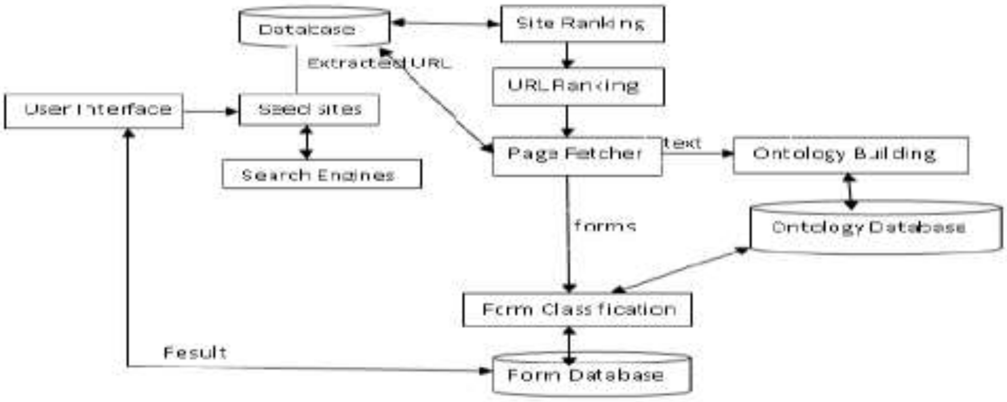


Fig.1. Proposed Architecture

There are four major parts in the framework: site classifier, site ranking, URL ranking, and form attribute builder.

User Interface

The user can submit their queries on to interface designed using HTML. The results are also shown on this interface.

Seed Sites

The traditional crawler follows all newly found links. In contrast, this system strives to minimize the number of visited URLs, and at the same time maximizes the number of deep websites. To achieve these goals, using the links in downloaded web pages is not enough. So it takes help from different search engines to get website URL's on given topic.

Site Ranking

Using TF-IDF ranking algorithm, each web site from the seed sites will be ranked. However, there is some drawback, of using term frequencies that we miss positional information. The ordering of terms doesn't matter; instead the number of occurrences becomes important.

URL Ranking:

Ranking links is the most promising task. To rank link for form focused crawling the link URL first be parse. Crawlers automatically learn patterns of promising links and adapt their focus and rank it.

Page Fetcher:

After ranking will be done, the page fetcher can downloads all this pages for the process of attribute building.

Attribute Builder

This approach is used to automatically extracting the proper attributes from Web data sources of the Deep Web. The more specific meaning of "attribute" is derived from the HTML/XML syntax. A tag of HTML consists of a mandatory name between angular brackets which we called as "attribute". The attributes can be extracted are classified as Programmer Viewpoint Attributes (PVAs) and User Viewpoint Attributes (UVAs). PVAs are extracted from within HTML tags whereas UVAs are the results of analysing the text of the Web form, especially as it is associated with text entry areas.

PVA Extraction

A PVA is an Inner Identifier-based Candidate Attribute. The algorithm 1.1 shows steps for separating a set of inner identifiers of a Web data source.

Final Attribute Extraction.

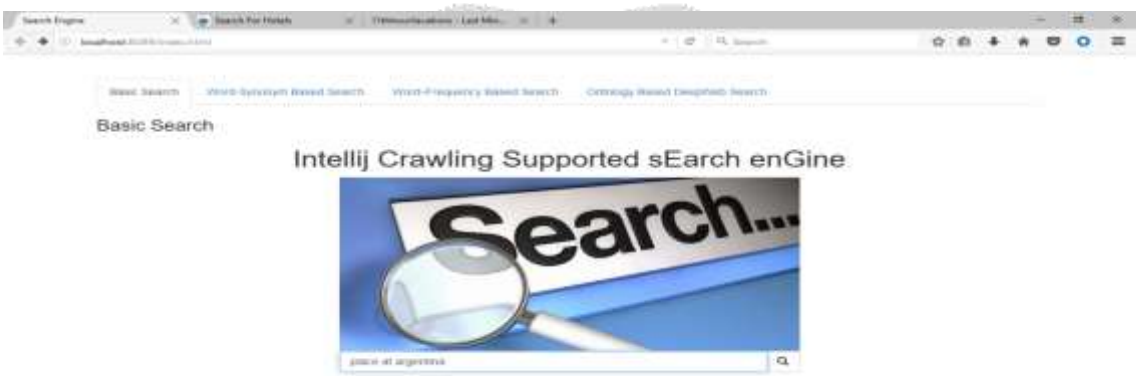
After obtaining the synonym sets, SOPVA and SOUVAi, the final attributes are derived by comparing each row in SOUVAi to all the rows in SOPVA. A two-step comparison is used to determine the final attributes by checking for overlap. First, the comparison between PVA in SOPVA and UVAi in SOUVAi is performed and secondly the synonyms of both sets are compared.

Form Extraction

If the extracted Page contains form then it is extracted and cross-checked using attributes extracted by attribute extracted module for given topic. If the extracted form contains elements from attributes then such form is classified as relevant form otherwise it is discarded. The relevant forms are stored in database for future reference.

VII. RESULTS:

In Fig 10.1 user can firstly select the search strategy after that enter the keyword which he/she wants to search and click on search button for the results.



Search Engine
Search For Hotels
11thhourvacations - Last Min...
Basic Search
Word-Synonym Based Search
Word-Frequency Based Search
Ontology Based Deepweb Search

Basic Search

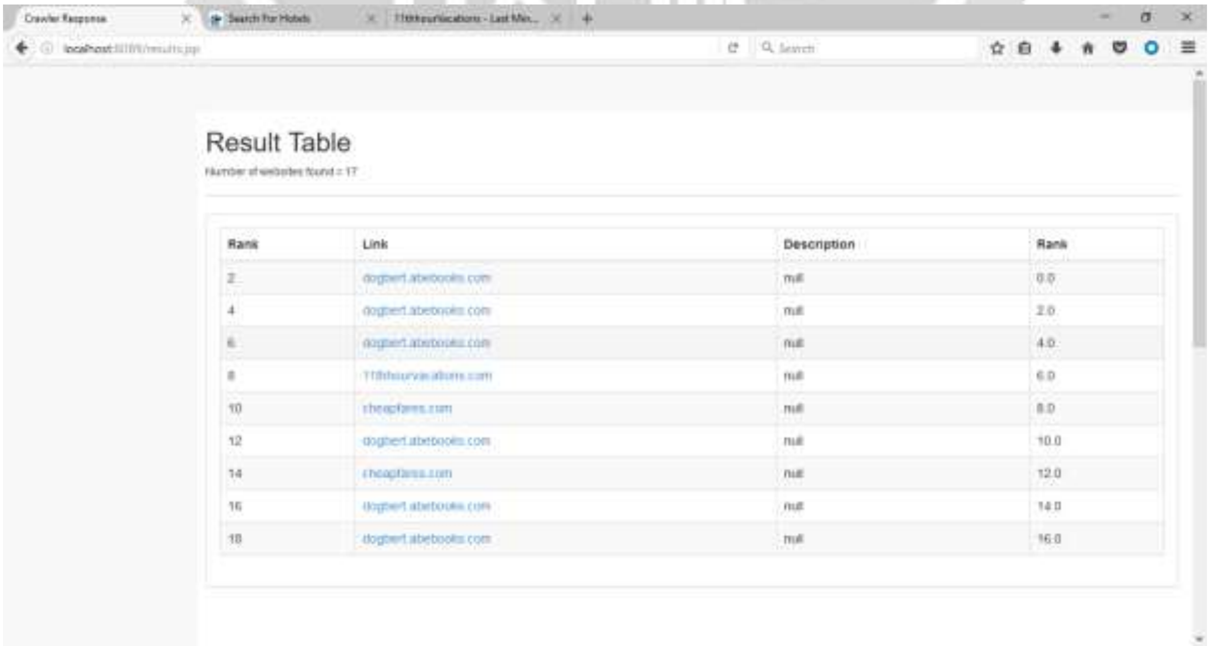
Intellij Crawling Supported sEarch enGine

place at argentina

Fig.1.2. Home Screen for Basic Search

In Fig 10.2 shows the result-1. After the first step user will come to the next step with new webpage, which show the how many number of results system able to find.

In the form of "No of websites found" with the table which shows the ranking for each website with respective description if any.



Result Table

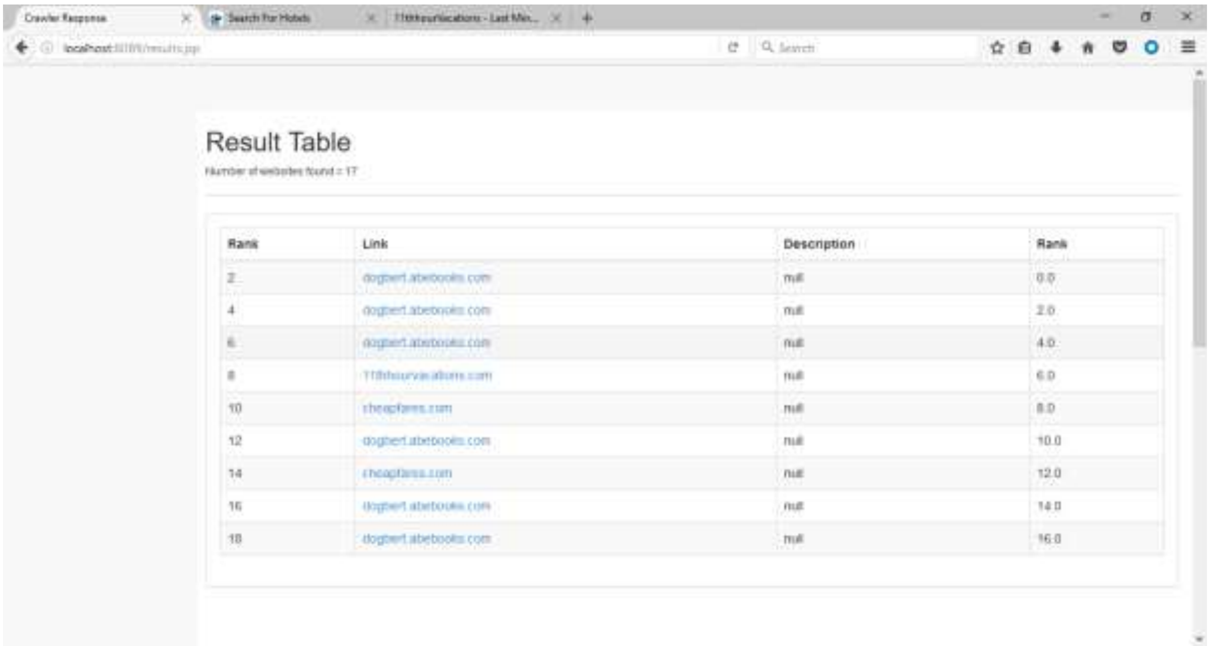
Number of websites found = 17

Rank	Link	Description	Rank
2	dogbert.abebooks.com	null	0.0
4	dogbert.abebooks.com	null	2.0
6	dogbert.abebooks.com	null	4.0
8	11thhourvacations.com	null	6.0
10	cheapfares.com	null	8.0
12	dogbert.abebooks.com	null	10.0
14	cheapfares.com	null	12.0
16	dogbert.abebooks.com	null	14.0
18	dogbert.abebooks.com	null	16.0

Fig.1.3. Result-1 for Basic Search

In Fig 10.3 shows the result-2. After the first step user will come to the next step with new webpage, which show the how many number of results system able to find.

In the form of "No of websites found" with the table which shows the ranking for each website with respective description if any.



Result Table

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4	dogbert.abebooks.com	null	2.0
6	dogbert.abebooks.com	null	4.0
8	11thhourvacations.com	null	6.0
10	cheapfares.com	null	8.0
12	dogbert.abebooks.com	null	10.0
14	cheapfares.com	null	12.0
16	dogbert.abebooks.com	null	14.0
18	dogbert.abebooks.com	null	16.0

Fig.1.4. Result-2 for Basic Search

VIII. CONCLUSION:

Web crawling is an initial component in search engines and estimation mining frameworks. We have compared between standard web crawlers and focused web crawlers to understand which one is better and apply it in our estimation mining framework in a proposed work.

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X. REFERENCES

[1] Feng Zhao, Jingyu Zhou, Chang Nie, Heqing Huang, Hai Jin. “SmartCrawler: A Two-stage Crawler for Efficiently Harvesting Deep-Web Interfaces” IEEE Transactions on Services Computing, 2015

[2]Liu, Hongyu, and Evangelos Milios. "ProbabilisticModels for Focused Web Crawling." Computational Intelligence, 2010.

[3] Batsakis, Sotiris, Euripides Petrakis, and Evangelos Milios. "Improving the performance of focused web crawlers." ELSEVIER, 2009.

[4] Liu, Hongyu, Evangelos Milios, and Larry Korba. "Exploiting Multiple Features with MEMMs for Focused Web Crawling." NRC, 2008.

[5] Rungsawang, Arnon, and Niran Angkawattanawit. "Learnable topic-specific web crawler." Science Direct, 2005: 97–114.

[6] Castillo, Carlos. "EffectiveWeb Crawling." ACM, 2005.

[7] Karkaletsis, Vangelis, KonstantinosStamatakis, James Horlock, Claire Grover, and James R. Curran. "DomainSpecificWeb Site Identification: The CROSSMARC Focused Web Crawler." Proceedings of the 2nd International Workshop on Web Document Analysis (WDA2003). Edinburgh, UK, 2003.

[8] Suel, Torsten, and Vladislav Shkapenyuk. "Design and Implementation of a High-Performance Distributed Web Crawler." Proceedings of the IEEE International Conference on DataEngineering. 2002.

[9] Chakrabarti, Soumen, Martin van den Berg, and Byron Dom. "Focused crawling: a new approach to topic-specific Web resource discovery." Elsevier, 1999.
[10] Mohamamdreza Khelghati, Djoerd Hiemstra, and Maurice Van Keulen. Deep web entity monitoring. In Proceedings of the 22nd international conference on World Wide Web companion, pages 377–382. International World Wide Web Conferences Steering Committee, 2013.
[12] Martin Hilbert. How much information is there in the ―information society‖? Significance, 9(4):8–12, 2012.
[13] Kambhampati Subbarao. Sourcerank: Relevance and trust assessment for deep web sources based on inter-source agreement. In Proceedings of the 20th international conference on World Wide Web, pages 227–236, 2011.
[14] Eduard C. Dragut, Weiyi Meng, and Clement Yu. Deep Web Query Interface Understanding and Integration. Synthesis Lectures on Data Management. Morgan & Claypool Publishers, 2012.
[15] Thomas Kabisch, Eduard C. Dragut, Clement Yu, and Ulf Leser. Deep web integration with visqi. Proceedings of the VLDB Endowment, 3(1-2):1613–1616, 2010.

[16] Idc worldwide predictions 2014: Battles for dominance and survival – on the 3rd platform.
http://www.idc.com/research/Predictions14/index.jsp, 2014.
[17] Booksinprint. Books in print and global books in print access.http://booksinprint.com/, 2015.