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CONTENTS

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HYPOTHESES

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APPENDIX/ANNEXURE

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- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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A PROPOSED FRAMEWORK FOR AUTO REGULATED MIGRATING PARALLEL CRAWLER

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ABSTRACT

A Web Crawler is a software program of a web search engine that fetches data from web servers [2,7]. It is a time taking process due to tremendous increase rate as well as the high change frequency of web documents, running a web crawler is becoming a challenge. Due to the deficiency in their refresh techniques [10, 11], current web crawlers add unnecessary traffic to the already overloaded Internet. Currently there is no any ways to verify whether a document has been modified or not [1, 3]. The aim of this paper is to develop a crawling technique that reduces load on the network caused by the search engine crawlers in this paper, an efficient approach is being proposed for building an effective migrating parallel crawler. It selectively migrate the crawler to the web server based on some calculation[11] and updates its database and/ or local collection of web pages, instead of periodically sending the crawler in round robin manner thereby improving the "freshness" of the collection significantly and reducing the required network bandwidth. It also detects web servers on which pages frequently undergo up-dation and dynamically calculates the migration rate [10, 11] of migrating parallel crawler for its next visit to the server. This approach will reduce the load and internet traffic on the remote site.

KEYWORDS
web crawler, url, migrating parallel crawler, Search Engine, frequency, regulated priority.

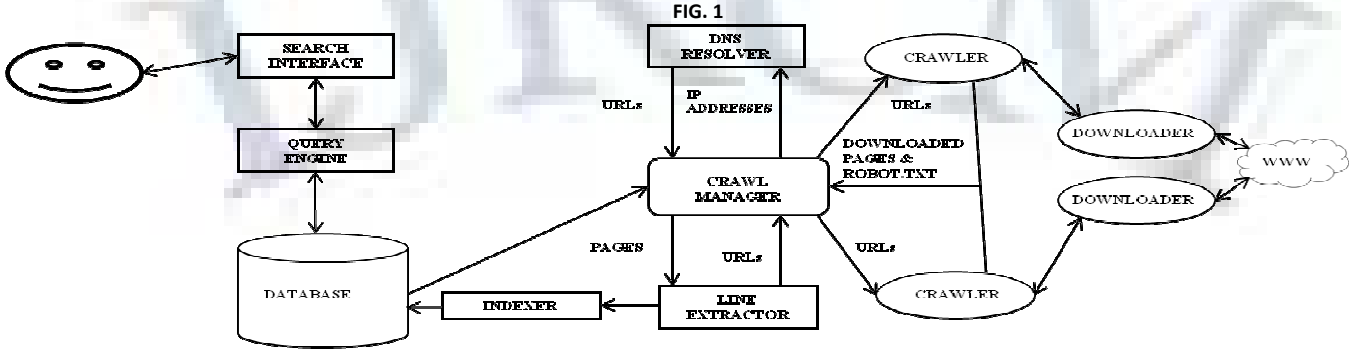
INTRODUCTION

Internet, an interconnection is a worldwide connection of millions of computers around the world, the internet carries a wide range of information, their resources and services. Is a global information system that is logically linked together by a globally unique address space based on the internet protocol [2,4]. The World Wide Web is a global, large repository of text documents, images, multimedia and many other items of information, referred to as information resources lying on different websites, distributed over far and distant geographical locations. [4] It is estimated that www contains more than 2000 billion visible pages which are static and dynamic and five times more lying in the hidden web. WWW is divided into two categories known as surface web and hidden web. So it is not possible to access the web easily so we take the help of search engines. Search Engine is system program designed to search the information on the web servers for specific keywords [2]. The search engine results are often presented in a list of results. Today's search engines are used for efficient and quick retrieval of information. A search engine consists of the three modules. Indexer reads the documents and creates the index based on the word in the document. A front-end user interface and a query subsystem which queries the database and presents the results of searches [6, 7]. A search engine works by sending out a crawler to fetch documents. Due to the extremely large number of pages present on Web, the search engine depends upon crawlers for the collection of required pages. A web crawler is software program that browses the web servers in a automated manner or in a orderly fashion download then scans internet pages to create an index of data.

GENERAL MODEL OF WEB CRAWLER

A web crawler is a computer program that visits web sites corresponding to given URLs and extracts the URLs from the downloaded pages. and store the entire pages in a centralized database are indexed in advance to be able to respond to many user queries quickly. as the Web is growing very large, a crawler have to large coverage but rarely refresh its crawls, the general architecture of a crawler [11] is shown in Fig.1.

FIG. 1



ARCHITECTURE OF GENERAL CRAWLER

In this figure, as user gives the query through the search engine interface, query is passed to the query engine which breaks the query in the keywords, which are search in the database by various combinations. According to query relevant result are provided to user and some URls related to that query given to crawl manager for crawling process. Crawl manager takes first URL from the database and send it to DNS-Resolver to find their corresponding URL-IP Address pair. DNS gives the URL-IP address pair back to crawl manager. This pair will be selected to visit. Crawl manager should make sure that this URL is not and image/pdf/google page/amazon page. If so select the next URL-IP pair. Crawler downloads the document from URL and returned to crawl manager. Crawl manager checks whether the document has already downloaded or not. If the document is new one then it sends to the Link Extrator to extract the urls or references of the other websites from that document. Otherwise discard the downloaded page. Then pattern match for emails. Extract the links within the page. With the help of indexer these new links are inserted into the database at their corresponding keywords.

CATEGORIES OF WEB CRAWLER

1. PARCAHYD [5]:- is a crawling technique that is proposed if the links contained within a downloaded page become available to the crawler before an instance of crawler starts downloading the documents itself, in short we can say as the URL downloaded it will be available for downloading to instance of crawler. Then downloading of its linked web documents can be carried out in parallel by other instances of the crawler. Therefore, it is proposed that meta-data in the form Table Of links (TOL) buffering of the links contained in a document be given and stored external to the document in the form of a file with the similar name as document but with different extension . This one time extraction of TOL can be done at the time of creation of the document
2. Distributed web crawler [12]-is a distributed computer program by using it search engine employs many computers to index the Internet via web crawling. Such systems allow for users to voluntarily offer their own computing and bandwidth resources towards crawling web pages. By dividing the load of these tasks across many computers, costs that be spent on maintaining large computing clusters are avoided.
3. MERCATOR [13] is a scalable and extensible crawler, now used for the Altavista search engine. The implementation issues to be acknowledged for developing a parallel crawler like bottlenecks and traps, which can improve performance. They discuss evaluation criteria and pros and cons of different coordination modes. In brief, they conclude that the communication overhead does not increase directly as more crawlers instances are added, throughput of the system increases directly as more nodes are added and the quality of the system, i.e. the performance to get "important" pages first, does not decrease with increase in the number of crawler processes.
4. PARALLEL CRAWLERS [5,6,7,14], A crawler that instances are centrally managed or totally distributed. The authors mention that distributed crawlers are advantageous than multithreaded crawlers or simple crawlers on the counts of efficiency, scalability, and throughput. If network load and network dispersion reduction are done, parallel crawlers can yield better results. Their instances fully utilize memory of the machines and there is no disk access.
5. MIGRATING CRAWLER [7,15,16], an alternative approach to Web crawling is based on mobile crawlers. these crawlers are transferred to the web server(s) where the data resides in order to filter out any unwanted data locally by reliability test to sure that this is coming from reliable source before transferring it back to the search engine. This reduces network load and speeds up the indexing phase inside the search engine.
6. Focused crawler- is a web crawler that workout to download only web pages that are relevant to a pre-defined topic or set of topics. Focused crawling generally assumes that only the topic is available, while focused crawling also assumes that some labeled examples and not relevant pages are available.
7. Incremental crawlers [10,17]:-is a special crawler that downloads the web pages to improve the freshness of the database. As the freshness of data is above the given level then it stops crawling. And take rest till the freshness of database is below the given level of freshness. By this the unwanted load over the network is reduced.

From above given categories of crawlers we can concluded that if two more categories are merged then the many challenges which we fill in information retrieval can be reduced. If multiple instances of migrating crawler work and crawling speed become efficient. Distributed crawler also spread their instance for fast result. And feature like changes as per requirement available in Mercator is may be applied on others. By these we can improve performance reliability and efficiency also.

CHALLENGES IDENTIFIED

With the rapid growth of the information stored on www, a high performance crawling strategy based on following design issues is need to be addressed.

REDUCE THE LOAD ON NETWORK

When the information contained in a document changes very frequently, the crawler should download the document as often as possible and updates it into its database so that new information could be maintained for the potential users. If the number of such documents is large, the crawling process becomes inefficient and hopelessly slow because it puts a fabulous pressure on the internet traffic. The crawler must not put extra load on network by visiting again and again normally to a web server for fetching fresh documents in order to make the local collection fresh.

KEEP THE LOCAL COLLECTION FRESH AND IMPROVE QUALITY OF THE LOCAL COLLECTION

Freshness of a collection directly proportion on the strategy used. Thus, the crawler should use the best crawling policies to keep pages fresh. This includes adjusting the revisit frequency to a web server based on its estimated change frequency.

The crawler should increase the quality of the local collection by changing less important pages with more important ones. This updation is compulsory for two reasons- firstly pages are constantly created and removed. Some of the new pages can be more important than existing pages in the collection, so the crawler should change the old and less important pages with the new and more important pages. Second, the importance of existing pages reduces with time. When some of the existing pages become less important than previously ignored pages, the crawler should replace the existing pages with the previously ignored pages.

RELATED WORK

Parallel Migrating Web Crawler [5,6,7,14]-is a new framework in which multiple instances of migrating crawler are used to collect more and more data. Decentralization the crawling process is a better idea for fulfill the user need in increasing size of web. As instances of mobile crawling process goes to various locations and run simultaneously by this the crawling process become fast and they save time in crawling. Documents are filtered [7] at remote side and updated pages are sent to local database.

DESIGN OF A PRIORITY BASED FREQUENCY REGULATED

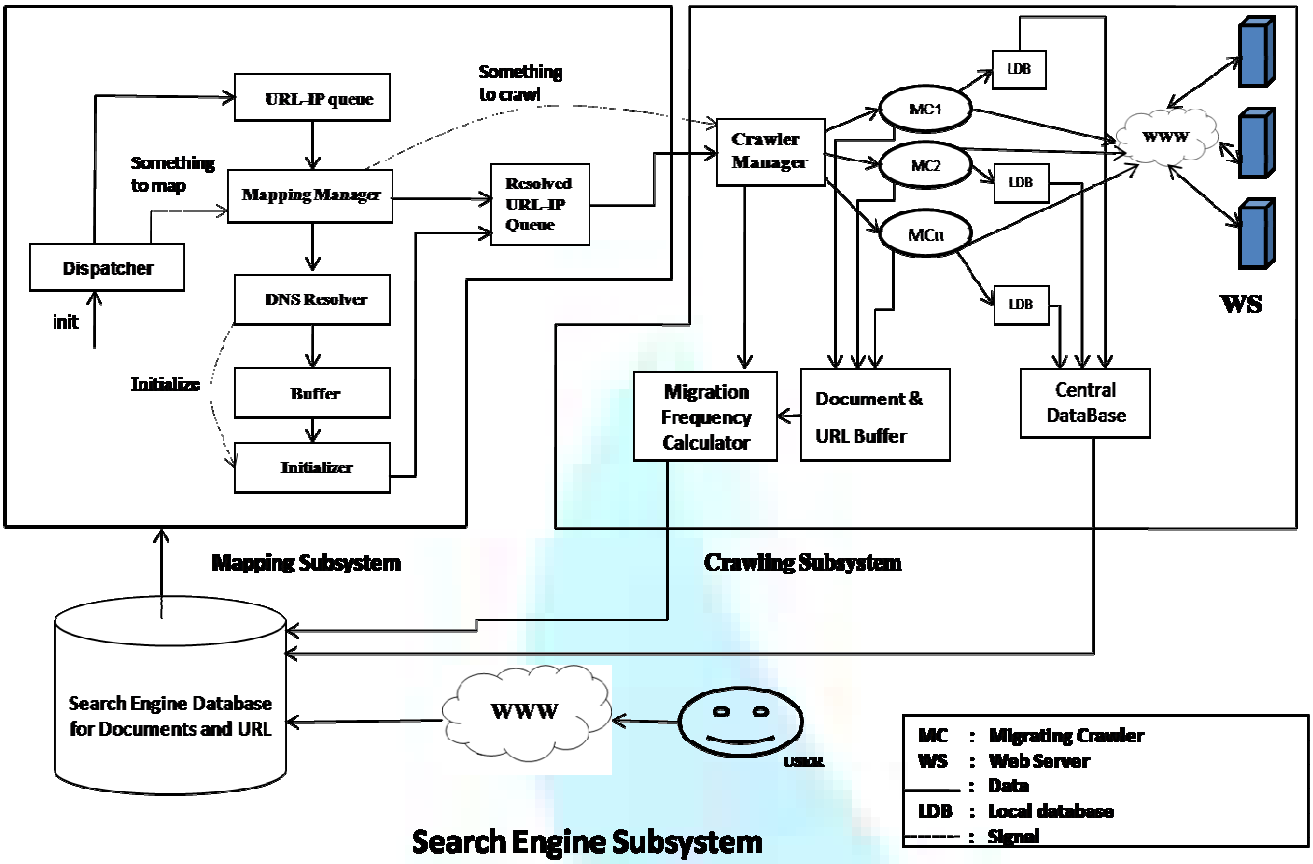
Incremental Crawler [10]- in this paper, the author explain a mathematical formula[10] by using the auto frequency calculator calculates the visit frequency of any web page as often as its updates because some pages are updated very quickly in minute and some in a hour, daily, weekly, monthly and so on. As on their updation time the visit frequency calculator module calculates the revisit frequency of that page so that after it the crawler crawl this.

PROPOSED WORK

As we discussed previously and related work, we conclude that if the instances of migrating crawler should visit a site frequently and the frequency of visits should be adjusted according to the category[10] of the site. Frequency of up-dation is a key idea that decides as when to revisit/crawl a page [10], and is directly depends on the number of visits to the site at present and also on the network traffic. So, a page that change very much frequently say every minutes, needs to be revisited frequently as compared to the page that change less frequently say every week, needs to be revisited least frequently.

The proposed architecture of the Auto Regulated Migrating Parallel Crawling module is given in Figure 2.

FIGURE 2: THE ARCHITECTURE OF THE MODIFIED MIGRATING PARALLEL CRAWLER



Search Engine Subsystem

In order to maintain the freshness of Search Engine's local database, the proposed crawler should download the fresh/new WebPages, therefore, migration frequency calculator of migrating parallel crawler will find the appropriate migration frequency of the crawling so that crawler can update its search engine database with fresh documents.

The algorithm for **Auto Regulated Migrating Parallel Frequency Calculator Module** is given below.

ARPMFCM ( )
Do
{
Read URL IP-Address pair from URL IP Address queue.
If the last Crawl Time is NULL and their Status is zero
then
change Status into 1
Set Migration Period equal to default migration period
Update URL record
Store URL-IP pair it into URL-IP queue
Else
If the Current Migration Period is greater than Lower Threshold value and Current Migration Period is less than Higher Threshold value
then
remain the previous value for migration period
Else
Calculate the new Migration Period [10]
Set Migration Period = New Migration Period
Store URL-IP pair into URL-IP queue
}
Forever

The whole ***mapping and crawling*** Process [4,8] can be defined as follows:

Mapping manager takes a URL_IP set from the URL_IP Queue and creates multiple instance of mapper threads named as URL-Mappers. Set of URL_IP taken from URL_IP Queue are assigned to each URL_Mapper. URL-Mapper examines each URL_IP pair and if IP is null, then URL is sent to DNS Resolver. After the URL has been resolved for its IP, it is stored in the Resolved URL_IP Queue. If URL is new then DNS Resolver stores it in the Buffer and a signal "initialize" is sent to Field initializer. Field initializer initializes the URL fields and stores them in Document and URL Buffer.

Downloaded documents are checked for modification of contents in it and Migration Period is Auto Regulated accordingly by Auto Regulated Migration Period Calculator module. Later these Documents and URLs are stored in Search engine Database.

So, the modified crawler optimizes the frequency of migration for an Migrating crawler, there by improving the quality of collection without incurring much traffic on the network.

ONGOING WORK

Crawler migration and remote execution of code causes severe security problem because a migrating crawler might contain harmful codes. We suggest introducing an identification mechanism for migrating crawlers based on digital signatures. Based on this crawler identification scheme a system administrator would be able to grant execution permission to crawler.

Instead of sending the entire downloaded pages, the crawl worker may first take difference between previous image and the current one and send only this difference, since many pages are static and do not change very often, this scheme can significantly reduce the network traffic.

Instead of sending the entire downloaded page at it is, we can reduce their size by applying any compressing mechanism on it. By this the traffic on the network will also be reduced.

CONCLUSION

Crawlers are used efficiently to collect Web data for search engine, data mining, and caches [1]. As the size of the Web increases, it becomes progressively important to use migrating parallel crawlers [4,7]. With the help of the proposed scheme, various design options for an migrating parallel crawler has been identified to find the refresh time of the documents and thus resolving the problem of the freshness of the pages [9]. The documents collected from each site are filtered. So only the relevant and useful pages are sent back to the central crawler and this saves network bandwidth. The documents before sending to the central crawler are compressed locally and then send to the central crawler which saves a hug amount of network bandwidth. To perform this task a no. of algorithms and a updated architecture have been proposed that will help the crawler to remove its deficiencies by dynamically adjusting the migration period and refresh time and thus improving the efficiency, as it makes the database rich. Only the useful data is provided to the user, thus network traffic is reduced and data enrichment is achieved.

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