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User Interface For A Search Engine: A Customized and Multi-domain Approach

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***Abstract*: The paper proposes a novel information retrieval framework by providing a customized, dynamic and multi-domain user interface for a search engine. This uses the idea of fragmentation of information into different domains before the actual search starts. This is realized by dividing the search criteria into different parameters or features of that domain. The user is assisted to enter only domain specific keywords. The user is also given the choice to select more than one search criteria to refine the search. The proposed system, which has been demonstrated with two different domains, can be replicated on other domains without changing the logic and the format of the database.**

Keywords: multi-domain, customized, search, fragmentation, information retrieval, domain.

I. Introduction

Web has a predominant say in the lives of people in modern times. It is estimated that [1] more than sixty percent of the people in the developed world and almost one third of the world population use web. Most of these users are nontechnical people who use the web as an easy, low cost, real time and far reaching communication medium. This necessitates an effective mechanism to retrieve required information from this ever growing knowledge bank by the common man.

Search engines have conventionally been used as tools in retrieving information [2] [3] from the web. Usually, the search engines use similarity measures to show how close one document is to the desired result. The files retrieved by the search engines are totally dependent on the keywords supplied by the user. Many times, users who are unaware of the retrieval strategy followed by search engines remain unsatisfied due to improper keyword selection in the query. The availability of synonymous keywords belonging to different domains with entirely different meanings and perspectives create more confusion.

In this regard, the literal usage of keywords to fetch intended retrieval from the web may not be proper. So, it is quite relevant to look at information retrieval from a different perspective. This paper is an attempt to categorize the intended retrieved information based on variation in user requirement. Thus, a customized search environment is offered to the user by means of a newly developed interface. This interface gives the user the option of a general search or an advanced search based on the requirements of a novice user or an expert user respectively. The search approach of this proposed method remains keyword based as in the case of other search engines. However, it goes further to offer a method of categorization of the information. The system prototype has been successfully implemented into a local web server. The same architecture can easily be implemented into World Wide Web without much variation.

The paper is divided into six sections. Section II offers detail study on related works. Section III proposes the new method. Section IV explains implementation and section V gives the experimental results. Section VI deal with conclusion and future works.

II. Related Works

There has been many works [2] [4] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20][21][22][23][24] in the area of information retrieval through search engines. There has also been some works on personalization of search engine. In such works, previous search behavior of a user is used as personalized trend, which is used for efficient and focused search.

Literature gives some specific attempts of personalization of web search. A personalized web search approach based on probabilistic query expansion and collaborative filtering by Palleti et al [8] aimed at exploiting browsing history of a user to get probabilistic correlations among the query terms and document terms. It performs a collaborative filtering and a pseudo query term selection for better query expansion. Pan et al [9] proposed an adaptive personalized approach based on context. It works on each user's need in different

situations by using a process of context-based adaptive personalized search. Then, it uses three technologies-semantic indexing for web resources, modeling and acquiring user context and semantic similarity matching between web resources and user context. They also proposed a novel adaptive personalized approach [10] based on context for adapting search results according to each user's need in different situations. Orland Hoeber [11] proposed a system that supports exploratory search through visual specification of utility functions. Users are able to recognize potentially relevant terms using a term frequency histogram, and can indicate their preferences for these in a visual manner. The search results are re-sorted based on utility function; color coding allows users to locate the selected terms within the list of search results.

Koutrika et.al [12] proposed a preference model that provides an algorithm for the selection of preferences related to a query. It also incorporates an algorithm for the progressive generation of personalized results, which are ranked based on user interest. Liu et.al [13] described a strategy for personalization of Web search in which a user's search history is collected without direct user involvement. The user's profile is constructed automatically from the user's search history and is augmented by a general profile which is extracted automatically from a common category hierarchy. The categories that are likely to be of interest to the user are deduced based on his/her query. These categories were used as a context of the query to improve retrieval effectiveness of Web search. Harb et al [14] proposed a new page rank technique based on user's browsing history where a personal search engine has then built based on this page rank technique and user interest. Xu et.al [15] implemented query expansion algorithm in personalized web search system, which can learn user's preference implicitly and then generate the user profile automatically. When the user inputs keywords, more personalized and expansive words are generated by the proposed algorithm, and then these words along with the query keywords are submitted to a popular search engine like Google. Wang et. al [16] created Internet Search Advisor (ISA), a personalized, knowledge-driven search system that helps the user find informative web sites. The ISA supports multi-dimensional data analysis and data mining based on association rules and sequential patterns.

Numerous approaches appear in the literature to handle processing of search query by implementing multi domain techniques. Seher et al [17] proposed a system which understands user request by identifying domain and task of user query. It then expands user query using contextual information such as domain, user and task-specific preferences. Domain identification algorithm was generated to identify the query domains. Alessandro Bozzon et. al [18] proposed an architecture aiming at answering multi-domain queries through composition of search services and provided facilities for the execution of multi-domain queries and the visualization of their results, at the purpose of simplifying the access to the information. He also included service-based architecture and implemented optimization and distribution options for evaluating the feasibility and performance of their approach. Tim [19] focused on designing alternatives for front end user interfaces that enable users to easily create search requests and efficiently search for business data. This pattern applies to both rich-client and web applications. The pattern language focuses on searching data that is stored in databases. Tim [20] also proposed an architecture pattern for information systems that require complex search capabilities. The pattern includes means to generically describe search requests, a service that interprets search requests and executes them on data sources, and strategies for transmitting results back to the requesting clients.

Zheng Wang et. al[21] developed Domain Specific Search Engine(DSSE) method based on Meta Search Engine and involves two processes. The first process, called, Odds Ratio, is used to refine domain specific keywords which are weighted by means of TF-IDF method. Second process uses Decision Tree method in which domain query expression is constructed with the keywords that reflects the features of domain documents. Lie Zhang et. al [22] developed a domain specific search engine based on domain characteristics. The system offers advantages like quick response, high accuracy, and significant enhancement of correlations between requirements and information responses as well as automatic cross-domain engine building. Nabeshima H et. al [23] suggested semi-automatic training example generation algorithms for rapidly synthesizing a domain specific web search engine. These semi-automatic algorithms were based on sample decision tree approach and similarity based approach which build a domain specific search engine with little time and effort. It developed a high precision and high recall framework by creating a keyword spice model. The similar concept of keyword spice was implemented by Oyama et. al [24] by accepting user's input query and forwarding it to general purpose web search engine. Here, keyword spices were discovered from web documents using machine learning technologies.

In all these systems and approaches, customization has been incorporated based on user search habits. They use advanced techniques to bring modifications at the logical level of the search engine by introducing different searching algorithms. The methodology proposed in the paper does not affect the logic of the search. However, a user interface is offered to the user, which guides and directs the search engine to offer only relevant information. Thus, the search methodology, though keyword based, help the user to search for the relevant information very easily.

III. Proposed System

The proposed system has been realized in four modules as follows:

A. Dynamic Domain Selection

The proposed system provides a user interface which one can use to select a domain dynamically. The domain names are maintained in the database 'keyworddictionary' having the field 'domain' which is indexed for fast retrieval of the result. When the search engine page is loaded, these domains are uniquely accessed from the database and displayed on the left side of the home page. This is illustrated in figure 1 with two domains- Medical and Sports.

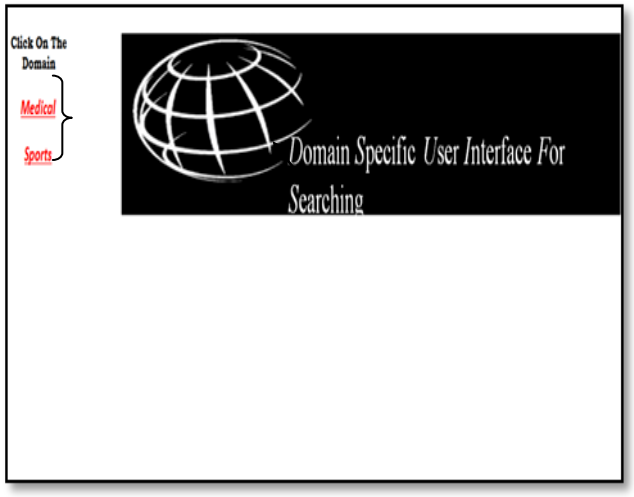


Figure 1: Interface for Domain Selection

Depending upon the domain selected by the user the parameters related to the respective domains, which are stored in the database 'keyworddictionary' are retrieved and displayed on the right of the home page as shown in figure 2 and figure 3.

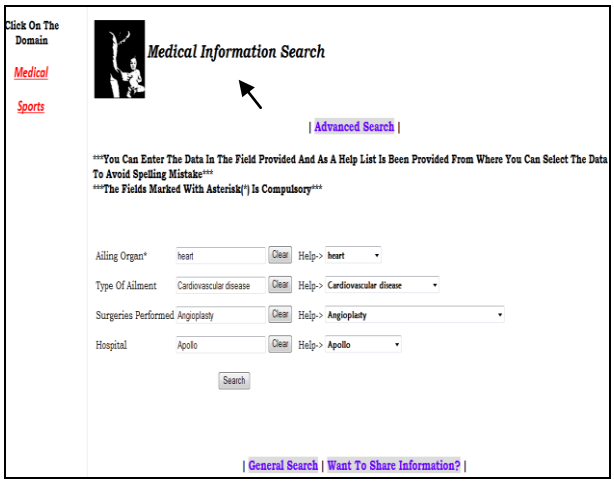


Figure 2: Interface showing Medical Information when Medical domain is selected

B. Customized Interface Designing

The design of customized interface takes into consideration two search requirements of a user- general search and advanced search of the chosen domain. General search satisfy the general information requirement of a user. Advanced search look for highly specialized topics which are not generally offered by a usual search. The design of the customized interface for advanced search in the proposed system, which is shown in figure 4, incorporates the following features.

- *Domain specific*: In this paper, the search is directed to a specific domain selection, for example Medical or Sports. So, the information is fragmented into different parameters only related to the specified domain. The keywords entered by the users will also be related to the specific domain. This will enable the search engine to know exactly what type of result the user is expecting so that relevant data only can be retrieved.

Figure 3: Interface showing Sports Information when Sports domain is selected

- *Keyword Specific:* The interface accepts only keywords so that the users do not have to type a statement for the search. For example queries like "I am suffering from cardiovascular disease. Is Angioplasty done at Apollo Hospital?" or "Want to know about Indian hockey team in the 1982 world cup" are avoided here.
- *Parameter Specific:* The important parameters or features of the domain will be specified on the interface. For example, the statement "I am suffering from cardiovascular disease. Is Angioplasty done at Apollo Hospital?" is broken into four parameters. They are:
  - ✓ *"Ailing Organ"* where the user will enter "*heart*",
  - ✓ *"Ailment Type"* , where the user will type "*Cardiovascular disease"*,
  - ✓ *"Surgery"*, where "*Angioplasty"* is entered
  - ✓ *"Hospital"*, where the user will choose *"Apollo"*.

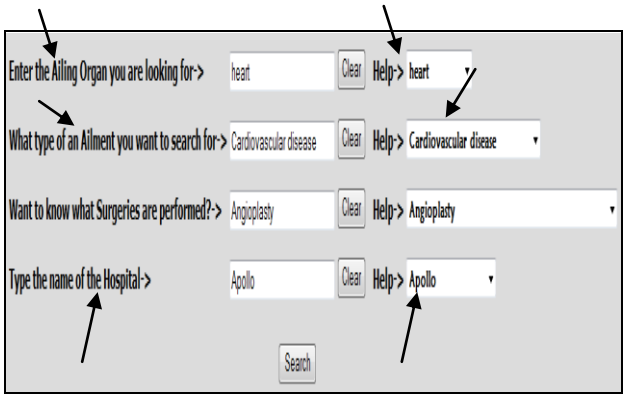


Figure 4: Customized Interface Designing for Advanced Search (Example: Medical Domain)

Similarly, the query "Want to know about Indian hockey team in the 1982 world cup" in the sports domain has the following parameters.

- ✓ *"Sports Category"*, with keyword *"hockey"*,
- ✓ *"Type of Event"*, that is *"world cup"*,
- ✓ *"Year"*, which is "*1982*" and
- ✓ *"Team Name"*, that is "*India*".

The interfaces for the two domains are shown in figure 4 and figure 5 respectively.

Figure 5: Customized Interface Designing for Advanced Search (Example: Sports Domain)

The search based on these features will be very much useful for organizations that are very domain specific. This can also be a platform to advertise their specialized services in a global market as specified in figure 6a. Here the user is asked for email id and is allowed to upload the information.

Figure 6a: Platform to share Domain Specific Information

Figure 6b: Platform to share Domain Specific Information

The information is uploaded in the server with automatically generated security key as shown in figure 6b. At times, the user might not need detailed information about a topic' in that case, he can use the general search feature to have information on the go. The design of the interface takes care of this need by offering a new interface for the general search. The customized interface for general search, as shown in figure 7 and 8, takes care of such information.

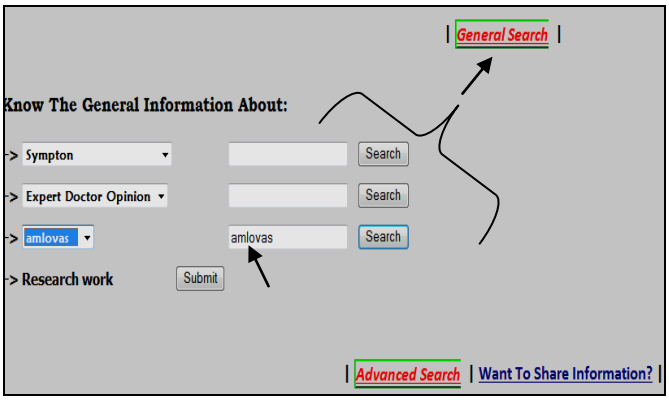


Figure 7: Customized Interface Designing for General Search (Example: Medical Domain)

C. Data Management

The management of a keyword for all the domains is taken care by maintaining a common data dictionary. The data dictionary is a table consisting of 4-tuples, which comprise of keyword, filename, count and domain. The keyword is any important word which is contained in the document from which the information is to be retrieved. The filename is the name of the file in which these keywords appear, count is the number of repetitions of a particular keyword in a file and domain specifies the type of domain to which the keywords belong to. The field domain is indexed so that the searching of the keyword is faster for any domain selection.

When user submits a query into the search engine through the customized interface, an iterative search mechanism is applied to the keywords which are matched in the data dictionary to retrieve files in descending order of count depending on the domain. These files are displayed as final result.

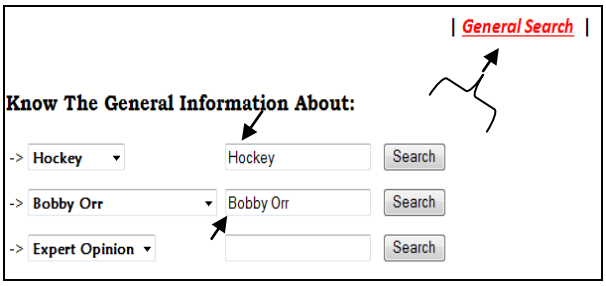


Figure 8: Customized Interface Designing for General Search (Example: Sports Domain)

D. Iterative Search mechanism to generate Results

The search engine processes the query by considering the combination of all the key words provided by the user, using different parameters in the interface. The pages retrieved mandatorily contain the combination of all the keywords specified by the user. For example, consider the interface shown in figure 4, where the user entered the keywords Heart, Cardiovascular Disease, Angioplasty and Apollo. When this query is submitted to the search engine, the following process takes place.

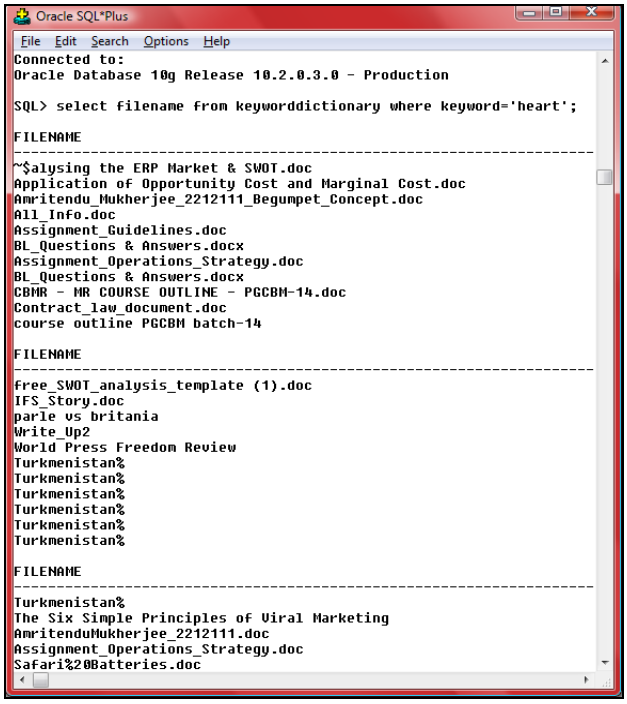


Figure 9a: 60 filenames generated for keyword "Heart"

The search engine gives a greater importance to the first keyword 'heart' which is the control point for starting the hierarchical search process and this search will result in giving all the documents having the keyword 'heart' as shown in figure 9a and 9b. Then out of these selected documents it will search iteratively for the next keyword 'cardiovascular' having higher counts. This process will continue iteratively and we will have matched results as shown in figures 10, 11 and 12. These figures show the resultant files generated for all the parameters specified in

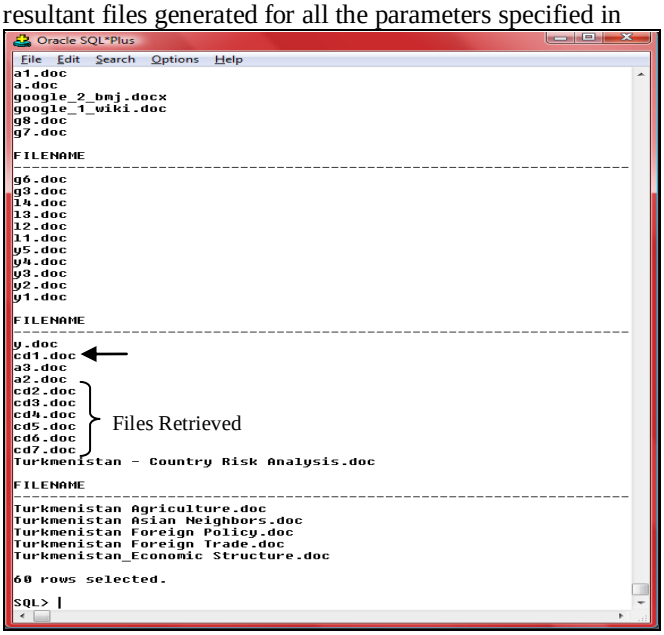


Figure 9b: Continuation of Figure 3a

the search. This iterative search based on hierarchical application of keywords ensures that the search will result in relevant files required by the user. The same technique is followed for Sports Domain too.

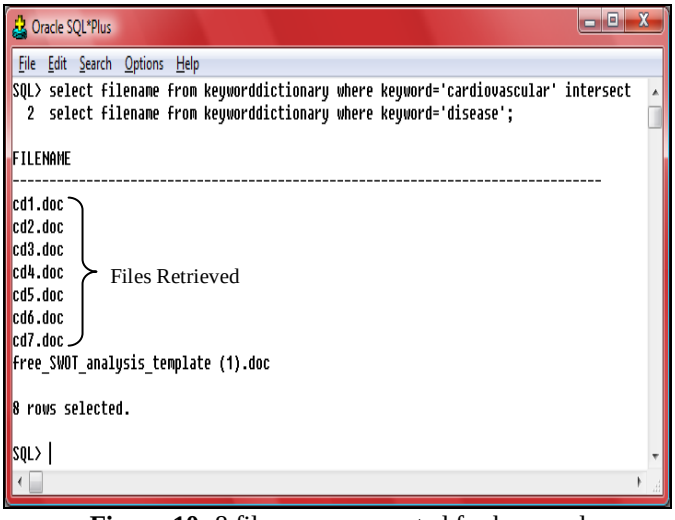


Figure 10: 8 filenames generated for keyword "Cardiovascular disease"

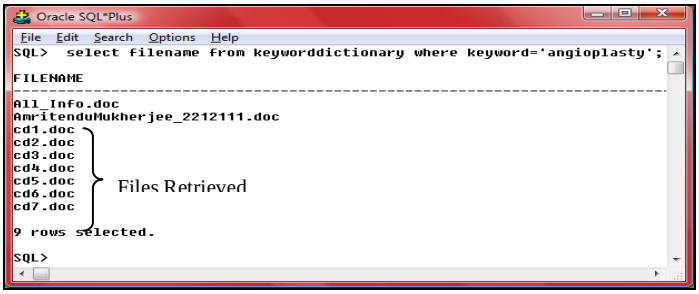


Figure 11: 9 filenames generated for keyword "angioplasty"

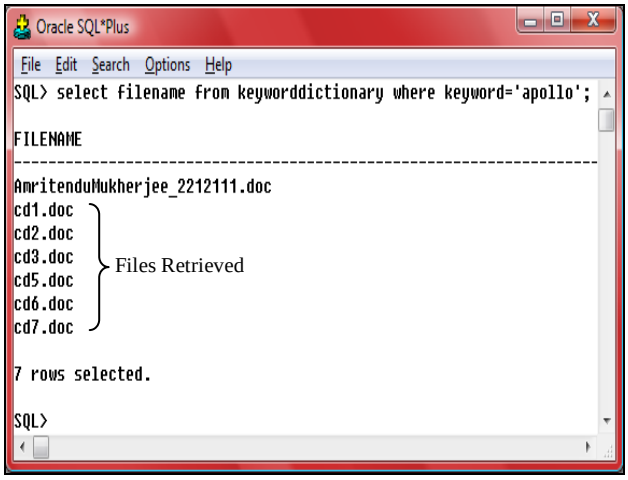


Figure 12: 7 filenames generated for keyword "Angioplasty" and "Apollo" respectively

IV. Implementation

The system is implemented using 3-end architecture. In the "F*ront end"* the user interface is the Internet Explorer running on a local computer or some other thin client device. The front end communicates with Apache Tomcat web server in the "*Middle end*". When the user request is for something more complex than a simple web page, the web server passes the request to Java Server Pages (JSP) application server, whose role is to handle the business logic to process the request. The request from the middle end involves access to database server which is Oracle 10g that runs in the "*Back end"* of the architecture.

V. Experimental Results

The results of running the system in a local server show the effectiveness of the methodology proposed. The experimental result of the proposed system has been explained vis-a-vis with that of the typical search engine for better clarity.

Result 1: Maneuvering

When a user accesses a search engine, the interface can be quite confusing for people who are ignorant about the subject they want to search. The search engine's method of capturing the thought process of the users as an input in the form of statement, as shown in figure 13, can be quite tough for an average user. Such a requirement can put pressure on the user to take decisions like what statement to be formed, what types of keywords to be included in the statement or what are the exact keywords to achieve the optimum result etc.

Figure 13: Traditional Search engine interface provided with only input tool and search button

In the proposed system, all these complexities have been taken care by making the search domain specific. Here, the user has to select the respective domain which will provide them with a dynamic interface that consists of the parameters belonging to that domain. Thus, the user will only have to select or type the keyword relevant to the parameter. This approach, as shown in figure 14, directs the user to achieve relevant result.

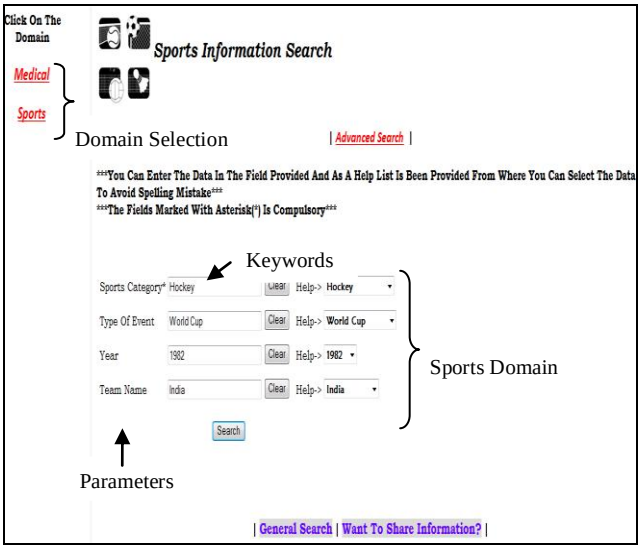


Figure 14: Dynamic Domain Search Interface of proposed system provides with domain selection, parameters and keywords for the respective domains here for example Sports domain

Result 2: Statement Formation

Search engine gives flexibility in typing the query. The users either type the important keywords, or can type queries as follows:

Query1: "Indian Hockey in 1982 world cup"

The results given by a typical Search engine are given below:

1. **Hockey World Cup**
   *en.wikipedia.org/wiki/**Hockey_World_Cup***
2. **India** national **hockey** team - Wikipedia, the free encyclopedia
   *en.wikipedia.org/wiki/**India**_national_**hockey**_team*
3. **History of** Hockey World Cup - **The Times of** India
   www.indiastudychannel.com › ... › Sports
4. India **and** World Cup Hockey
   www.indianetzone.com › Sports › Indian Hockey
5. **Hockey World Cup 1982** Quiz Bombay **India** | Go 4 Quiz - A quiz ...
   *www.go4quiz.com/825/**hockey-world-cup-1982**-quiz/*
6. **History of** Hockey World Cup
   timesofindia.indiatimes.com › Sports
7. cheer indian hockey team world cup 2010... | Facebook
   www.facebook.com/group.php?gid=322024112303
8. 2010 hockey World Cup in Delhi
   imsports.rediff.com/sports/2007/nov/07hock.htm
9. Hockey is Baldev's middle name (9/5/2007 - Latest Hockey News ...
   *ww.stick2**hockey**.com/ViewArticle.aspx?ArticleOID=101*
10. Temple of Indian hockey - Marketing and Media - livemint.com
    *www.banknet**india**.com/html/**hockey**.htm*

Query2: "details on Indian hockey team in the year 1982 for the event world cup"

The results retrieved by a typical search engine for the following query are given below:

1. Hockey World Cup - Wikipedia, the free encyclopedia
   *en.wikipedia.org/wiki/**Hockey_World_Cup***
2. India national hockey team - Wikipedia, the free encyclopedia
   *en.wikipedia.org/wiki/**India**_national_**hockey_team***
3. India women's national field hockey team - Wikipedia, the free ...
   *en.wikipedia.org/.../**India**_women's_national_field_**hockey_team***
4. India and World Cup Hockey
   www.indianetzone.com › Sports › Indian Hockey
5. Mohammed Shahid Profile - Indian Hockey Player Mohammed Shahid ...
   *www.ilove**india**.com/sports/**hockey**/.../mohammed-shahid.html*
6. History of Hockey World Cup - The Times of India
   timesofindia.indiatimes.com › Sports
7. After 28-year interval, India is set to host hockey World Cup ...
   *www.livemint.com/2007/11/.../After-28**year**-interval-**India**.html*
8. Did Commonwealth Games Bring Indian Hockey Back On Track?
   ezinearticles.com › Recreation and Sports › Hockey
9. 2010 Hockey World Cup Schedule
   *www.clbuzz.com/2010-**hockey-world-cup**-schedule/*
10. OTA - Official Website of Indian Army
    indianarmy.nic.in/Default3.aspx?MenuId=2Hz5j0fnJfo=

In the above two lists of retrievals, the outputs offered from the 5th to 8th information are not relevant for the queries. This is because the search engine fails to capture the requirement of the user. It requires that the keywords need to be framed and supplied to get the required information. The user who does not have good familiarity with computer or are not good in English language may find this very difficult to handle.

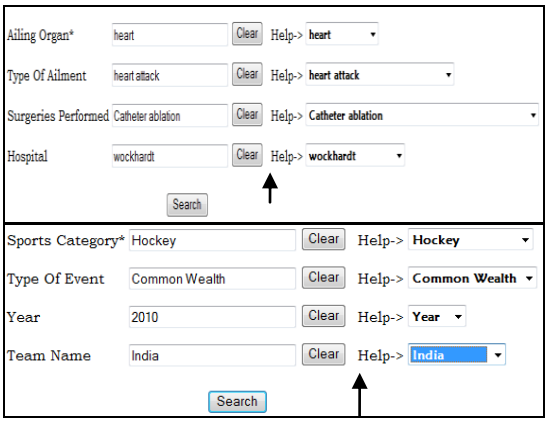


Figure 15: Customized Domain Interface for Medical and Sports

This problem is overcome in the proposed system by default as shown in figure 15, as the customized domain interface guides the user to enter only the keywords instead of framing the whole statement. Help is also provided for the user to choose from the list or enter keyword of similar type to get the relevant result.

Result 3: Synonymy

When a search is done the expectations is to get the pages that contain the exact words as in the user query and also the pages that contain other words that mean the same thing as long as they are relevant to the search. For example the keyword "operation" and "surgery" means the same for medical domain or "sports" and "game" means the same for sports domain. The user of medical or sports profession knows the keywords surgery or sports respectively hence they may get the exact expected result. But for professionals who are not aware of the exact terms used in other domain may get irrelevant result. This is valid for all different domains or profession. When the synonyms like "sports" and "game" were entered the result generated by the traditional search engine is different as shown in the example below:

Query1: "Details on game hockey"

Results obtained by the traditional search engine***:***

1. Sports Guide - **Hockey Details**
   *www.marvelgraphics.in/sports/**hockey**.html*
2. **Hockey** - Wikipedia, the free encyclopedia
   *en.wikipedia.org/wiki/**Hockey***
3. Buczek 20051226 **Hockey Game** Liberty Dollars Incident - **Details**
   www.scribd.com › Business/Law › Technology
4. 3 On 3 **Hockey** - Shockwave **Game Details**
   *3_on_3_**hockey**.top20free.com/**game_details**/*
5. NHL: Eastside **Hockey** Manager 2007 System Requirements - PC **Game ...**
   *www.**game**-debate.com/**games**/index.php?...**game**...*
   %20Eastside%20**Hockey**%20Manager%202007
6. Amazon.com: Backyard **Hockey**: Video **Games**
   www.amazon.com › Video Games › Nintendo DS › Sports
7. Random Facts and **Details** about Field **Hockey** OtownSports.com **...**
   *www.otownsports.com/**hockey**.../random-facts-and-**details**-about-field- **hockey**.html*
8. Toy **Hockey Game**, **Hockey Game** Toy, Toy **Hockey Games**
   *www.landofnod.com/1/3/toy-**hockey-game** - United States*
9. XIX Commonwealth **Games** 2010 Delhi
   www.cwgdelhi2010.org/
10. B.C. Senior **Hockey** Fan Forum: Stampeders @ Braves - **Game** 1 **details**
    www.network54.com/Forum/597341/thread/1295775375/?...

Query2:"Details on sports hockey".

Results generated by the traditional search engine:

1. **Hockey** - Wikipedia, the free encyclopedia
   *en.wikipedia.org/wiki/**Hockey** - Cached - Similar*
2. **Sports** Guide - **Hockey Details**
   *www.marvelgraphics.in/**sports**/**hockey**.html*
3. Open Directory - **Sports**: **Hockey**: Field **Hockey**: Clubs: Oceania **...**
   *www.dmoz.org/**Sports**/**Hockey**/Field_**Hockey**/Clubs/.../Australia/*
4. Google Directory - **Sports** > **Hockey** > Field **Hockey** > Clubs **...**
   *www.google.com/Top/**Sports**/**Hockey**/...**Hockey**/.../Australia/*

5. Tuner update **details** - EA **SPORTS Hockey** League Xbox 360 Team Talk **...**
forum.ea.com/eaforum/posts/list/15/375150.page
6. Combat **Sports** - **Hockey** - Players - Future Coaches' Choice Pros **...**
*www.combatlacrosse.com/**hockey**/pg_FutureCoachesChoiceProsPhotos.php?...*
7. Random Facts and **Details** about Field **Hockey** | OtownSports.com **...**
*www.otownsports.com/**hockey**.../**random-facts-and-details-about-field-hockey**.html*
8. Amazon.com: Franklin **Sports Hockey** Passer Training Set: **Sports ...**
www.amazon.com › ... › Ice Hockey › Training Equipment -
9. Hockey Night in Canada broadcast **details**
*www.cbc.ca/**sports**/**hockey**/story/2011/01/01/sp-**hockey**nightsked.html*
10. Hockey Equipment,**Sports Hockey** Equipment,Wholesale **Hockey ...**
***sports**-entertainment.exportersindia.com/**sports**.../**hockey**-equipment.htm*

In the above examples the results shown with arrow are similar and other results show entirely different information.

This drawback of the typical search engines has been taken care in the present work. Here "surgery" or "operation" and "sports" or "game" are treated as parameter. Hence for medical domain the appropriate word "surgery" is selected which is not of user's concern because the user has to just enter one of the keywords for this respective parameter as shown in figure 16a. Similarly for the domain sports the user selects just one of the sports categories as shown in figure 16b.

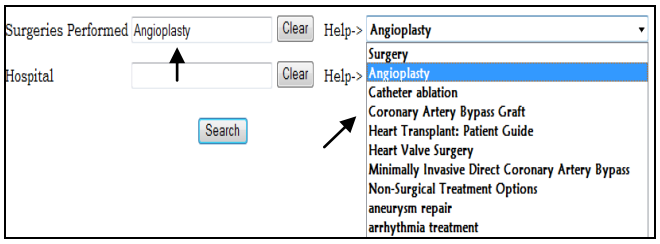
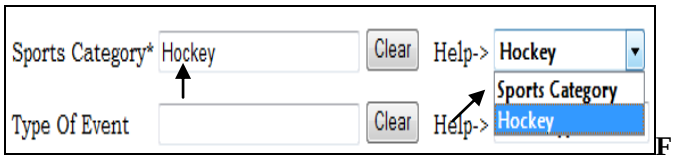


Figure 16a: Interface showing the parameter "Surgery" with different expected Keywords



iFigure 16b: Interface showing the parameter "Sports Category" with different expected Keywords

Result 4: Polysemy

There are the words that change their meaning depending on the context in which they are used. For example, when the word "heart" was entered, it displayed information on heart organ, institute, failure, books related to heart and many other related information as shown in the example below. This is because in the traditional search engine the search is generalized and hence it shows information on all the aspects to which the keyword is related. But this problem will never arise in the proposed system as the search is domain specific and so is the result.

Query:" information on heart"
Search Results by traditional search engine:
1. Heart - ***Wikipedia, the free encyclopedia***
*en.wikipedia.org/wiki/**Heart***
2. Heart, Heart Information, *Cardiovascular Facts, News, Photos* ...
*science.nationalgeographic.com/science/.../**heart**-article.html -*
3. *Your* Heart & *Circulatory System*
kidshealth.org › Kids › How the Body Works
4. Heart *and Vascular Disease* Information *for Patients and the Public* ...
*www.nhlbi.nih.gov/health/public/**heart**/index.htm*
5. Heart *Diseases: MedlinePlus*
*www.nlm.nih.gov/medlineplus/**heart**diseases.html*
6. *Welcome to the Texas* Heart *Institute* Heart Information *Center*
*www.texas**heart**institute.org/HIC/his.cfm*
7. Heart *Disease Symptoms, Treatment, and Drug* Information ...
*www.healthcentral.com/**heart**-disease/*
8. Heart *Health* Information - *Maryland* Heart *Center*
*www.umm.edu/**heart**/health_info.htm*
9. Heart *Failure* Information *and Education*
www.abouthf.org/
10. ***Heart** Bypass Surgery **Information***
www.learnaboutbypass.com/

Result 5: More sorted result compared to traditional search engine:

The effectiveness of the advanced search has been validated by submitting queries in both the domains. For this, two queries were created as shown below:

For Medical Domain:
***Query 1:* heart cardiovascular disease angioplasty Apollo**
Search Results: (Only first 10 pages)
1. Apollo Hospitals::
*www.**apollo**hospitals.com/specialities.php?...**Heart**%20Institute - United States*
2. Understanding the "**Heart** Attack - **Apollo** Hospitals
*www.**apollo**hospitals.com/**heart**_attack.php - United States*
Show more results from apollohospitals.com
3. Angioplasty Surgery India,Peripheral **Angioplasty** Hospital India **...**
*www.prlog.org/10733459-**angioplasty**-surgery-indiaperipheral-**angioplasty**-hospital-india**angioplasty**-cost.html*
4. Operator in Live Case **Angioplasty**/Interventional Workshop - Best **...**
indiancardiologist.net/livecase.html
5. Details - **apollo** hospital|orthopedic|cardiology|neuro in visakhapatnam
*www.**apollo**vizag.com/**apollo**-hospital-specialists-dkbaruah.htm*
6. Angioplasty
*www.hotfrog.in/Products/**angioplasty***
7. Apollo Heart Institute
*www.**apollo**healthcity.com/**ApolloHeart**/Consultantsteam_%20pcrath.html*
8. Coronary **Angioplasty Apollo** PA - **Apollo** PA, **heart** attack treatment **...**

*local.healthcommunities.com/Coronary_**Angioplasty**_**Apollo**_PA-r1338457-**Apollo**_PA.html*
9. Cardiac Care Services **Apollo** Hospital India
*www.sps**apollo**.com/our-services-cardic-care.aspx*
10. apollo-hospitals-chennai | find-doctors-hospitals
*www.surgeryplanet.com/find-doctors.../**apollo**-hospitals-chennai.html*

For Sports Domain:
Query2:"India hockey world cup 1982"
Search Result by Traditional search engine:
1.***Hockey World Cup*** *- Wikipedia, the free encyclopedia.*
*en.wikipedia.org/wiki/**Hockey**_**World**_**Cup***
2. ***India*** *national* ***hockey*** *team - Wikipedia, the free encyclopedia.*
*en.wikipedia.org/wiki/**India**_national_**hockey**_team*
3. ***Hockey World Cup 1982*** *Quiz - Bombay - **India** | Go 4 Quiz - A quiz ...*
*www.go4quiz.com/825/**hockey-world-cup-1982**-quiz/*
4. *History of **Hockey World Cup** - The Times of **India.***
timesofindia.indiatimes.com › Sports
5. *Fifth **Hockey World Cup** - Bombay, **India** (Dec 29, 1981-Jan 12, **1982** ...*
timesofindia.indiatimes.com › Sports
6. *Teams at the 2010 Men's **Hockey World Cup** : **Hockey World Cup**: **India** ...*
***india**today.intoday.in/.../Teams+at+the+2010+Men's+**Hockey**+**World**+**Cup**+.html*
7. ***India*** *and* ***World Cup Hockey.***
www.indianetzone.com › Sports › Indian Hockey
8. *Pak won **1982 hockey World Cup** at Wankhede [Mumbai] | Times of ...*
*findarticles.com/p/...**india**...**1982-hockey-cup**/ai_n39498166/*
9. *History of **Hockey World Cup.***
www.indiastudychannel.com › ... › Sports
10. *Rediff.com Sports: 10th Men's **Hockey World Cup**, Kuala Lumpur, 2002.*
www.rediff.com › Sports › Hockey › 10th World Cup -

The above two queries when submitted to the system produces many different files. When we compared the first ten results offered by traditional search engine and the proposed system the following differences were noted.

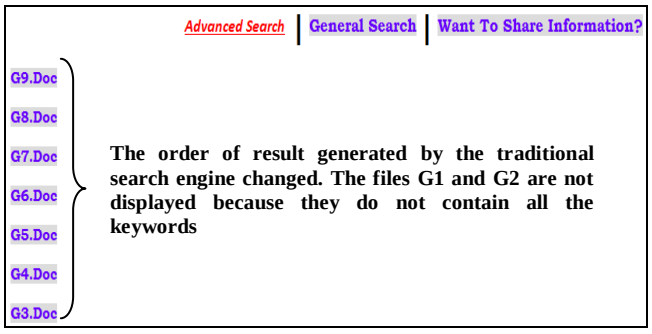


Figure 17: Result generated by the proposed system having all the combination of keyword

- Some files were not retrieved by the proposed system because different combinations of keywords have been given the importance in traditional search engine. But the proposed system displays only those files which have all the combinations of keywords. The example in figure 17 shows output generated by the proposed system for query 2 in which first two results generated by the traditional search engine are not displayed.

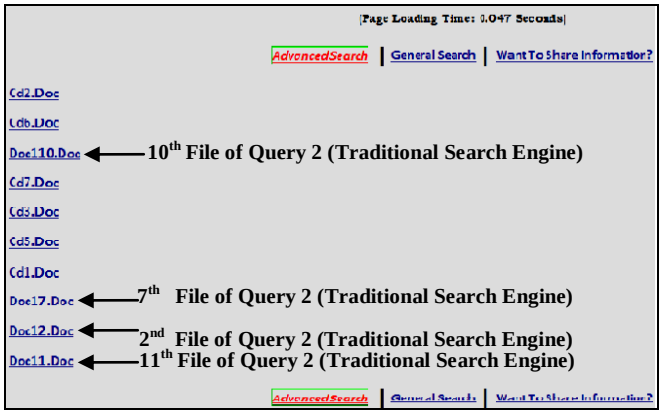


Figure 18: Result Of the keywords provided in Figure 3

- The files generated by the traditional search engine when submitted to the proposed system are shown in figure 18. Here, the orders in which the files are displayed are changed because along with giving importance to the combination of keywords other factors are also given importance. These factors, which include the popularity of the site, audio and visuals included in the sites etc, might lead to having irrelevant information placed in the start of the result.

Result 6: General Search

The following results were displayed when the query "Details on Amlovas related to heart" was entered in the traditional search engine.

Search Results

1. What are the side effects of **Amlovas** M morning dose and Libotryp **...*****
*www.clinnovo.com/health/free-consultation/**related**.../36144*
2. What are the side effects of **Amlovas** M morning dose and Libotryp **...*****
*www.clinnovo.com/health/free-consultation/**related**.../free.../36144*
3. **AMLOVAS**-AT tab drug information | MIMS India
*www.mims.com/Page.aspx?menuid=mng...**AMLOVAS**-AT...*
4. **AMLOVAS**-M tab drug information | MIMS India
*www.mimsonline.com/Page.aspx?menuid=mng...**AMLOVAS**...*
5. **Amlovas**: where to buy online
cheap **Amlovas** medicine. Online **...*****
*www.eurodrugstore.eu/blood...5.../**amlovas**__2139.html*
6. **AMLOVAS**-L tab drug information | MIMS India

*idrbiz.com/Page.aspx?menuid=mng...**AMLOVAS**-L...h...*

7. AmLODIPine: Drug Information Provided by Lexi-Comp: Merck Manual **...** *www.**merck**manuals.com/professional/**lexicomp**/**amlodipine**.html*
8. **AMLOVAS** tab drug information | MIMS India *idrtrade.com/Page.aspx?menuid=mng&name=**AMLOVAS**+tab...*
9. Amlodipine5mg. PharmaCheckAmlodipine. Amlodipine is prescribed for **...***** *www.pharmacheck.com/products/details.cfm?productId=28*

In the above results, the files shown with arrow (1, 2 and 6) are the only ones which describe the query. File 10 showed the information about some other medicine which is a synonym of the query and other files were not relevant. Hence the intention of the query, which was to search about the medicine Amlovas and is related only to heart, does not satisfy the user. It has been observed that none of the first ten search results generated by the typical search engine could satisfy the user. To overcome this shortcoming, the proposed system offers an option of general search wherein the keyword 'amolvas' is entered as shown in figure 2. This

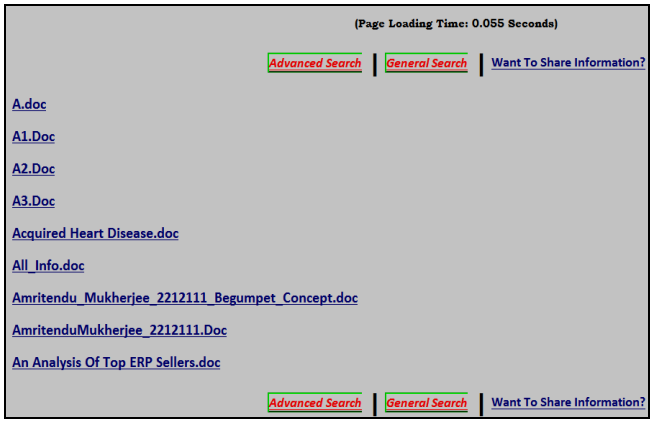


Figure 19: Result of the general search for medicine Amlovas for heart

ensures that only the files which have the information about this medicine and are related to 'heart' only are provided as shown in figure 19. We observed that the general search makes the search engine to produce the relevant result for specific information in a specific domain quickly. The proposed system, irrespective of adopting an advanced search or a general search, follows a domain specific search so that the large pool of information can be fragmented into different sectors. This helps the user to avoid entering complex queries or to understand what information he is searching for. This provides an edge to further the degree of refinement in the result that we achieve.

VI Conclusion and Future Work

This paper proposes a customized and dynamic domain specific user interface, which guides the user to seek an effective and relevant information retrieval mechanism. The present work, which is illustrated by two domains, uses the same search mechanism and database management system. Thus, the system can be replicated on other domains without changing the logic of searching and the format of the database. This effectively gives an entirely new search experience for the user. In future, the efficiency of the system can be enhanced by incorporating the concept of page ranking by widening the scope of parameters to be considered.

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