

Usage of electronic resources in research libraries located in Kolkata and a proposal for expert system based information service.

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Abstract: Research libraries are attached with enormous information resources to provide the global research updates to its research scholars. In the present era research libraries mainly deal with the information sources which are electronic in nature. We can say electronic resources (e-resources) are the life line for any research library. With the explosion of information there is ocean of e-resources on any subject. Now the question arises, how the scientists are coping with this ocean of e-resources. They cannot avoid any source of information as they need exhaustive information search in his specified subject area. Again, what is the existing information searching mechanism followed by the research scholars. Are they satisfied with the existing procedure of accessing electronic resources. These are some questions studied here to assess the requirement of an expert system to provide better information service. An expert system based information service has been proposed finally.

Keywords: Electronic resources, Information management, Expert system

1. Introduction: In the era of globalization, electronic resources (e-resources) are most important information sources for any research library. Various multidisciplinary researches have been taking the frontier role in the research organizations. As a result, diversified amalgamation of different subjects and overlapping subject areas, the scope and need of e-resources have gone far beyond any boundary. Library professionals of research libraries are interested to know the browsing pattern of research scholars for different e-resources and whether researchers are satisfied with the existing method of accessing e-resources or they need better sophisticated mechanism like an expert system to make their information search easy or more enhanced search. To assist the researchers for filtering information from several e-resources a expert system has been proposed.

1.1. Objectives:

1. To study the existing methods of browsing electronic resources in the research libraries.
3. To assess the need of expert system based information filtering mechanism.

1.2. Expert system:

“In artificial intelligence, an expert system is a computer system that emulates the decision-making ability of a human expert”[1]. “Expert Systems are computer programs that are derived from a branch of computer science research called Artificial Intelligence (AI)”[2]. Therefore, from the definition of expert system, it is found that Expert System is a sort of software program which will have some artificial intelligence based on its logical design. Here an expert system will be developed by sharing human knowledge. The proposed expert system will take the response from the researchers and store information in its database. This process will increase its artificial intelligence gradually.

1.3. Some previous study on e-resources usage:

As per UNIVERSITY OF TEXAS AT EL PASO, “an electronic resource is any information source that the library provides access to an electronic format”[3]. Electronic resources are documents in an electronic version that can be accessed online or offline. E-resources can be in various forms like a book, journal, database, magazine, thesis, archive etc.

There various studies have been conducted in the past on the usage pattern of e-resources. Dr.L.Santhi and Dr.N.Radhakrishnan [4] studied usage Pattern of Electronic Resources among the Research Scholars in Anna University of Technology. G. Kiran Kumar and Mallinath Kumbar [5] analyzed the use and search pattern of electronic resources in five autonomous engineering colleges in Bengaluru. K. Chandra and others [6] wanted to know the awareness of various types of e-resources among Faculty Members at Arts and Science Colleges in Chennai. S. Sarasvady and N. K. Khatri [7] concerned about the effect of a library consortium in usage of electronic resources. Saumen Adhikari [8] gave a model for economic management of electronic resources in research libraries and information centres. Gowda and Shivalingaiah [9]

showed interest to study the attitude of research scholar towards usages of e-resources in Karnataka University. Singh and Veralakshmi [10] discussed about cloud computing for sharing of resources.

Although several studies have been carried out by library professionals, but the solution to the effective mechanism for retrieving relevant information from several e-resources remains unanswered. That is the area where the present study is interested upon.

2. Methodology:

Survey method has been followed in the study of e-resource browsing pattern. Three research institutes in Kolkata (S N Bose National Centre for Basic Sciences, Bose Institutes and Indian Association for the Cultivation of Science) have been selected for this purpose. A questionnaire was distributed among (32+61+79) 172 researchers through email. Mail IDs were collected from a list of faculty members of the respective website of those institutes. Out of which 54 responses were received. The data have been collected, assimilated and analyzed. Among the respondent it is found that most of the scientists are having age below 50 years. Here it may be considered that scientists below 50 years are the major users of electronic resources. The collected data has been studied and analyzed. It is found that approximately 58% people are interested about better information extraction mechanism. They prefer to have alert service which should provide relevant and required papers related to their research field. Also, it should connect them to the surrounding research fields of their core research area. Some of the researchers are interested about the multidisciplinary researches which are somehow connected with their core research.

The usage of electronic resources for research institutes has been increasing day by day. There is a requirement of artificial intelligence based information filtration. To relax such inadequacy, an expert system based information service has been proposed to perform parallel information extraction from several e-journals to provide a promising solution to the above challenges.

3. Usage pattern analysis:

The questionnaires were circulated to 172 research scholars of three different research institutes. Out of those 54 responses were received.

Table 1 - Types of electronic resources accessed

Different type of electronic resources	Percentage (Decimal figure has been rounded off)
Electronic Journals	89
Electronic Databases	32
Electronic Books	55
Digital Library for audio, video, and other Learning resources	18
Electronic thesis	52
Searched 'IR'	24

Thereby it is found that approximately 89% researchers prefer to browse electronic journals of different subjects. 32% like to consult electronic databases. Out of this 32% it is found that 67% researchers are mainly dealing with chemistry. Again 55% of scholars are regular user of electronic book. Almost 24% people are interested to access institutional repository (IR) of different organizations. Among these, 24% some scholars mentioned that when they do not get access to any particular paper normally try to find that paper in the IR. 18%, researchers browse digital library regularly for accessing different audio, video, and other Learning resources. 52% research fellow browses electronic thesis on a regular basis. Here it is found that the majority of research scholars are interested to browse electronic journals.

Table 2 - Frequency of accessing electronic resources

Frequency of access	Percentage (Decimal figure has been rounded off)
Daily	87
Weekly	16
Monthly	4
Occasionally	3

It is found that most of the researchers are regular user of electronic resources. They are having the habit of browsing electronic journals every day. Non access to any e-resources hampers their research work to a large extent.

Table 3 - Places of accessing electronic resources

Place of access	Percentage (Decimal figure has been rounded off)
Central Library	53
Personal Office/Room	67
Computer Centre	32
Laboratory	48
Students' Bay	45
Hostel	59

Here it is interesting to find that there is considerably fall of accessing electronic resources in the Library rather researchers prefer to browse those at the personal sitting place, laboratory, computer centre, hostel etc. through campus LAN.

Table 4 - Search Engine preferred while browsing

Search Engine	Percentage (Decimal figure has been rounded off)
Google	93
AltaVista	22
MSN	12
Yahoo	38
Others	8

As far as browsing is concerned Google is the most popular search engine. Next is yahoo but not the first choice to the larger community of researchers.

Table 5 - Time spent in browsing electronic resources per week

Time spent in hours	Percentage (Decimal figure has been rounded off)
0 – 5	58
5 – 9	89
10 – 19	18
20 – 30 and more	3

To measure the time of engagement between researchers and electronic resources it reveals that most of the scholars have been spending 5 to 9 hours per week for browsing e-resources. Some of them mentioned that it varies time to time on the basis of their requirements.

Table 6 - Accessing approach

Method of accessing	Percentage (Decimal figure has been rounded off)
Through Publisher's site	33
Trough Search Engine	72
Through Institution's website	42

Here it is found that researchers prefer to access e-resources through search engines like Google. This may be because of quick access and the habit of as usual search.

4. Requirement of Effective mechanism for information management and access:

It is found that approximately 58% people are interested about better information extraction mechanism. They prefer to have alert service which should provide relevant and required papers related to their research field. It should also connect them to surrounding research fields of their core research area. Some researchers are interested about the multidisciplinary research areas which are somehow connected with their core research.

Table 7 - Satisfaction level and requirement

Satisfaction level of existing method of browsing information	Percentage (Decimal figure has been rounded off)
Highly satisfied	12
Satisfied	28
It is time consuming	72
Satisfactory. But better mechanism is required	85
Requirement of better information extraction mechanism	58
Interested in multidisciplinary research areas	46

5. Origin of the problem and proposed expert system:

It has been found that a good number of research scholars are accessing e-resources regularly. There are several e-journals available in a particular subject area. How a researcher will go on browsing all the journals on a regular basis. Again, while searching a single journal user gets some bundle of links of papers. Out of those he can only search first few links (say 20) and due to mental fatigue, he leaves the search session without seeing all other links of papers. This practice returns less number of relevant papers. If this is the situation for one e-journal how he will browse all the e-resources in his subject area. Further interest in multidisciplinary areas of research will expand the subject areas which add requirement of more e-resources to be searched regularly. This procedure will waste the valuable time of the research scholars.

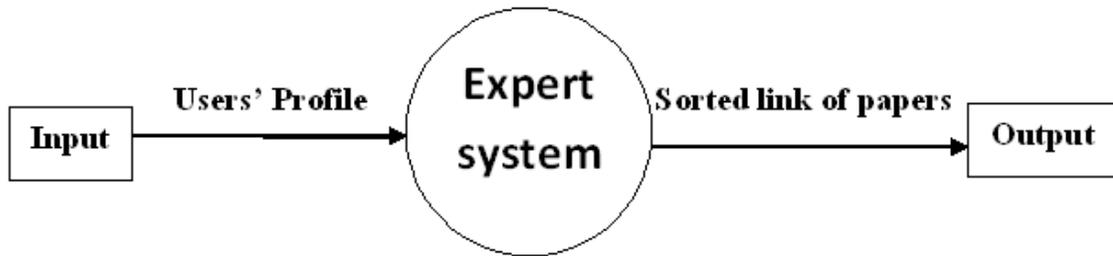
As a solution to the above problem an expert system will be designed based on artificial intelligence which can provide a fruitful solution to the above problem. The system will first learn the information searching pattern and research interest of the user. As a person, learns by example the expert system will be trained to filter out information from several e-resources as per keywords of the users' profile. This will be treated as the training phase of the system. The system will develop its intelligence by the search pattern of the users. After a few days of training, the system will work as an expert to provide relevant information from multiple sources based on federated search [11] mechanism.

In the system, different key words with their corresponding document links and priority number (based on relevancy) assigned by the users are continuously sorted (descending order of priority number) in logical table and stored. After reading each paper user will mark the paper with some points based on their relevancy related to his topic. Initially the system will be trained after few training interaction with the users, the system will be expert to deliver service to the users. But the process of learning will be lifelong for the system like human beings. As human beings learn throughout his lifespan. Time and Experience will make the system expert gradually. The sorted links of papers (corresponding to respective key words) are integrated from major e-journals to make the information search exhaustive. After some phases of sorting

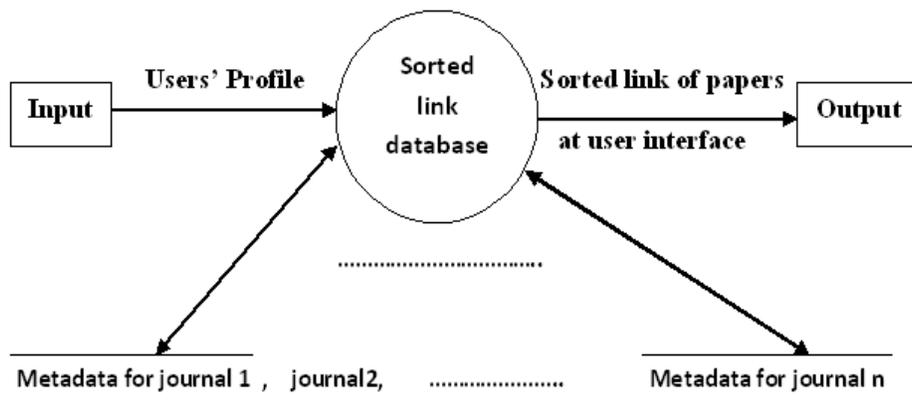
the relevant links of papers will be popped up gradually towards the top portion of the database. It will help the users to find their relevant papers in less time. The system will develop its intelligence by sharing knowledge of human beings. The database design of the expert system is going on. Details of the system with prototype test will be published in a near future.

Data flow diagram of the expert system

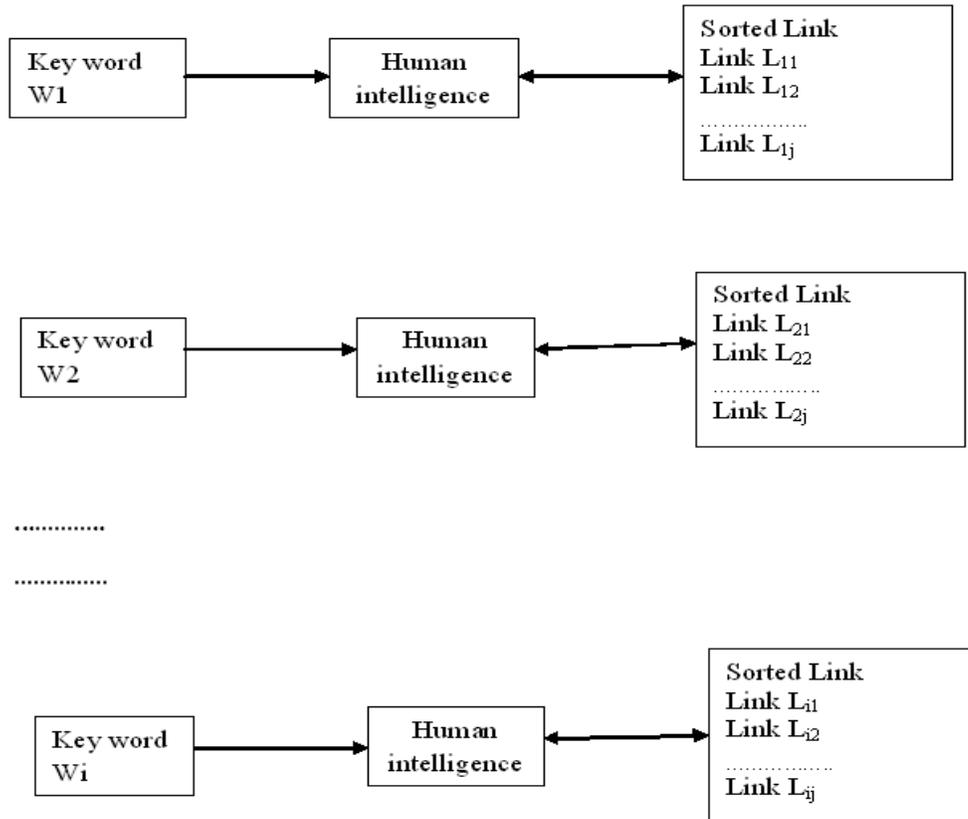
Context Level - 1



Level - 2



Level – 3



6. Conclusion:

The usage pattern of e-resources and requirement of better search mechanism has been assessed in the paper. On the basis of the study an effective federated search based expert system has been proposed. There is indeed a requirement of the application of artificial intelligence for information filtration. It will save the time of research scientists. If they get a relevant information alert on regular basis they will be encouraged to go ahead with their research without wasting time on browsing multiple journals and databases. The development and implementation of the devised expert system is under progress. The first system will be

developed for any micro subject area for prototype testing. Later on the subject area will be made broader based on its efficiency and throughput.

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7. Reference:

1. Jackson, P. (1998). Introduction to Expert Systems (3 ed.). Addison Wesley, 2.
2. http://www.wtec.org/loyola/kb/c1_s1.htm
3. <http://libanswers.utep.edu/a.php?qid=57186>
4. Santhi, L. & Radhakrishnan, N. (2014). Usage Pattern of Electronic Resources among the Research Scholars in Anna University of Technology, Coimbatore and Its Affiliated Colleges. IOSR Journal Of Humanities And Social Science (IOSR-JHSS), 19(7), 23-26.
<http://iosrjournals.org/iosr-jhss/papers/Vol19-issue7/Version-4/E019742326.pdf>
5. Kumar, G. K. & Kumbar, M. (2012). Use and Search Pattern of Electronic Resources in Five Autonomous Engineering Colleges (Bengaluru). Trends in Information Management (TRIM), 8(2), 90-99.
<file:///C:/Documents%20and%20Settings/Administrator/My%20Documents/Downloads/1675-4656-1-PB.pdf>
6. Chandra, K., Sankaranarayanan, D., Nagarajan, M., & Mani, V. (2014). A Study on Use Pattern E-Resources among Faculty Members in Arts and Science Colleges in Chennai. Journal of Advances in Library and Information Science, 3(1), 1-05 <http://jalis.in/pdf/pdf3-1/Chandra.pdf>
7. Sarasvady, S. & Khatri, N. K. Study of the Use of Electronic Resources for Implementing Library Consortium. <http://www.isical.ac.in/~serial/consortia/CBSOR-07.pdf>

8. Adhikari, S. (2015). A model for economic management of electronic resources in research libraries and information centres. *International Trends in Library and Information Technology (ITLIT)*, 2(3), 2-12.

<http://www.itlit.net/v2n3/v2n3art2.pdf>

9. Gowda, V., & Shivalingaiah, D. (2009). Attitude of research scholars towards usage of electronic information resources: a survey of university libraries in Karnataka. *Annals of Library and Information Studies*, 56(3), 184-191.

<http://nopr.niscair.res.in/bitstream/123456789/6566/1/ALIS%2056%283%29%20184-191.pdf>

10. Singh, S. P., & Veralakshmi, R. S. R. (2012). Cloud Computing: A Promising Economic Model for Library and Information Centers. *DESIDOC Journal of Library & Information Technology*, 32(6), 526-532.

<http://publications.drdo.gov.in/ojs/index.php/djlit/article/view/2850/1394>

11. Peter, J. (2004). Thoughts About Federated Searching. *Information Today*, 21(9), 17.