Role of Librarian in Internet and World Wide Web Environment

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Abstract

The transition of traditional library collections to digital or virtual collections presented the librarian with new opportunities. The Internet, Web environment and associated sophisticated tools have given the librarian a new dynamic role to play and serve the new information based society in better ways than hitherto. Because of the powerful features of Web i.e. distributed, heterogeneous, collaborative, multimedia, multi-protocol, hypermedia-oriented architecture, World Wide Web has revolutionized the way people access information, and has opened up new possibilities in areas such as digital libraries, virtual libraries, scientific information retrieval and dissemination. Not only the world is becoming interconnected, but also the use of Internet and Web has changed the fundamental roles, paradigms, and organizational culture of libraries and librarians as well. The article describes the limitless scope of Internet and Web, the existence of the librarian in the changing environment, parallelism between information science and information technology, librarians and intelligent agents, working of intelligent agents, strengths, weaknesses, threats and opportunities involved in the relationship between librarians and the Web. The role of librarian in Internet and Web environment especially as intermediary, facilitator, end-user trainer, Web site builder, researcher, interface designer, knowledge manager and sifter of information resources is also described.

Keywords: Role of Librarian, Internet, World Wide Web, Data Mining, Meta Data, Latent Semantic Indexing, Intelligent Agents, Search Intermediary, Facilitator, End-User Trainer, Web Site Builder, Researcher, Interface Designer, Knowledge Manager, Sifter.

Introduction

Traditionally librarian is known as a person located in the library building carrying out the tasks like acquiring, organizing, preserving the printed documents besides helping the readers in locating the information needed by them. In the last decades of the twentieth century this picture has rapidly changed under the influence of advances in computer and communication fields. The paper collections have given place to networked, computer resident, user searchable collections like bibliographic databases, Online Public Access Catalogues (OPAC) obliterating the need for the user to visit the library building. With the digitization of ever increasing number of collections and advances made in computer/communication hardware and software seamless access to digitized information located in geographically diverse locations has become a reality. The walls of library are thus pulled down and a "Virtual Library" in Cyber Space came into being. The Virtual Library brought in its wake new flavors in the form of digitizing not only printed material but also pictures, maps, scenarios, paintings and sounds and presenting them all in a lively show in a theatre like environment. Where do librarians stand in this scenario and where their profession is headed is the nagging question faced by one and all in the profession. This article tries to focus on the impact of Internet and World Wide Web on the traditional library profession and on the opportunities and options open to the librarians.

Traditionally librarians have been information providers for centuries. They now have the opportunity to use modern tools to provide quicker, more complete, and more sophisticated service to the users. Databases and reference sources can be queried via the Internet and World Wide Web; remote library catalogs are available on desktops; newsgroups and mailing lists provide a wonderful opportunity to discuss mutual concerns quickly and electronic mail allows librarians to find out and contact those who might be able to help in solving the problems. Perhaps no innovation has impacted the library profession to such a great extent as the Internet, World Wide Web and networked resources. The interconnection of world through the use of Internet and Web has changed the fundamental roles, paradigms and culture of libraries and librarians once for all.

The base of recorded information is growing at an accelerating rate in increasing variety of formats such as texts, numeric, graphic, video, audio, images, etc. In addition, increasing arrays of computing and telecommunication technologies are emerging to create new options and opportunities for the development of information capture, storage, retrieval and delivery. The seamless access of information available anywhere

on the globe has brought people so close that the phrase "Global Village" is coined to describe the scenario.

In the prevailing situation the librarian is called upon to assume new roles and perform tasks like guiding, facilitating, sifting information resources and preserving the access to the information. The collaboration with computer and information technology scientists in the design and maintenance of information access systems for the effective use of Internet and Web in the interest of information seekers has become imperative.

Limitless Scope of Internet and World Wide Web

Internet, network of networks, connects several computers and resources around the world using the language called TCP/IP (Transmission Control Protocol/Internet Protocol). During the early years of Internet use, the access was mainly for basic database searching in large systems such as Online Computer Library Centre (OCLC), Research Libraries Information Network (RLIN), Bibliographic Retrieval System (BRS), and DIALOG. With the growth of the Internet and the addition of more diverse electronic resources, the capacity for searching the Internet also increased. Since 1993, the Internet has experienced unprecedented growth in terms of networks, host computers and users. Prior to the Internet dissemination of information was limited to the delivery of formal print publications. In contrast, nowadays a person is able to create a Web page or send an e-mail message for disseminating information. Furthermore, people are able to use e-mail or teleconferencing to exchange information with others in real-time collaborative sessions.

World Wide Web (WWW) or Web is the practical and existing real world application of the age-old dreams of a universal information database - information that would not only be accessible to people around the world, but information that would link to other pieces of information so that only the most useful information would be quickly found by a user. World Wide Web, developed by Tim Berners-Lee of European Particle Physics Laboratory (CERN), can be defined as a "distributed heterogeneous collaborative multimedia information system". The most fundamental and powerful features of the Web are its:

- Support to distribute information in a number of different sites all over the Internet;
- Capacity to incorporate all types of media objects (video, sound, images, text, etc.) into a single document;
- Utilization of hypertext or hypermedia-oriented architecture in which a document has embedded links to other documents, which can exist locally or anywhere in the world;
- Ability to span the depths of heterogeneous client/server platforms. One can view from any client platform (DOS, UNIX, etc.) a data object stored on virtually any server platform that supports almost all protocol types i.e. E-Mail (Simple Mail Transfer Protocol), Telnet (Telnet Protocol), FTP (File Transfer Protocol), USENET (Network News Transfer Protocol), Gopher (Gopher Protocol) and Web pages (HyperText Transfer Protocol);
- Ability to support construction of information resources all over the Internet;
- Revolutionizing the way people access information, and opening new possibilities in areas such as digital libraries, virtual libraries, scientific information retrieval and dissemination, education, commerce, entertainment, government and health care.

Many libraries are in transit from the traditional towards the digital library. Not only recent publications, but also many historical library holdings are being digitized. These digital collections allow users from anywhere at any time to consult the material without doing any harm to the fragile documents.

Despite numerous digitization projects, electronic media is still not as dominant as print media. There are still a lot of printed pages in our libraries, and we expect this to be the case for a long time to come. The paper-based library will coexist with the digital library for the foreseeable future, because electronic publications are not developing at the expense of print media, but in addition to them (Grothkopf, 1997). Also physical convenience and emotional attachment of people to printed books are factors that ensure their survival.

The tools used by the librarians in their daily work have changed vastly during recent years. In addition to traditional card catalogs and microfiche readers, most libraries now offer an Online Public Access Catalog (OPAC), public PCs equipped with CD-ROM drives, DVD drives, scanners, or terminal connected to the Internet. An increasing number of libraries are building home pages on the World Wide Web from where users have access to a variety of services without physically entering a library. Also, information push and pull technologies have given librarian an opportunity to automate the required information gathering and dissemination to the users.

Librarian in the Changing Environment

The environment in which librarians work is changing in terms of greater access to a range of information, increased speed in acquiring information, greater complexity in locating, analyzing and linking information, constantly changing technology and adaptation, lack of standardization of both hardware and software, continuous learning for users and staff, management of financial investment for technology.

The question of role of librarian in the new environment of exponentially growing Internet and World Wide Web has been addressed by a number of authors. On one hand, it has been postulated that librarians would play a more dynamic role than at present as guides to the information seekers in an ex-

ploding universe of information. In another way, the rise of digitized information is an opportunity to elevate the role of librarian and leads to the emergence of a new breed of librarian: "The Cyber Librarian" or "Cybrarian" - a specialist in locating information on the Internet (Hathorn, 1997). At the extreme of the spectrum, on the other hand, total obsolescence and eclipse of library professionals in a scenario where knowledge base is diversified and wide and the developments in the fields like Artificial Intelligence, Neural Networks result in powerful, cost effective, user-friendly search strategies and methods (Brodie, 1995).

The future scenario, however, may not be near any of these extremes. This is apparent from the facts like the information quantity has enormously increased and codification and classification of this information to facilitate easy location is best done now as well as in foreseeable future by the librarians. The familiarization with new gadgets and methodology of locating information for vast majority of population requires guides and librarians can easily fit into this role with training. The leveraging of the available information to suit the needs of the clientele is also best done by the librarians.

Parallelism Between Information Science and Information Technology

The advent of high-speed high memory computers and the developments in the sciences like Artificial Intelligence and Neural Networks, Statistical and Computational Methods have resulted in casting the traditional library operations in new light.

The task of distilling information from a universe of data is addressed by the librarian, technologist and analyst in their own way. For the librarian it is the "searching the literature", for the technologist it is "data mining" and for the analyst it is "asking critical questions". The common feature in their endeavor is that the request for the information must be presented to the technology in a highly precise manner at the man-machine interface (Dallape and Bonski, 1997). For the librarian the aids for framing a query in a precise manner are linguistics, semantics, and context. The precise mechanisms developed by the technologist include Structured Query Language (SQL) for relational data and Z39.50 WAIS (Wide Area Information Service) standard for accessing and retrieving free text data.

The task of locating and finding the correct information is made easy by the technologist by introducing what is called "Metadata". Metadata is nothing but the data about data and describes the attributes and contents of an original document or work. Metadata makes information access easy by labeling the contents consistently and it leaves a pathway to the users to follow and find the information all in one place (Milstead and Feldman, 1999). For the librarian the traditional tasks of cataloguing and indexing are equivalent to the task of metadata by the technologist.

The practice of classification of documents in a library aims at bringing related documents close together in the physical arrangement in the stacks so that the users time is saved in locating all the documents relevant to a subject. The librarians use the standard classification schemes such as Universal Decimal Classification (UDC), Dewey Decimal Classification (DDC) etc for this purpose. The concept similar to classification developed by technologist is "Clustering" or "Cluster Analysis". Clustering attempts to divide a collection of documents into groups or clusters, such that, the documents in the same cluster have high degree of homogeneity and the documents in different clusters have high degree of heterogeneity. Most of the existing methods for document clustering are based on either probabilistic method such as Bayesian classification or distance and similarity measures such as K-Means analysis, hierarchical clustering and Nearest-Neighbor clustering.

Another development in the field of context information retrieval is the Latent Semantic Indexing (LSI). Most of the existing approaches to retrieving textual material from scientific databases depend on a lexical match between words in users request and those in or assigned to documents in a database. Because of the diversity in the words people use to describe the same document, lexical methods are necessarily incomplete and imprecise. LSI tries to overcome the problems of lexical matching by using statistically derived conceptual indices instead of individual words for retrieval. LSI assumes that there is some underlying or latent structure in word usage that is partially obscured by variability in word usage. In LSI, truncated Singular Value Decomposition (SVD) is used to estimate the structure in word usage across documents. Retrieval is then performed using the database of singular values and vectors obtained from the truncated SVD. LSI is a completely automatic yet intelligent indexing method, widely applicable, and a promising way to improve users access to textual documents.

Another information technology application similar to the document delivery or information dissemination in library science is the "Push and Pull technologies". These technologies have emerged as useful concepts to describe the operation of distributed information resources in different formats i.e. text, images, sound, and video. Traditional information distribution applications are based on request/reply model, whereas push and pull technologies are based on client/server model. Web browsing, library searches, FTP, GOPHER, WAIS are examples of pull technology and e-mails, telephone newscasts, electronic newsletter are the examples of push technology. Another category of push technology is the Quasi-push technology, which includes off-line web browsing, enabling publishers to deliver customized information to niche audiences, notifying Web site visitors of updated content, and the distribution of software updates (Sigmon, 1997). Though the push technology may not meet the needs of the typical knowledge worker, it facilitates librarian to locate and auto-

mate distribution of relevant information to a large number of users.

Librarians have traditionally concerned with certain functions in the print era i.e. collection development and acquisition, classification and cataloguing, circulation, reference service, preservation, conservation and archiving. Most of these have their parallel roles in the internetted information era. For example, in the traditional library, acquisition of documents involved a decision between either buying a physical item, or not buying it. For the electronic information available on the Web, "acquisition" offers a spectrum of choices such as: download, print or store on disks and facilitation to make electronic information available on a local area network. The distinction between types of library, defined by the nature of their collection may change with the availability of Internet and World Wide Web.

It is often suggested that some or all of these functions become redundant in an era when increasing amount of information is available directly to users via Internet and World Wide Web. This argument is contradicted by a complaint that the Internet and World Wide Web is completely chaotic and people waste much time in fruitless search for the precise information they need.

Librarians and Intelligent Agents

The rapid growth of unstructured data on Internet and World Wide Web has created significant problems related to the efficiency and accuracy of information retrieval. In addition, information repositories on Internet are heterogeneous, inconsistent and sometimes incomplete (Bowman et.al, 1994). To make effective use of this wealth of information, a number of resource discovery tools have been created. In Internet browsing, the user follows the hypertext links to locate the information. When the size of the Web increased beyond few sites and a small number of documents it became clear that manual browsing through a significant portion of the hypertext structure is no longer possible (Koster, 1995). To solve this problem and locate information required by the user search engines have been developed. Many of the search engines use the concept of a 'robot' or 'spider', an automated browsing program. A web robot is a piece of program that traverses the Web's hypertext structure by retrieving a document, and recursively retrieving all documents that are referenced and develops huge index database. When a user performs a search on a topic or keyword, Web search engines returns several thousands of hits, many of which may not be relevant to the user's enquiry. The size and wide coverage of such a database can make it difficult to quickly and effectively track down relevant information using the limited searching features that are available (Stanley, 1997). In order to provide a solution to this problem, Intelligent Agents have been developed.

Intelligent Agents are autonomous and adaptive computer programs operating within software environments such as operating systems, databases, or computer networks. Intelligent Agent technology combines artificial intelligence (reasoning, planning, natural language processing, etc), and system development techniques (object-oriented programming, scripting languages, human-machine interfaces, distributed processing, etc) to produce a new generation of software that can, based on user preferences, perform routine tasks for users (Meek, 1995). Although they are still in their infancy, the Intelligent Agents of tomorrow have the promise to relieve users of the time-consuming and tedious searches through a massive, intricate and globally dispersed Web of electronic information. These agents will find, assemble and analyze information that users need to solve problems, become better informed and make intelligent decisions (Roesler and Hawjins, 1994).

Librarians have been efficiently accomplishing many of the tasks at which the artificial intelligence community is now working to make software agents competent. Therefore, the software agents can be developed by a look at how human information agents carryout their work. (Zick, 2000). Intelligent Agents will accelerate the change in the librarian's role, enabling more complex tasks like gathering a portfolio of information on particular topic to be done electronically. This need not be construed as a threat, for, it is also an opportunity to relieve the librarian of the drudgework of searching for information, which more often than not is a boring task. If machines can do this work, librarians can spend their time on more interesting tasks (Library Association, 1997).

Qualities of Software to Become Intelligent Agent

It is reasonable to say that the intelligence level of agents can be correlated to the degree to which they implement the following properties or qualities.

Autonomy - Autonomous agents use their knowledge to handle user-defined tasks independent of the user and often without the user's guidance or presence.

Adaptive - Adaptive agents should be able to learn as they react to or interact with external environment, so that their performance improves over time. The external environment may include the physical world: users (humans), other agents, or the Internet and other resources. For this reason, adaptive agents are sometimes called as learning agents.

Collaborative - When the task of finding the same information in different sources is given to sets of agents, they may perform the task in parallel. In order to avoid the duplication, they must work together to establish which agent will carryout each task, and how they will merge the information they collect for presentation to the users. Also, agents should be able to work in concert with other agents, possibly via an agent-communication language, to achieve a common goal.

Mobility - This concept refers to the ability of agents to migrate in a self-directed way from one host to another on a network in order to perform their assigned duties.

Modus Operandi of Librarians

Librarian interacts with the user to provide reference service, learns and assesses user's information needs. Librarian and the user work together to refine the information need iteratively as many clients are unclear about their needs. During this process librarian learns about the user's context: history, preferences, constraints, etc.

The next step the librarian may take is the formation of search strategy such as selection of databases resources, search terms and operators. Subsequently he executes the search and finds the information. Past experience with the user and the knowledge of user context for each information request guides the librarian to find more relevant information.

Librarian follows certain steps to filter information while selecting a database, choosing search terms and operators. Finally he eliminates the false drops and duplicates from the results using the knowledge of the context of the information need and the profile he had constructed for the user.

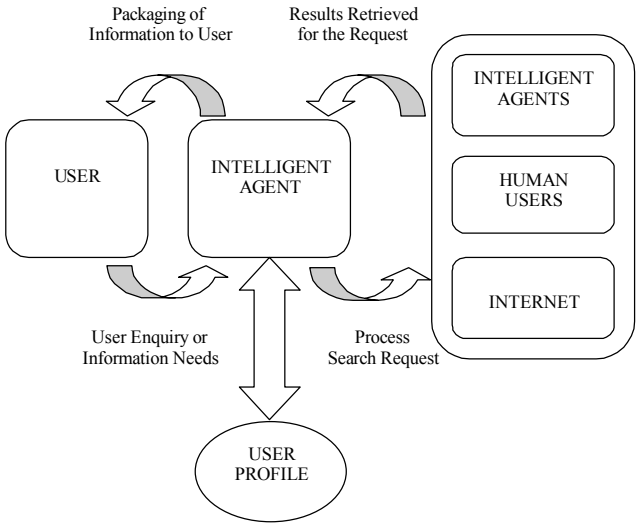
Librarians usually arrange search results into customized sets for the user such as sorting the results by relevance, chronological, author alphabetical, collection-wise, and indication of availability of articles in their library. Intelligent Agents also perform similar procedure for providing information to the user.

Working of Intelligent Agents

The creator of Intelligent Agents utilizes the abilities that are available in artificial intelligence, computer hardware, software, communication and databases technologies, etc. to mimic the task of the librarians explained above. Figure below shows the general working process of intelligent agents.

Librarian Vis-a-Vis Intelligent Agents

Will the librarian exists in the Internet environment due to proliferation of Intelligent Agents? What roles the librarians are going to play? Librarians are becoming more important in the information-centric universe. Intelligent Agents will act as catalysts to enhance the role of librarians. Librarians are already fulfilling new roles as content providers, search strategists, digital catalogers and information mechanics. These roles will only grow and new opportunities will flourish with the development of truly intelligent agents that build upon the experience of librarians and information professionals (Valauskas, 1997).



Working of Intelligent Agents

The precise information needs of a user/person can be grasped quickly and correctly by another human being. To convert the information needs or queries into a machine-readable and executable form often is very involved and time consuming. Yet the full essence of the user needs may remain un-captured in this process. The adequacy, appropriateness, and timeliness of the information gathered by Intelligent Agents can be judged best either by the librarian or the user of the information. In the event of non-availability of the user for consultation librarian is the best judge.

Strengths, Weaknesses, Threats and Opportunities for Librarians in the Web

Since the 1800s, the field of librarianship has seen the technology grow from handwriting to electronic pen, to typewriter, to word processor, and now to computer. Electronic resources and the Internet now help to make the task of obtaining reference material more accessible and much faster than ever before. Already computer databases have rendered the bulky card catalogs obsolete and new media have broadened the range of materials available for browsing (Percovitz, 1995). The technology changes have been affecting almost every type of library including public, school, academic and special. Very few libraries have been immune to technology. Librarianship is one of the oldest professions in the world and the times call for a new breed of librarians, those who understand and integrate technology, information and learning into a new model (Drake, 1996). However, to sustain in the field of librarianship, librarians need to equip with technical skills

such as knowledge of HTML, programming languages, knowledge of hardware basics and troubleshooting, understanding of software programs, and the skill to search, display, and retrieve data effectively in a variety of information retrieval systems (Morris, 1999).

The following are strengths and weaknesses inherent in the library science profession.

Strengths

- By the nature of their profession, librarians are service oriented.
- Librarians are able to identify, evaluate and organize print as well as electronic information resources.
- Librarians understand what the user wants and are very close to the user information requirements than other professionals.
- Librarians are able to train users to search and retrieve information, which is a part of user education in his profession.
- Librarians believe in the value of information sharing and networking.
- Librarians are experienced in knowledge management concepts, which are most identical to the classification, cataloguing, documentation, storing and making information available on networks.
- Last, but not least, 'human touch' they can impart.

Weaknesses

- The general feeling of the librarians is that they are threatened by technological change.
- Librarians lack same level of technical knowledge in dealing with computer hardware, software, etc. as the concerned professionals.
- Librarians are no longer acting as controllers of information especially while using Internet.
- They are struggling with the user's false perception that the Internet can meet all information needs.
- Librarians need to interact with knowledgeable users and IT professionals to understand their specific needs and to add value to their products. (Smee et.al, 1999).

Threats (Challenges)

Is the Internet a threat to librarians? Will the increasing use of Internet lessen library traffic? Can the libraries not online compete with those with online? These are some of the questions that are asked by those who all of a sudden became aware of what is happening in the library and information science field. It is a fact that information is no longer print based alone. It is a fact that Internet has become part of day-to-day life of a majority of academic, business and Government communities. It is every day scene that information resources, library users are turning to electronic media and phenomenal storage capabilities have been built into DVD-ROMs, portable hard disks, etc. Information, in a nutshell, is digital plus print. If libraries have to stay as information providers this reality has to reflect in their content, constitution, and working. This reality also should reflect in all budgeting and funding action of the libraries. The change that is called for is best viewed as an opportunity to stay tuned to the times rather than something undesirable. Inherent improvement has taken place in the normal work of the librarian and the opportunities that opened up as a result of digitization of information could be summarized as below.

Opportunities

There are numerous opportunities for the librarian in Internet and Web environment in providing information services easily, timely and appropriately to the users.

- Universal Accessibility of Material – Same electronic document will be viewed by multiple users simultaneously, which eliminates the waiting periods for popular documents in the library. Rare and fragile historical documents will be scanned and stored for electronic viewing by numerous users around the world for indefinite periods.
- Patron Initiated Inter-Library Services – In the cyber library links will be provided for searching electronically stored material as in the traditional method by author, title or subject. Once the appropriate material is located, users can view at their terminal. If the desired material is not located during the search, the user will electronically forward a request to the librarian to arrange the document on inter-library loan from another library.
- Book and Reading Lists – Reader's advisory services have not disappeared from the list of functions libraries traditionally perform. Web versions of book and reading lists are available for users.
- Online Catalogs – The catalogs of many of leading libraries these days are available in Web-based and telnet based formats for platform independent easy browsing.
- Local Databases – Creation and provision of access to local information by the librarians has taken new life on the Internet.
- E-Newsletters – Communicating the news of the library to its users of both physical and virtual collections takes many forms such as electronic newsletters-bulletins, etc.
- Virtual Reference Desks – Earlier, reference librarian was available in person, or on phone. Because of the Web, virtual reference librarian is available via e-mail or through a Web form for providing reference services to the users. Many find that this facility is highly useful as it replaces the rigidity of sticking to timings for person-to-person contact.
- Virtual Tours – Virtual tours have been created by the librarian to describe the physical library.
- Web Forms – Web forms increasingly allow online provision of services formerly reserved for inside the wall

transaction like Inter-library loan form, book and journal requisition form, suggestion form, etc.
- Cooperative Cataloguing – Librarians use the Web to assist in cooperative catalog of Web-based resources.
- Distance Education Support, provision of access to E-Journals, coordination of Electronic Bulletin Boards, posting guides, and hosting online tutorials are some of the opportunities for librarians in the Web environment.

It is an indisputable fact that knowledge is power in the modern organizations. Acquiring greater skill, wider knowledge and familiarity with the important facets of individuals work will definitely contribute to the enlargement of ones knowledge base. A knowledgeable librarian is better placed to face the changes and the uncertainties in the emerging scenario.

Earlier times, library & information science courses were not very demanding and used to attract mediocre students. This situation is not the same any more. A library & information science student should possess the aptitude and ability to work with modern technologies in the field of information science. In order to serve in the modern information age, the erstwhile traditional librarians would be better placed if they change their mindset and make efforts to become familiar, if not proficient, in the use of modern day tools.

Role of Librarian in Internet and World Wide Web Environment

Internet and World Wide Web are very powerful and bringing changes not only in librarianship but also in his daily professional activities. Ever since the creation of United States Machine Readable Cataloguing (USMARC) record in the late 1960's and the resulting proliferation of online catalogs, librarians have been spurred by technological developments to become more efficient organizers, indexers, abstractors, archivers, in addition to assuming new roles such as, intermediary, facilitator, end-user trainer/educator, web organizer & designer, researcher, interface designer, knowledge manager/ professional and sifter of information resources.

While the librarian plays many roles in an organization, it is difficult to identify a role as primary one as the same changes from time-to-time depending on the organizational objectives and requirements.

Librarians As Search Intermediary

In an organization, though librarians began training end-users to perform their own searches, the demand for searches by information professionals have not decreased. End-users having been trained and having performed some of their own searches became aware of the complexities of searching, the limitations of some of the resources and of the searching process especially on World Wide Web. So, a more educated user who continues to perform simple searches on his own behalf, returns to the librarian or information specialist to perform the more complex searches. The effect on librarians has been an increase in workload because the searches are more complex and the amount of time per search has increased. Hence, there will always be a role for the search intermediary.

An Intermediary is defined by Peter Ingwersen (Ingwersen, 1992) as "A person or mechanism placed physically between IR (Information Retrieval) systems and actual user with the purpose to transform interactively requests for information to query formulations that suit the retrieval components of one or several IR systems, to model and support the actual user as to his information need and underlying goals, and to provide information of potential value to that user from IR systems".

Traditionally a human intermediary is a librarian or an information specialist. An IR system includes text-presentations, classification and indexing systems, and IR techniques in catalogues and databases or other information sources. However, research in this field is directed towards implementing non-human intermediary functions into online IR systems through user interfaces and system setting.

In addition to more efficient and more effective searches by librarians, research has determined that a single librarian or information professional can save the equivalent amount of time of three, or four, or even five end-users. In other words librarians are three, or four, or five times more efficient and more effective than end-users are at performing their own information searching activities (Griffiths, 1995). This, probably, is the most important point to remember, because it is why librarians will continue to play a role in the newly emerging digital information world. So, those searches which are not straightforward will always tend to be delegated to an intermediary for querying and providing packaged answer, drawing on a range of resources like print, online bibliographic databases, Internet and Web documents.

In India, the availability of infrastructure for exploiting the Web fully like high speed Internet connectivity, access to CD-ROM databases are in the process of catching up with the advanced countries like USA. However, the lack of the same is not a damper to the enthusiast of young library & information science professionals in the making. They have the idea and vision of what the Web can do and means to them.

Librarian As Facilitator

The availability of electronic documents on Internet and the support extended by World Wide Web to access these documents have recently increased tremendously. Several print journals have shifted their platform to Web, which includes free and paid publications. In this scenario, it is imperative for the traditional librarian to acquire necessary skills in effective use of modern gadgets and associated software to locate and retrieve the widely dispersed information in the cyberspace. Not only he has to acquaint himself but also gain a degree of proficiency to effectively guide and train the information seekers in their usage. Thus, the traditional librarian has

to play the role of facilitator in identification, gathering and arranging information infrastructure such as network access, software access, licenses and passwords to use charged resources like FirstSearch, UnCover, Ovid etc.

The role of the facilitator if characterized by qualifications would be closely related to the ones of the librarian. It is likely to emerge that the traditional intermediary function of the librarian by its nature could create a basis for the role of the facilitator in a networked community (Schreiber and Moring, 1997). Normally, the facilitator does not solve the total information problems of users. He addresses the communications and information needs of the users in one way or another and makes an identification of resources for fulfilling the needs of users.

Librarians As End-User Trainer/ Educator

The number and variety of information sources available, whether locally or remotely via the WWW have increased greatly, and users in many cases have not been able to keep up with all of the choices open to them. Few users of the libraries are effective and efficient in accessing information resources. However, no matter how sophisticated interfaces and search engines come up in future information access systems, people still would need to be educated regarding their usage. Users will need to possess an understanding of essential information gathering skills and tools. The areas in which training is given by the librarian would include not only the use of electronic primary journals from many different publishers, but also the use of abstracts and indexing databases, databanks, CD-ROM publications and document delivery services. End-user training aspect of librarian would also include organization of information resources, search strategies, tools, information searching skills, awareness of resource constraints and alerts to users on new resources in their subject area. The librarian therefore, has a critical role in the digital library of future as educator or end-user trainer.

Librarian As Web Site Builder or Publisher

The traditional skill of a librarian in locating, evaluating and organizing the information would be of immense use in the creation, development and content filling of a Web site for the organization and library. Web site of an organization provides access to external resources, where Web pages specific to their discipline are available. Managing organization's own information on the Web site includes details of course information, directories, statutes, annual reports, etc., The role of the librarian while creating a web page is to deliver information about the library and its services like hours of service, location of services, details of library staff, library policies, an interface to the library Online Public Access Catalog (OPAC), etc,

Librarian As Researcher

Librarians are highly skilled in the research process and possess a unique knowledge of the breadth and depth of information resources in various subject specialties. Librarians are increasingly going to participate in and be critical members of research teams. By facilitating access to information - finding it, analyzing, synthesizing, and packaging - librarians would move to the beginning of the information production cycle, playing a more substantial role in the information creation process. Teams within an organization should have an information professional who is responsible for the information-gathering skills of the team.

Librarian As Interface Designer

Interface design is going to become increasingly important and increasingly relevant to the way people access and use digital technologies. A beneficial way for librarians to break out of their insularity is to become much more closely involved and collaborate in the work of computer and information scientists in tasks such as design, organization, development, and maintenance of digital library repositories, interfaces, search engines, networks and Web documents. Librarian can help in the design of technology-based information services and share their intimate knowledge of what users want and need as they have years of experience in helping patrons utilize electronic media and subsequently using Internet and World Wide Web.

Librarian As Knowledge Manager/ Professional

Knowledge Management (KM) involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets so as to fulfill organizational objectives. Organizations worldwide are realizing the advantages of enlisting librarians in the KM systems. Librarian as a part of KM system can effectively participate in the process of knowledge creation which include mechanisms for knowledge capture, exploitation and protection besides in required infrastructure creation by the virtue of capabilities gained as Information Managers of the organization.

The creation of the knowledge center in an organization normally involves contributions from three groups of experts such as users, knowledge professionals and technology experts. Knowledge professionals are the individuals in the knowledge center who have the skills, training and know-how to organize knowledge into systems and structures that facilitate the productive use of knowledge resources. They include librarians, managers, archivists, and others.

Librarians to become Knowledge Managers or Professionals should possess variety of talents and perform the work with high level of skill and expertise. They should be able to ex-

tract, filter and disseminate vital external knowledge, and work side by side with users in collecting and analyzing strategic intelligence throughout the organization. Librarians, in future, would move from the background to the center of the organization. They would shed their traditional role as a part of support group, uninvolved in any critical functions, to a prominent position to jointly hold the reins of knowledge management with users and the technology experts. They would help steer and shape the knowledge policies, structures, processes, and systems that will nurture organizational learning (Seonghee, 1999).

Librarian As Sifter of Information Resources

Normally, sifter or siftware is described as "software programs to extract unknown, valid, and actionable patterns, associations, changes, anomalies, and rules from large databases". This process is also known as "Data Mining". The Internet and Web provide access to vast information resources. The term "sifter" may be used for the skilled librarian who helps users make sense and order of the resources. The future belongs neither to the conduit or content players but to those who control the filtering, searching, and sense-making tools to navigate through the expanses of cyberspace (Saffo, 1994). In another words, the librarian can be a key player in the emerging scenario.

Conclusion

The role of librarians is continuing to evolve with the adoption of Internet and World Wide Web into the profession of librarianship. Though it is difficult to predict with certainty how active the role of librarians would be in this evolving scenario, it can be said with confidence that their services cannot be dispensed with because they have the necessary qualification and historically the first right to attend to the information needs of the seekers.

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