Digital Libraries: Definition's Need, Major Issues and Challenges

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1. Introduction

The term digitization is often used when diverse forms of information, such as an object, text, sound, image or voice, are converted into a single binary code. The core of the process is the compromise between the capturing device and the player device so that the rendered result represents the original source with the most possible fidelity, and the advantage of digitization is the speed and accuracy in which this form of information can be transmitted with no degradation compared with analog information.

Digital information exists as one of two digits, either 0 or 1. These are known as bits (a contraction of binary digits) and the sequences of 0s and 1s that constitute information are called bytes.

Analog signals are continuously variable, both in the number of possible values of the signal at a given time, and in the number of points in the signal in a given period of time. However, digital signals are discrete in both of those respects – generally a finite sequence of integers – therefore a digitization can, in practical terms, only ever be an approximation of the signal it represents.

Digital Libraries: With the introduction of the Internet, most public libraries have started to provide electronic resources such as electronic books, electronic journals and multimedia content. This trend has led to a transformation of them into digital libraries. Library automation systems have helped in the transformation by providing access to available collections through the use of digital catalogues. However, this transformation requires high-cost and complex digitization project. Digitization can be defined as the process of converting traditional library materials to digital formats for electronic use and distribution (Witten and David, 2003). In this way, the traditional library materials can be stored in computers and manipulated easily. Most digital libraries are built in the following order (Cornell University Library/Research Departments, 2000), (Alhaji, 2009). Selecting documents to be added to the digital library collection and digitizing them to an appropriate digital form, assigning the metadata to the documents being added to the collection, Indexing and storing the documents and metadata for efficient search and retrieval, Developing a web-based interface to enable browsing, searching, retrieving, and viewing the contents of the digital library.

Definitions of Digital Libraries: Definitions of Digital Library by William Arms: "An informal definition of a digital library is a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network. A crucial part of this definition is that the information is managed. A stream of data sent to earth from a satellite is not a library. The same data, when organized systematically, becomes a digital library collection. Most people would not consider a database containing financial records of one company to be a digital library, but would accept a collection of such information from many companies as part of a library. Digital libraries contain diverse information for use by many different users. Digital libraries range in size from tiny to huge. They can use any type of computing equipment and any suitable software. The unifying theme is that information is organized on computers and available over a network, with procedures to select the material in the collections, to organize it, to make it available to users, and to archive it."

According to E.A. Fox (Fox, 1999) the digital library may be defined as the "New way of carrying out the functions of libraries encompassing new types of information resources, new approaches to classification and cataloguing, intensive use of electronic systems and networks and dramatic shifts in intellectual, organizational and electronic practices".

There are many definitions of a "digital library." Terms such as "electronic library" and "virtual library" are often used synonymously. The elements that have been identified as common to these definitions are:

1) The digital library is not a single entity;
2) The digital library requires technology to link the resources of many;
3) The linkages between the many digital libraries and information services are transparent to the end users;
4) Universal access to digital libraries and information services is a goal;
5) Digital library collections are not limited to document surrogates: they extend to digital artifacts that cannot be represented or distributed in printed formats.

Need and Purpose: Libraries in physical form are in existence since several centuries and have reformed the way the society works. But it is incomparable when it Comes to the influence and impact the present day digital libraries have exerted on the societies. The knowledge society is reaping the benefits of the digital library in day to day activities which is many folds compared to the benefits of a traditional library. The information revolution not only supplies the technological horsepower that drives digital

Libraries but also fuels an unprecedented demand for storing, organizing and accessing information. 'If information is the currency of the knowledge economy, digital libraries are the banks where it is invested'. Some advantages of a digital library over a conventional library are, - cutting down costs of library maintenance - resource distribution - resources are electronically catalogued and can be browsed - provides equitable and widely distributed access at lower costs - most appropriate means of organizing intellectual artifacts that cannot be represented or distributed in printed formats, 168 - evolves into a complex system that makes information available in a hard copy, on magnetic tape/ discs, CD-ROMS, including those from online sources. Important applications identified for digital libraries are, Archival preservation such as manuscripts, ancient literary works, cultural artifacts, community identities; Legal documentation such as government documentation of plans and policies, history of legal cases, census and statistical data, spatial data and other relevant information that can be brought into the public domain; and - Educational and research purposes such as scholarly publishing, theses, research work, hosting reference material

2. Major Issues

Development and Designing of digital libraries is very complex. It has multi dimension involves numbers of things to look at. Different set of technologies, standards, software, file formats, access and several other things need to take in to account. Therefore to build a digital library, one has to look for appropriate technological solutions and handle the following major aspects and related issues:
1) Digital Library Standards • Resources Organization
2) Metadata Standards • Digital Archiving and Preservation
3) Digital Library Services These has been further elaborated in the following section here;

The main purpose of developing a digital library is to provide wider and Seamless access, preserve the content for future use, interact with another similar digital library etc. To ensure this, there is a greater need for adopting various standards and best practices to build interoperable digital 147 libraries. Some of most important standards used in the digital libraries are listed below:

1) User Interface
2) Common web browser compatible to all platforms
3) Data Handling and Interchange
4) Structured Documents - HTML, XML, PDF
5) Video, ViviActive, VRML etc
6) Graphic Formats - JPEG, TIFF, GIF, PNG, Group 4 Fax, CGM
7) Moving Pictures/3-D - MPEG, AVI, GIF89A, QuickTime, Real

Metadata
1) Resource Description - Dublin Core, METS, MODS,
2) Resource Identification - URN, PURL, DOI, SICI
3) PREMIS (Preservation Metadata: Implementation Strategies)
4) MARC, TEI Headers, Other Open Source and Domain Specific Standards.

Retrieval Services
1) Intermittently transfer data from one system to another
2) Federation and Harvesting: FTP-enabled, OAI-PMH for
3) Federated search: Z39.50 protocol, SRW Protocol

Authentication and Security for Emerging e-Commerce Standards

Resources Organisation: When we have too many items as part the digital collection, to bring together related items a classification systems are used. Traditional libraries have been arranging and organizing printed materials such as bool journals on related subjects together and by following modern and widely used library classification schemes. Classification uses notation symbols, while Cataloguing creates document surrogates which facilitate browsing and search facilities using author, title, series and other elements.

These classification schemes have also been used for organising web based /digital information resources according to the disciplines, specific subjects and topics within discipline. Having been familiar with Organization of print world in our libraries, users find it easy to get information from organized resource structures. Following are some of the web based systems/digital libraries where library classification systems have been followed;

1) Cyber Dewey. http://www.anthus.com/cyberdewey/cyberdewey.html.
2) SCORPION. http://orc.rsch.oclc.org:6109/.
3) Cyber Stakes. http://www.public.iastate.edu/~cyberstack/.(LC).
4) INFOMINE. Http: BUBL LINK, http://www.bubl.ac.uk/link. DDC & LCSH
5) BIOME. http://www.biome.ac.uk
6) //infomine.uUCRedu. (LCSH)

However, classification schemes are unable to keep up the pace as digital libraries deal with many new and nascent subjects and formats of documents. Moreover, it is a costly affair to classify and catalogue according to traditional schemes by experts. Various new metadata schemes have been developed to organize disparate digital resource best than print libraries.

Digital library challenges: Creating "effective" digital libraries pose serious challenges for existing and future technologies. The integration of digital media into traditional collections will not be straightforward, like previous new media (e.g., video audio tapes), because of the unique nature of digital information, which is less fixed, easily copied, and remotely accessible by multiple users simultaneously. Some specific challenges are resource discovery, digital collection development, digital library administration, Copyright and licensing, etc., library of congress specified various challenges for building an effective digital library, which are grouped as broad categories as follows.

Building the resource: Develop improved technology for digitizing analog materials.

Design search and retrieval tools that compensate for abbreviated or incomplete cataloging or descriptive information.
Design tools that facilitate the enhancement of cataloging or descriptive information by incorporating the contributions of users.

Interoperability: Establish protocols and standards to facilitate the assembly of distributed digital libraries.

Intellectual property: Address legal concerns associated with access, copying, and dissemination of physical and digital materials.

Effective access
1) Integrate access to both digital and physical materials
2) Develop approaches that can present heterogeneous resources in a coherent way
3) Make the national digital library useful to different communities of users and for different purposes
4) Provide more effective and flexible tools for transforming digital content to suit the need of end users.

Advantages and Disadvantages: The advantages of digital libraries as a means of easily and rapidly accessing books, archives, and images of various types are now widely recognized by commercial interests and public bodies alike. Traditional libraries are limited by storage space; digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain it. As such, the cost of maintaining a digital library can be much lower than that of a traditional Library.

An important advantage to digital conversion is to highly increased accessibility to users. They also increase availability to individuals who may not be traditional patrons of a library, due to geographic location or organizational affiliation. Some advantages are as follows:

No physical boundary: The user of a digital library need not go to the library physically; people from worldwide can gain access to the same information, as long as an Internet connection is available.
Round the clock availability: A major advantage of digital libraries is that people can gain access 24/7 to the information, i.e., users can access the information anytime provided the proper network connectivity.
Multiple accesses: The same resources can be used simultaneously by a number of institutions and patrons.
Information retrieval: The user can use any search term (word, phrase, title, name, and subject) to search the entire collection. Digital libraries can provide very user-friendly interfaces, giving clickable access to its resources properly.
Preservation and conservation: Digitization is not a long-term preservation solution for physical collections but does succeed in providing access copies for materials that would otherwise fall to degradation from repeated use. Preservation and conservation of data in the digital library are one of an important issue.
Space: Whereas traditional libraries are limited by storage space, digital libraries have the potential to store much more information; simply because digital information requires

very little physical space to contain them and media storage technologies are more affordable than ever before.
Added value: Certain characteristics of objects, primarily the quality of images, may be improved. Digitization can enhance legibility and remove visible flaws such as stains and discoloration.
Easily accessible

Disadvantages
There are some disadvantages of digital libraries also, which are as follows:
1) User authentication for access to collections
2) Digital preservation
3) Equity of access
4) Interface design
5) Interoperability between systems and software

Initiatives in India: The experimental stages of digital libraries. Barring the Health Education Library for People (HELP), Mumbai, the Tata Institute of Fundamental Research (TIFR), Mumbai, IIT Kharagpur, and National Centre for Science Information (NCSI), Bangalore, a majority of libraries provide bibliographic access only. IASLIC-LIST and the LIS-FORUM, along with the electronic newsletter, INFOWATCH provides professional information. Information today and Tomorrow, INFLIBNET Newsletter, and the DESIDOC Bulletin of Information Technology (D-BIT) are a few other sources of current information on the use of ICTs and networks in India. Research and development activities regarding digital libraries are being undertaken in some institutions, for example, at the Education and Research network (ERNET) of Department of Electronics, GoI (http://www.doe.ernet.in) and the electronic library being developed at the Indian National Scientific Documentation Centre (NISCAIR), New Delhi (http://www.NISCAIR.org)

A brief account of some of the resources and services is presented below.
Searchable databases on the web from Central Library of Indian Institute of Technology, Kharagpur or http://libweb.iitkgp.ernet.in)
1) Digitization at IIT-Kgp Library initiated at the beginning of 1990s. IIT-Kgp is one of the six premier institutions of quality education in engineering and technology,
2) The Indian Institute of Technology (IITs). Electronic current awareness bulleting „Info watch' beginning on July 1996 by the University Grants Commission (UGC).
3) (LIS-FORUM, a discussion forum sponsored by NCSI, Bangalore.
4) Development of OPACs in many libraries such as Centre on Rural Documentation CORD of National Institute of Rural Development (NIRD), Hyderabad http://www.nird.org/clic/index.html and http://www.nird.org/clic/L.html)
5) Index of Hitesranjan Sanyal Memorial Collection (HSMC) at the Centre for Studies in Social Sciences (CSSS), Calcutta. (http://www.iisg.nl/asia/cssc.htm and http://www.socialsciencecal.org) Health Education Library for People (HELP), in Mumbai.
6) HELP is a privately managed site providing health related information and managing an online catalogue of over15,00 00 (PDF) Digital Libraries: Functionality,

Usability, and Accessibility. Available from: https://www.researchgate.net/publication/280049262_Digital_Libraries_Functionality_Usability_and_Accessibility [accessed Dec 12 2018].

3. Conclusions

Libraries have been working on this daunting set of challenges for several years now. The library and information centers has to overcome the inhibitions and look ahead for the betterment of information services to the user community by successfully adopting the digital technology - the need of the hour and keep pace with world. It seems that the days may not far when the whole world would have digital libraries interconnecting all libraries to meet the academic and research needs within the short time. However, before digital libraries took over the library and information network, the country's an archives law there will be continuing expansion of digital library activities. LIS and computer science professionals face challenges that will lead to improved systems. More and more libraries will have departments and programs in the digital library arena. Digital libraries will build upon work being done in the information and data management area. Digital libraries provide an effective means to distribute learning resources to students and other users. Planning a digital library requires thoughtful analysis of the organization and its users, and an acknowledgement of the cost and the need for infrastructure and ongoing maintenance (Adams, Jansen, and Smith 1999). Digital Libraries present opportunities and challenges for the library and information communities and all stakeholders

References

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