Implementation of library portals for information resources: A case study of the Indian Statistical Institute, Bangalore (ISIB)

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Summary   The explosion of the Internet and information technology in general has created challenges for information professionals to seek more efficient navigating tools for their users to locate their Web resources. One of the approaches is through implementing library portals. This paper briefly discusses metasearch, the technology of searching across multiple databases which is the key feature of a library portal. It analyzes the need for implementing a new library portal at the Indian Statistical Institute Bangalore Centre Library and introduces a new library portal, Library Search Aid, which performs metasearching across the Library's four online resource databases.

Introduction

The explosion of the Internet and information technology in general has created challenges and more opportunities for information professionals who are redefining their roles for the present and future. Web-based information services are receiving much attention from the library community. With the advent of the Internet and more specifically, the World Wide Web, libraries have undergone a revolution in the way that they operate and provide information services to users. Information professionals are uniquely positioned to play a major role in the new Internet world.

While information is readily available, especially with the help of "Google-like" searching on the Web, libraries are forced to focus on developing more effective ways for users to efficiently navigate among the library resources distributed on library Websites. One of the approaches to accomplish this goal is through customized portals performing simultaneous database searching. As Strauss has noted, a portal is a special kind of gateway to Web resources, "a hub from which users

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can locate all the web content they commonly need" (Strauss, 2003). Jackson states that portals gather a variety of useful information resources into a single, one stop-web page that allows users to customize their information sources by selecting and viewing information they find personally useful (Jackson, 2002). Luther further argues that there is flexibility in how libraries can design the initial search screen, either a single search box or list of databases grouped into subject (Luther, 2003). In other words, the design and implementation of a local portal will be the responsibility of individual institutions. Local portals will allow tailored access to a selection of resources of importance to a particular institution and their users, plus integration with other locally licensed data sets and local products, abstracts and indexing and citation databases, the OPAC, and even collections of electronic journals (Webb, 1998).

Metasearch

The key feature of a library portal is to allow searching across multiple databases without having to repeat a search. This feature is generally referred to as metasearch, parallel search, broadcast search or federated search (Fyer, 2004). However, Mischo and Schlembach distinguish slight differences between the federated search method from the broadcast search method (Mischo & Schlembach, 2004). Furthermore, federated search engine technology can harvest the search results from the fee-based password-protected databases into a homogeneous database system for search and discovery. While Google works efficiently to spider the Open Web across billions of sites, a metasearch system can send queries across multiple heterogeneous databases, such as bibliographic and full-text databases (Luther, 2003). In essence, metasearch has emerged as the one-stop shopping answer for librarians in the "Google-generation" to move beyond teaching specific databases or publisher interfaces, into the realm of ubiquitous article discovery (Luther, 2003).

A model of this dynamic metasearch engine has been demonstrated successfully as the library portals such as "Journal Finder" and "Full-text Article Locator" at the Grainger Engineering Library of the University of Illinois at Urbana-Champaign (Mischo & Schlembach, 2004; Mischo, 2001). Based on the Grainger approach to metasearch, this paper presents a model of a library portal customized for searching across the multiple

online resources at the Library of the Indian Statistical Institute at Bangalore.

Existing Web access at the Bangalore Centre Library

The Indian Statistical Institute (ISI) has three centers in Calcutta, Bangalore and New Delhi. The Library at the Bangalore Centre (ISIB), established in 1978, has one of the best collections of literature on Statistics, Mathematics, Statistical Quality Control and Library and Information Science in India. Presently, it subscribes to around 300 international journals for its 300 library users including faculty and students and research scholars. The overall collection of books and reference materials, reports, reprints, directories, encyclopedias, CDs, etc., is approximately 50,000.

As Chen, Andrea, Sewell, and Schatz (1998) noted, the content, structure, and relationship of information in the information space are most commonly represented as alphabetically based or hierarchical categories. The ISIB Library has been relying on hypertext browsing abilities in locating information on their alphabetically based listings of Web resources. From its homepage to online journal resources, separately linked according to their procurement agreement or content provided (Fig. 1). They are, namely, ISIB Online Subscriptions, ISIB Periodical Holdings; *Science Direct* consortium, and Union Catalog of Publications in Bangalore Libraries.

Web access to ISIB E-journal subscriptions

The first listing is the "E-journals available for ISI Bangalore." The ISIB Library has a total of 278 online journal subscriptions since 2000. This listing, written in html format, provides access to ISIB licensed electronic resources, either to the full-text articles or to the abstract of the articles. Linking data to these electronic resources are embedded in this hypertext file. They include such data as the details of the URL path and sometimes include the session information needed to establish authorization at the vendor/publisher server. Through this dynamic linking, access to the Library services is enhanced with immediacy, accuracy and currency of information, which are the most important factors in fulfilling user information needs.
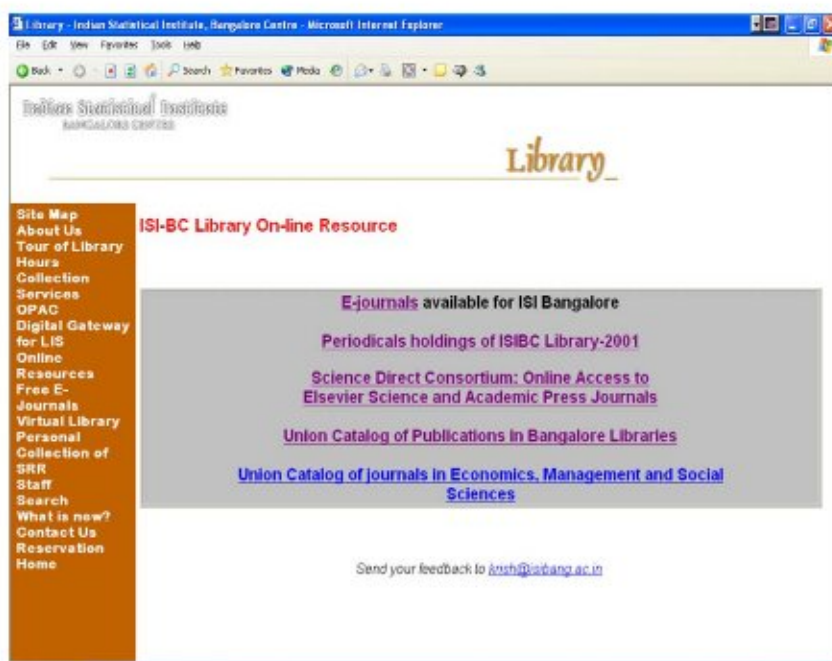
Figure 1 ISIB Library online resources web page.

Web access to ISIB Periodicals holdings

The second listing is the "Periodicals holdings of ISIBC Library-2001." The ISIB periodical collection has a total of 412 records of holdings since 2001. This listing, also written in html format, provides access to the ISIB journals alphabetically by the first letter of the title word. It includes publisher information and the beginning date of the periodical holding, and bibliographic notes such as the former and/or later titles. This Web list is continually updated in the source code by library staff to incorporate new titles when they are added to the library.

Web access to Science Direct Consortium

The third listing is the "Science Direct Consortium: Online Access to Elsevier Science and Academic Press Journals." In 2003, a contract to use Elsevier Science Direct electronic publications was signed by the Indian Statistical Institute to establish a consortium networking the three ISI Centre libraries. The consortium was formed to contribute to the development of research through the acquisition of electronic publications by the participating libraries of Indian Statistical Institute using the LAN (Local Area Network), in addition to their individual current journal collection. In this consortia gateway, the ISIB Library maintains a total of 133 online journal subscriptions. They consist of consortium subscriptions to e-journals from various

Elsevier publishing groups such as Pergamon, Saunders and Academic Press.

Web access to Union Catalog of Publications in Bangalore Libraries

The fourth listing is the "Union Catalog of Publications in Bangalore Libraries." In 1997, a project to promote access to journals available in Bangalore was launched to create a union catalog of current journals subscribed by the major libraries in the region. The result is the formation of a union catalog of current journals compiled by the National Centre for Science Information (NCSI). The catalog consists of five separate annual listings from 1997 to 2001. It provides bibliographic information as well as the holding library information. It also provides a subject search to the journal titles. However, each annual listing is searched independently and the title word searching is limited by adjacent search only.

The union catalog is the only source for current journal subscriptions in the region for the period of 1997–2001. This union catalog project has been discontinued in 2002.

Analysis of need

The cooperative environment of library resources allows the ISIB Library to serve its users with a host of journal resources available in the region. The

development of the Library's homepage reflects the active participation of each component of the Web listings; however, users often need to navigate among and between the various Web pages to locate the journal holdings or full-text articles in question. Because the search is mainly conducted as a browsing operation, knowledge of title words is required as key word or truncated searches are not possible. There are also issues of high maintenance for the upkeep of these hypertext-markup lists.

Perhaps the biggest difficulty is the lack of normalized data across the various Web listings. For example, forms of abbreviation were not standardized for name of the journal title, publisher, place of publication, or library code of ownership. As a result, the search, regardless of how thoroughly conducted, would be futile and incomplete. As electronic and print resources increasingly overlap in various journal collections, the best practice for providing efficient and accurate access is inevitably through a library portal that is customized to navigate simultaneously across the various lists.

Local portal customization

Normalization of metasearch in a SQL database

The Web pages at the ISIB homepage were created to display individual listings of journal resources. In order to achieve normalization of data, a MS Access database was created as the main resource registry. Four databases were then constructed sharing many identical metadata field names and information, such as Title, ISSN, Place of Publication, URL, Subject, etc.

Data from the Web lists at the original ISIB site were downloaded as sources to populate the corresponding registry. For the union catalogs of current serials from 1997 to 2001, the 5-year data were merged into one registry. A Visual Basic (VB) application was composed to eliminate duplicates and consolidate the holdings for multiple years.

Spelling and use of abbreviations were standardized throughout the registry. This is a crucial feature for producing accurate and meaningful results for the end users.

Programming for a metasearch system

The first step to implement the new ISIB Library portal is to develop a new registry for the four above-mentioned categories of online resources. It

is accessible over a MS SQL server, which is considered a best practice in a multi-user situation (Mischo & Schlembach, 1999). Unlike the Library's original Web access approach, the new metasearch engine provides a screen display for a search box and a list of library online resources. Secondly, a series of Active Server Pages (ASP) Web applications were developed to process the result sets. The embedded VB scripting commands process and parse the user search strings into appropriate SQL commands to retrieve data across the four databases defined in the online resource registry.

The new Library portal, known as Library Search Aid on the ISIB Library's homepage, provides a gateway to the entire spectrum of journal resources available; however, it also allows end-users to choose among them as desired for more efficient searching. Figure 2 shows the newly designed ISIB Library search aid as a gateway to its journal resources.

Figure 3 shows a screen display of a composite result from a search.

The search term entered, *computing*, retrieves a number of matches simultaneously from a preselected list of information sources, i.e., in this case all are selected: E-Journals at ISIB Library, *Science Direct* Journals at ISIB Library, Periodicals Holdings at ISIB Library, and Union Catalog of Bangalore Libraries. Users may proceed to choose from here with one single click to locate more details about the journals of interest.

Evaluation of the new library portal service

With the advent of digital libraries and of wide area network, an enormous amount of textual information is made available all over the world. Searching and browsing are the two resource discovery paradigms most often used to access this information. To improve access to the information stored in various locations, two key steps were taken in implementing a library portal: normalization of online resources formerly stored on hypertext files in the Open Web, and applying metasearch engine technology to harvest data across multiple databases.

Efficiency of searches

The advantage of simultaneous searching across multiple sources of library information is evident. For users, the new library portal design presents a
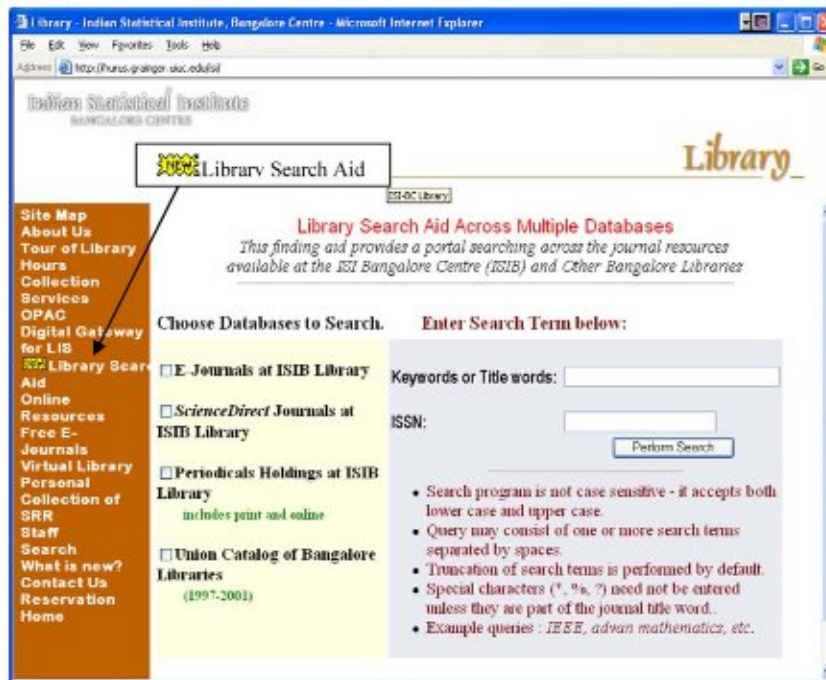
Figure 2 The new ISIB Library search aid webpage.

Figure 3 A metasearch result set for a search term 'computing'.

gateway to navigate fruitfully from a simple step rather than making a series of search attempts indiscriminately across the previous Web lists. The biggest improvement of this approach is exemplified particularly in integrating the 5-year union catalogs into one database, as it eliminates the need to make multiple searches one year at a time as required previously.

With the new approach, collection scope is well defined for users to make intelligent decisions for making their selection. Resource sharing is better served as interlibrary loan staff can easily determine where their request is best filled.

Maintaining and updating Issues

One of the major concerns in providing library resources is a maintenance issue. Information is only as good as it is up-to-date. Consequently, the four Web listings on the ISIB Library homepage present several challenges in maintaining current information. For one, new title information must be updated in hypertext language. It is also quite cumbersome to make changes, such as library holdings, to the existing files.

In contrast, the new library portal performs a uniform SQL searching across four online resource databases. Each database has identical field structure so that information can be kept in standardized format. Normalization of title words, library codes and abbreviations improves the accuracy of search matches as well.

Conclusion

The core function of a library portal is to provide and integrate access to the metadata of a library's multiple databases. The technology to make database content become easy to find and access is known as metasearch or federated search. In a federated search process, content database searching is performed within the native database

search capabilities, thus retrieving pertinent textual information over heterogeneous databases. The new library portal at the ISIB Library, Library Search Aid, employs this search approach to perform cross-database searching over four online resource categories, formerly separately stored in the Open Web. Users' queries from the 'black box' on the portal page are sent to simultaneously search the Access SQL database with ASP on a Windows IIS server and to get information from the databases with standard SQL query. For this test bed of federated search, the resulting hit list from each database is displayed separately to provide a transition of change for resource managers as well as users. Eventually, a consolidated display for the E-journals, the *ScienceDirect* journals and the Periodicals Holdings is desirable not only because it would reduce repetitive navigations among the resulting Web listings but also minimize the uncertainty of whether the user need can be filled traditionally with print copy or immediately available in electronic format.

The basic concept of the library portal service is to provide integrated access to multiple databases accessible to its users. The technology used to accomplish this goal is known as metasearch. Unlike the Google search engine, a metasearch system can perform searches over heterogeneous databases, such as bibliographic or full-text databases. The new library portal at the ISIB Library, Library Search Aid, employs this search method to perform cross-database searching over four online resource categories, formerly separately stored in the Open Web. The implementation of this new portal has brought forth many benefits in improving access efficiency as well as managing the various online resources.

Acknowledgements

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