

Concept and Design of a Virtual Library

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Abstract

Libraries are centers for social and scholarly collaborations in networks and associations. Virtual libraries should fill a similar need, yet virtual libraries regularly center essentially around making their property accessible. In this article, an online corporate library is depicted that places information sharing and the network is working at the center of its structure. The library system supports personal websites that are visible to the entire organization. In this investigation of the virtual library and the job it plays for established researchers as an educational and logical specialized article, a hypothetical interdisciplinary examination was gotten together with an observational system. Old fashioned reports, which without a doubt speak to our social legacy and can be viewed as an extremely rich wellspring of data, are kept in numerous nations just on libraries with authentic chronicles. The artefact and delicacy of such archives make their entrance confined. Taking into account that nowadays the Internet is one of the most fascinating spots to distribute any sort of data, it appears to be consistent to utilize it to both save our social legacy and give more extensive access to these records.

Keywords: Digital Library; Virtual Library; Multimedia.

1. Introduction

Today, we can access and utilize many kinds of information in various digital formats on the Internet. Many researchers usually access and read academic papers digitized in a text file format, HTML, PDF (Portable Document Format), SGML (Standard Generalized Markup Language), PostScript, Image data (e.g., GIF, JPEG, BMP) and so on. Newspaper publishing companies and publishers have already attempted to provide articles and magazines for distribution on the Internet. The problems of the use of digitized information on the Internet are intellectual property rights, means of charging fees and so on. However, digital publishing is coming into general use worldwide, because the volume of digitized information is increasing rapidly. We consider that a set of such digitized information can be regarded as a sort of library and that the Internet can be treated as a huge virtual library. On the other hand, Web search techniques are advancing, and various search engines help users to find valuable information from the huge information resources distributed on the Internet. The search engines can be considered as a retrieval mechanism for a virtual library. Various types of digital libraries have

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been developed and come into practical use. Some libraries provide users with information services such as searching books stored in real libraries through WWW browsers. Others provide users with text file data and document images scanned from real books. In academic circles, the IEEE Computer Society has published some journals with CD-ROM media. The IEEE Computer Society and ACM have started service with their digital libraries. In Japan, NACSIS (National Center of Science Information Systems) and NAIST (Nara Institute of Science and Technology) have also started digital library services. Although it is expected that publishing with CDROM or through the Internet will become popular shortly, it will be more difficult to find really valuable information and to manage it. Consequently, we consider that the framework of a next-generation digital library must be different from the current digital libraries described above.

2. Identity Cyberspace

Obscurity is a sign of the internet. Be that as it may, secrecy squares network building and information sharing. It blocks the formation of a social climate dependent on watched practices. On the off chance that a site, similar to a virtual library, is to help network building and information sharing, at that point the benefactors must be recognized and detectable to other people. Personality, in these cases, doesn't need to incorporate a wide scope of individual attributes. Rethink the instance of individual taking books from a rack in a library; It isn't important to find out about the individual. Numerous gatherings meet specifically puts at specific occasions in which the members just know each other's names, applicable interests and purposes and chronicles that are pertinent to the gathering. This cut of character and conduct is sufficient to help extraordinary intrigue networks. Along these lines, the accompanying parts of character should be bolstered in the plan of advanced libraries if they are to have social worth. This is how individuals know each other in numerous business and casual exchanges. Therefore, on the internet, they can't be spoken to by customer made landing pages, however, rather, must be the consequence of some component that makes a noticeable record of customer exercises. Nonconcurring perceivability. On the off chance that characters are to be gotten from conduct, at that point it follows that the practices must be noticeable. Declarations, which are settled on the internet. People who encourage network building are individuals who can watch the conduct of others in a typical situation and make associations among them. This is frequently a basic job for bookkeepers.

3. Books and Browsing in Virtual Library Space

3.1. Book data formats and registration

There are various types of book data in virtual library space: image data scanned from real books, a text file format which is extracted from the image data by OCR (Optical Character Registration), digital publishing data as HTML and PDF, audio data as MIDI, digital video data, and so on. It is necessary to find out desired and valuable information from huge data sets with such various data formats, and store it in virtual library space. It is desired that information registered into the virtual library space can be managed and accessed independently with data formats. Implementing this requires techniques that avoid troublesome data conversion and can cope with new formats. These techniques are still under development; therefore, data formats that can be browsed by common WWW browsers are used in the current prototype system.

Besides, information stored in the virtual library is not the original information but links (URL) to the information in the virtual library space. This makes it easy to process information distributed on the Internet, and huge hard-disk storage is not needed. Registering books in the virtual library space requires some data: the URLs, or locations of books distributed on the Internet; and the book data format and book characteristics, as mentioned later. They are input through a WWW browser on a WWW client with a CGI (Common Gateway Interface) script [8]. In a prototype system, they are sent to a book registration script implemented in CGI script on a virtual library server. Then, they are stored in a personal library space.

3.2 Browsing interface

Searching with keywords and categories is usually used in current digital libraries, and the search results are based on textual information. This search is suitable for users who understand the target books clearly. However, it is not always useful for checking whether interesting books exist at a library or not, without identification of specific target books. Besides, it is not appropriate for browsing books at a bookstore. The user interface enables users to find their desired books while walking through 3D virtual library space, like walking through a real library. This interface allows a user who is unfamiliar with retrieval by a computer to find books easily. There are virtual books in the 3D virtual library space. They are represented as 3D objects and differ in shape and color according to their data formats. For examples, image data of book covers are texture-mapped into the surface of a 3D object, and HTML data are shown in HTML data headers as a 3D object. Each object size is in proportion to the book's data size. The object is embedded as link information (URL) into the content of the book. Hence, these objects enable users to recognize books and their contents

easily and help users to find books. Besides, users can hear and see audio and video data by clicking the objects and can find out their contents easily. In a prototype system, the virtual library space and virtual books are implemented in VRML (Virtual Reality Markup Language). A user can walk through 3D virtual library space and use the system with a VRML browser. Walking through space smoothly needs considerable machine power because large amounts of image data are used for texture mapping of 3D objects

4. Virtual Communication and Virtual Libraries

There is a tendency to envision virtual libraries in the organization of systems as we likely am mindful them. Notwithstanding, it gives off an impression of being reasonable to imagine that an essential democratic open of virtual libraries will be virtual systems. By increase, it seems, by all accounts, to be reasonable to imagine that the propelled types of the open library will be used even more comprehensively by promoters who are generally content with working and bestowing in electronic spaces- - they are, taking everything into account, people who all around enter electronic spaces to get and also share information - and that the vitality of the virtual library thought as it applies to open libraries may depend in the tremendous measure on how much open libraries support the improvement of virtual systems. The requests, or if nothing else among the more noteworthy requests are: What will those virtual systems take after? What will they expect of virtual libraries? In what way will virtual systems use virtual libraries? Finally, what occupation will overseers play in this new condition, and in what limit will they

apply virtual proximity? Electronic notification sheets, conferencing structures, and the Internet offer snippets of data about the shape and character of virtual systems. Continuous appraisals place the full-scale size of the present-day the web masses at 50 billion, around the globe. We get to is available to someplace near 40 billion people, far and wide, with approximately 30 billion customers getting to the Internet on some arbitrary day. It seems, by all accounts, to be reasonable to imagine that at some point or another soon customers will have the alternative to get to libraries of record like The Library of Congress, download full-development automated video, shop astutely at L.L. Bean's, or view the arrangements of the Louver. In any case, Howard Rheingold, who has elucidated extensively on virtual systems, battles that the more noteworthy indications of the situation to come will come more from the direction than the imaginative bit of the structure. Rheingold acknowledges that the virtual system exists in the web, which is: the applied space where words and human associations, data and wealth and impact are appeared by people using [computer-interceded communication]; the web is advancement; virtual systems are social combinations that ascent whenever enough people chance upon each other consistently enough in the web. Rheingold accepts that we can get some answers concerning virtual systems of things to stop by concentrating on how people work on the web today.

5. Personal Adaptation Mechanism

One of the major features in VL is the ability to automatically extract the users reading characteristics as he/she reads books, using the characteristics attached to each book. The system maintains user reading characteristics for each user. This information is used for a book recommendation and book search aids for retrieval.

5.1 Representation of book characteristics and personal characteristics

Keywords and categories, together with bibliographic information, are commonly used to represent features of books and documents. Besides, a URL is added to their identifiers for WWW information distributed on the Internet. Some other identifiers should be attached for audio or video data. In this system, the book characteristics are represented by a combination of book identifier (BID) and book characteristic vector BCH. The BID for a document consists of elements including the following:

- Bibliography: author, title, name of book/journal, volume, number, page(s), date of issue, publisher, URL.
- Book type: article, commentary, catalogue, and so on.
- Media type: text file format, image data, video data, and file extension (txt, jpg, bmp, midi, . . .)

The book characteristic vector BCH is a vector K, W

that represents the vector space of keyword k_i and its weight w_i . It is important how we select keywords and how many weights we assign them because these matters relate to book retrieval and management of user information in VL. We represent user reading characteristics as a combination of the personal identifier (PID) and the reader characteristic vector (RCH).

5.2 Uses personal characteristic growth process

In using books. There are personal bookshelves prepared for each category or purpose in a personal library. Each bookshelf represents an interest category. An RCH is managed at each bookshelf. We consider that the mean of the features shows the overall reading characteristic for a user. As a user reads a book in the virtual library space, its BCH affects his RCH. Namely, if a user has a great interest in the book, the user can amplify the representation above by increasing the interest level; then his personal character growth occurs. The process is described in Fig. 1.

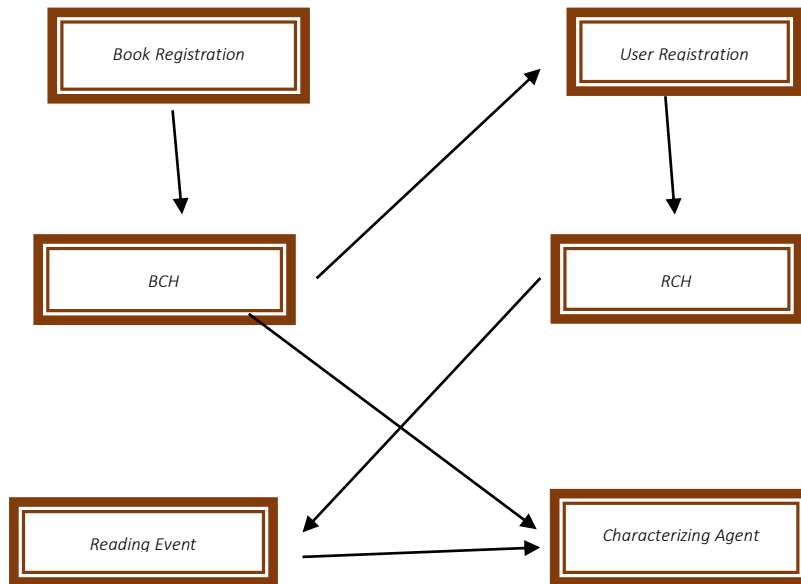


Fig.1 Reader characteristics (RCH) growth process

Step 1: Initialization of RCH All weights w_i of keywords in RCH is initialized to 0.0. Step 2: Reflection in RCH As a user reads a book in virtual library space, a reading event is sent to a characterizing agent together with a slider value. The value represents the interest level expressed in a reading browser and takes values from 1 to 1. If a user does not supply a slider value, the agent uses a default value of 0.0. Then the agent places the value in the RCH, in the form of the product of the BCH and the slider value. Step 3: Update of RCH Whenever a user reads a book, the agent updates his RCH with its BCH, its slider value, and the previous RCH. At the result, as similar books are read, the weights of the common keywords increase and the readers' interests become specified. As mentioned above, we consider that the BCH affects the RCH. Besides, we conceive of a users RCH as providing feedback to the BCH of the books which he reads. As a user reads a book and sets a slider value, his RCH will be updated, and the updated RCH will add to its BCH. We have not yet tested the validity of the feedback, but have left it for future work. Besides, we consider that experiments on interaction between RCH and BCH will illuminate this process.

5.3 Ways of registration of BCH

It is important how we assign BCH to a book. Keywords and categories for almost all academic papers are decided by authors. If the authors do not provide a paper with them, it is comparatively easy for indexers to extract them from its title and abstract. Authors and indexers usually use standardized keywords and systematized categories, because tables of these are prepared in academic circles. Automatic keyword extraction by full-text search has been applied to machine-readable books. This method is useful for books which are not given keywords by the authors. One can avoid manual keyword assignment for such books. On the other hand, automatic keyword extraction cannot be applied to multimedia data as images, audio, and video. It is too difficult to automatically determine keywords for such multimedia data. Keyword extraction for multimedia data is a subject of current research. It is highly desirable to be able to extract some sort of keywords automatically. In our current system design, we select keywords from keyword dictionaries such as keyword tables prepared in academic circles and manually assign them to multimedia data on registration.

6.Virtual Librarian and Personal Bookshelf

A personal bookshelf keeps a personalized information set organized while a user reads books and documents. A virtual librarian works as a housekeeper for the personal bookshelf.

7.1 Virtual librarian

In a real library, it is difficult for users to find the books they want to read without the help of librarians unless they know well what they want and how to find it. The librarians help to find suitable books in response to user requests and recommend those books to users. Moreover, they arrange books on the bookshelves to retrieve them easily, and exhibit frequently used books on specific bookshelves. A virtual librarian behaves like a librarian mentioned above in our virtual library (Fig. 2). The function of a virtual librarian is to recommend suitable books and documents for users and to manage personalized information set as reading history and reading characteristic: RCH. To realize the latter, a virtual librarian is implemented by the agent technique.

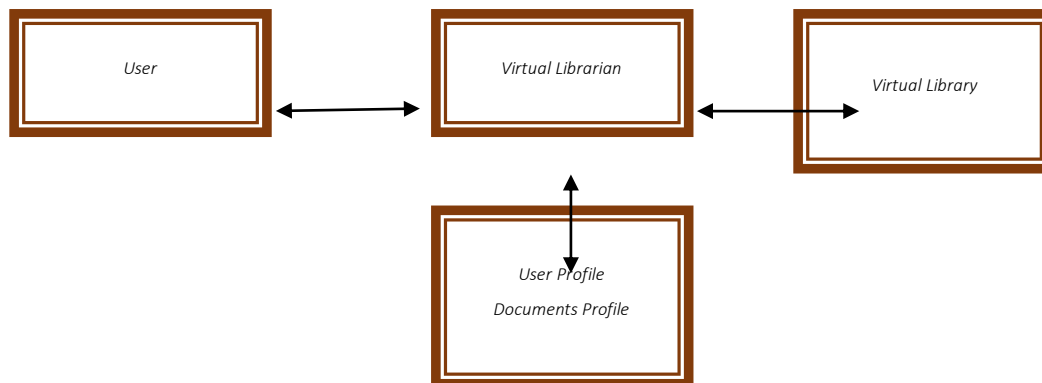


Fig.2 Virtual Librarian

7.2 Procedure of registration and recommendation of books

The Internet. However, there is too much information on the Internet to retrieve it by oneself. Without appropriate information selection, users would be swamped with too much information. Hence, we consider that automatic book recommendation is essential to avoid this problem. In a virtual librarian selects potentially valuable books for a user from many books registered in the virtual library, and reports them. A virtual librarian realizes the function with characteristics of users and books. If a new book or document is registered into a virtual library, a virtual librarian determines whether a user will be interested in it or not. To do so, the virtual librarian compares the distance between RCH and BCH with a threshold level given by default. If the calculated distance is within the threshold range, the virtual librarian judges that the book is suitable for the user. The librarian registers it into his library temporarily and recommends it to him. He decides whether it might be acceptable for a book of his library or not. This threshold level is chosen as the average of the results of user experiments. As an experiment, we investigated the distance between the BCH of a book and the RCH of a user interested in it. However, we have not verified the validity of the method described above in obtaining a threshold level, and it is left for future work. On the other hand, a virtual librarian can work for others' libraries as well as one user's personal library. In this case, the average of the RCH for others is substituted for the RCH of one user.

7.3 Information management on personal bookshelves

In the real world, when we read an article or a book for private use, we sometimes underline with a marker pen or make annotations on it. Sometimes, we make a copy of a part of a book to paste into our documents. Books and documents registered in personal bookshelves are virtual books, namely, a set of link information into their original contents. It is thus possible to cut and paste virtual books, underline them, and make annotations





Fig.3. Personal Library

and memos on them. A working space which stores profiles of these works is provided in the personal bookshelves and a virtual librarian manages it.

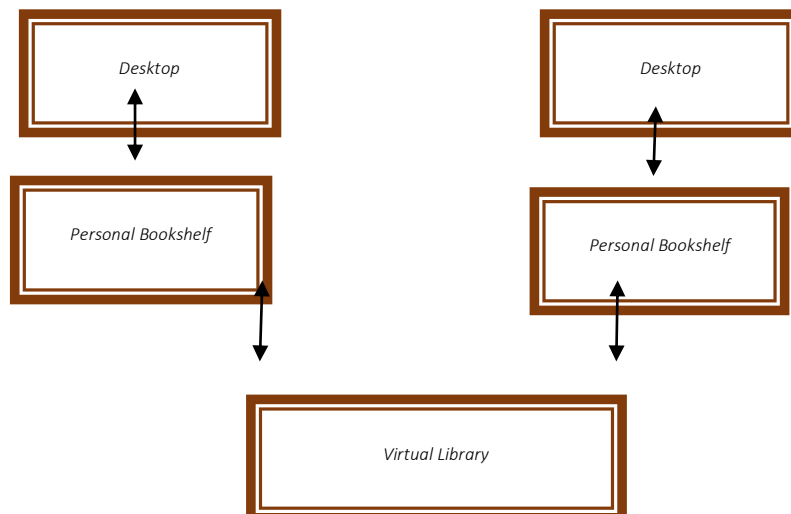
7.4 Multilevel management of information

In the real world, books and documents can be divided into several categories, according to the work types and the facilities where the information is stored. (Fig. 3). The levels are as follows.

1. Books which are now being read.
2. Books piled on a desk.
3. Books placed on a bookshelf in the home.
4. All books stored in a library.

This classification concept is applied to information management in Yawara. At the first level, books are avail

Fig.3 Tiers of Information



able via a browser or a text editor, and the contents are stored on hardware disks or in virtual memory. At the second level, books which are frequently used are put on the desktop in the virtual personal study (Fig. 3). At the third level, books are less frequently accessed, and their link information with compiling profiles is treated by the personal bookshelf. At the fourth level, all of the books are stored in the virtual library or somewhere on the Internet.

Conclusions

In this paper, we propose a concept of a virtual library. We have presented in this paper a Virtual Library of Emblem Books, which was developed in a research project that had two major goals. First, to provide access to a documental database about emblem books, especially to researchers that can use this literature as a source for their studies, and second, to help their preservation. These goals were tackled mainly by building the virtual library, which in turn had two main objectives: to design a Web interface that is easy to use and intuitive, yet extremely powerful and flexible, and to create a meeting place for the mentioned researchers. To achieve these objectives, two techniques were used systematically through all the interface: cognitive metaphors to design the interface. These techniques overcome some of the difficulties found in some current Web interfaces, mostly those related to search forms. For example, avoiding a specific query language and the use of logical connectors made our users much more comfortable with the search interface. By using these techniques, and offering additional services like a bulletin board or a meeting room, we have developed a successful virtual library that accomplished all the requirements expressed by the humanities experts. Now, our library is mentioned by them as a model to follow on the development of a virtual library for antique documents

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