



Exploration on the Present Situation and the Way Forward for Chinese and American Smart Libraries

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Abstract: Smart technology and smart services based on Internet, big data and cloud computing have penetrated into every corner of social life. As an essential part of smart library, library smart service has also been widely concerned and practiced. Library smart service can be understood as omni-directional perception, information interconnection and smart management, which is the symbol of the transformation of the library from the traditional literature service mode to the smart service mode. In this context, this work first discussed the basic characteristics of the smart library, then analyzed the advanced nature of the United States in the development of the smart library, and then put forward the way forward for the development of the smart library in China.

Keywords: China and America; Smart Libraries; Current Situation; Development Countermeasures

1. Introduction

With the rise of the concept of “smart” and the promotion of a new generation of information technology, such as the Internet of things and cloud computing, the research and practice of “smart library”, a new library model in the future, has also begun in China. The concept of smart library first appeared in 2003, when a new service named “Smart Library” was proposed by the library of Oulu University in Finland. The research of smart library in China came after the practice, and the earliest practice was carried out by Taipei Municipal Library in 2005, while the related theoretical research began in 2010. The development of the smart library is based on the digital library, which integrates a variety of new advanced technologies, especially the Internet of things technology. From this point of view, the smart library should have four characteristics: green energy saving, convenience and efficiency, comprehensive perception and three-dimensional interconnection ^[1].

2. The basic characteristics of smart library

2.1 The interconnection of smart library

As the foundation of the smart library, digitization, networking and intelligent technology are the external characteristics of the smart library. The concrete manifestation of the technology is the comprehensive perception of the people and things of the library; the three-dimensional interconnection across time and space on the basis of perception; the deep collaboration on the basis of information sharing. Comprehensive perception is not partial or local perception, but the full coverage of information perception, which connects the information isolated island of a single document and the information individual of the reader librarian, and connects the fragmented information into interconnected information to realize the intelligent connection between the reader and the librarian, also the foreground and the background. The three-dimensional interconnection is the comprehensive three-dimensional interconnection of the library across departments, industries, cities and even national boundaries. It is not only the interconnection between the

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library service object readers, but also the everyone interconnection between the subject librarians and the object readers^[2]. Interconnected libraries need to have the basis and environment for information sharing, break through the obstacles of system and mechanism, and realize deep cooperation on the basis of information interconnection and sharing. This innovative practice of sharing and collaboration can play an important role in library service and management.

2.2 The efficiency of smart library

Smart Library is energy-saving and low-carbon. Green development is the trend and focus of contemporary global development, and also the soul of smart library. Energy saving and low-carbon is an important way and method of green development. The energy-saving and low-carbon library is closely related to the smart public. In many aspects, readers and librarians need to change their reading and working methods, enhance the concept of green development and put it into practice. At the same time, the smart library is sensitive and convenient. The smart library is to realize the integration and transformation among the elements of library service and management, and to reflect the immediacy and timeliness of library response, in order to improve the sensitivity of library management.

2.3 The convenience of the smart library

Mobile Internet has penetrated into almost all fields of social life, including library services, e-commerce, media communication, information services and life and entertainment. Wireless digital library is becoming the service mode of extensive libraries. The three-dimensional basic network architecture, which is composed of wired broadband metropolitan area network, wireless broadband metropolitan area network, mobile digital television network and mobile multimedia network, is being formed in some cities, and has been used in cultural services and other fields. Through the construction of the wireless city, the library will build a learning and reading environment in which “the library is always by my side”, so that readers can realize a learning and leisure environment where everyone can read all the time in any place through mobile phones and multimedia information carriers (i.e., most documents can use information technology reasonably or be used in digital environment).

3. The advancement of the development of American smart libraries

3.1 American libraries provide a larger proportion of subject service, reader service and librarian service

Subject service and subject librarian construction have always been the focus of university library service construction. Especially in recent years, under the background of big data and Internet +, the transformation of related services from traditional mode to smart mode has attracted extensive attention from readers and library insiders. Relevant scholars^[3] investigated and studied the subject service, subject librarian and reader classification service and librarian service in Chinese and American university libraries. Among the libraries interviewed, the proportion of these two services in American libraries was higher than that in Chinese libraries. The proportion of subject services in Chinese university libraries was 52.5%, and the proportion of subject librarians was 20.3%. More than 90% of libraries had set up subject classifications. Subject branch libraries covered a comprehensive range of basic teaching content, and information literacy courses or lectures were offered to enhance readers’ awareness of information resources and the efficiency of retrieval and utilization. According to the statistics of the number of librarians, it was found that the proportion of librarian services provided by libraries was low, and the input of human resources varied greatly. Among them, the number of librarians in Huazhong University of Science and Technology was up to 59, and that in Peking University and Renmin University of China, the number of librarians was also up to 32 and 35, respectively, while the other university librarians were less than 10. The proportion of subject service in the American universities surveyed was 80%, and that of librarians was 56.7%. Subject services in American universities had developed earlier and become more mature, with more extensive extension around basic subject services. For example, Columbia University Library and University of Chicago Library had developed well, providing users with subject guides, paper writing, course reservation and other services. Columbia University had launched more than 40 subject guide services and established a detailed classification of subject services database. Some American universities were equipped with subject librarians and subject experts. Statistics showed that there were more than 40 subject librarians and subject experts in 21

universities, and most of them had bachelor degree or above.

3.2 American libraries provide a higher proportion of learning space and reservation services

Nowadays, with the rapid development of big data and mobile Internet technology, the smart construction of library space resources has been listed as a key planning project by many libraries, and has become one of the most significant services in smart libraries in the future. This survey made statistics on learning space and online space reservation services in China and America. The proportion of learning space provided by Chinese university libraries was 27.1%, of which the proportion of online reservation of learning space was 47.5%. The two proportions of American university libraries were higher than those of Chinese university libraries, which were 73.3% and 78.3% respectively. The proportions of learning space and online reservation services in provincial public libraries in China were 6.7% and 13.3% respectively, which were extremely low. The two proportions of public libraries in big cities of America were 63.3% and 40%, which were higher than Chinese. There was no detailed classified management of space in Chinese public libraries, and there was some gap between Chinese online reservation service and American online reservation service.

4. The way forward for the development of smart library in China

According to the characteristics of users and business of university library, its smart function is mainly composed of three modules: user-centered smart service function, smart management function to facilitate the work of librarians, and smart building function for all personnel. In order to make these functions play their roles in a systematic and effective way, each collaborative support module should be established and improved to form an organic overall structure. The functional structure model of university smart library is shown in Fig. 1.

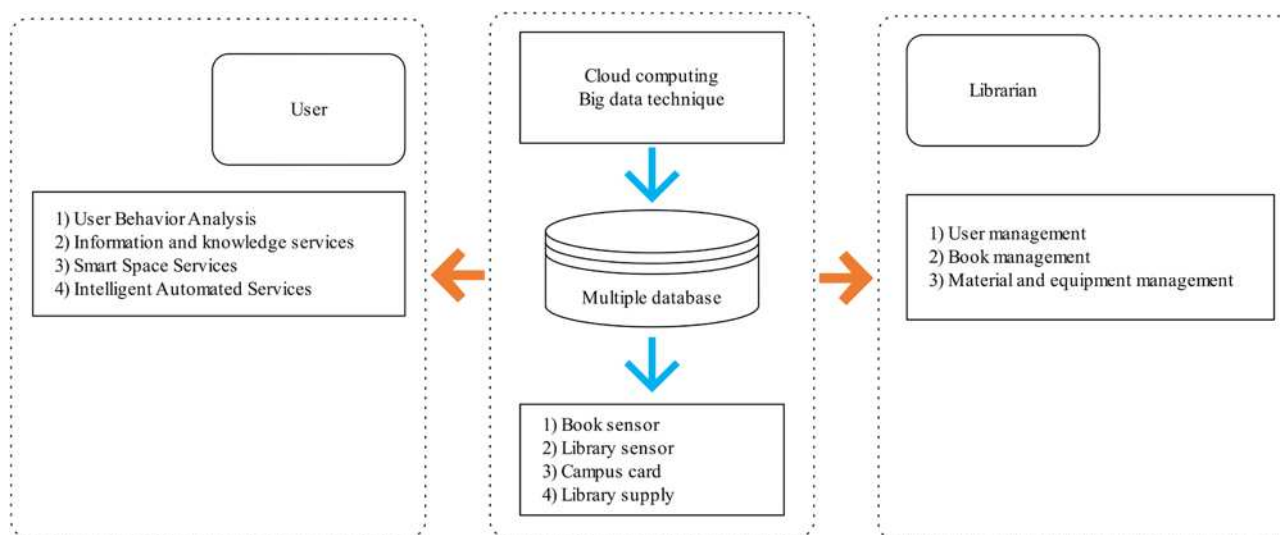


Fig. 1 Functional structure model of university smart library

4.1 The construction of database and its supporting technology

Big data technology is used to achieve the processing of multiple databases. For example, big data acquisition -- obtaining various types of data through RFID and sensors; Big data preprocessing technology -- distinguishing and filtering the acquired data to extract effective information; big data analysis and mining technology -- mining potential and hidden knowledge from existing data according to different objects. The data extraction, data mining, behavior analysis and semantic analysis of the multivariate database through the above technologies can not only meet the higher needs of university library users for accurate knowledge services, but also help librarians make personalized push according to users' interests and hidden needs. So that the smart service function and the smart management function interact effectively at the same time^[4].

4.2 The construction of Internet of things in library and its supporting technology

The Internet connects the campus card, sensors in the library, including books and periodicals, library sensors,

system equipment sensors and materials in the library to realize the comprehensive information exchange, interconnection and automatic control of all equipment in the library. Automatic recognition technology mainly includes voice, video, image barcode, optics, RFID recognition, etc. This technology can automatically obtain the relevant information of the object to be perceived, and transmit it to the computer for further processing. At present, RFID radio frequency technology has become the core technology of the development of the Internet of things, which is widely used in library, access control system and other fields; the essence of sensor technology is to sense the measured object through sensor device, and convert it into signal and output to transmit information according to its change law. At present, sensor technology is the key technology to realize automatic control.

5. Conclusions

As a new mode of the future library, the smart library will become the new concept and practice of the innovative development, transformational development and sustainable development of the library. Smart library is another brand-new form following the development of compound library and digital library, and it provides a new mode for the development of library. Based on the development experience of American smart library, this study put forward some countermeasures for China to develop smart library to realize smart service and better meet the increasing information needs of users.

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