Analysis of Mobile Push Service Model of Smart Library Based on Big Data

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Abstract. [Purpose / Significance] With the development of big data, massive data resources appear. Smart library should provide more personalized services to better meet the needs of users. [Method /Process] This article analyzes the characteristics of smart library services. It includes precision, timeliness, interactivity and personalization. [Result / Conclusion] This paper analyzes the development opportunities of knowledge push service in Smart Library, and establishes the mobile push service model of Smart Library.

1. Introduction
With the advent of 5g era, a variety of mobile terminals and mobile ways have entered the public life. For example, mobile payment, smart watch, online conference and so on can be based on various mobile devices. According to the China Internet development report 2020 China Internet Association Report released at the 2020 China Internet Conference. According to the report, the number of Internet users in China has reached 1.319 billion, and the digitalization and intellectualization of information have been continuously improved. China is speeding up the construction of network infrastructure. The construction of new infrastructure such as 5g network and data center is developing rapidly. In order to meet the needs of users for mobile learning, various libraries have launched services based on mobile terminal. According to the survey, among the 919 undergraduate colleges and universities in China, 283 colleges and universities provide wechat based mobile service, and 556 colleges and universities provide service platform based on superstar mobile library[1]. There are good opportunities for the development of various mobile services based on mobile Internet and user needs. For university libraries, we should actively study how to improve the level and quality of service, and better serve teaching and scientific research.

2. The characteristics of Smart Library Service
It is an important trend of library development to carry out the information service of Smart Library Based on mobile terminal. It can not only realize various functions of traditional library, but also break the limitation of limited space and limited opening time of physical library. Users can use the massive digital resources of the Smart Library at anytime and anywhere.

The Smart Library Information Service Based on mobile terminal has the following four characteristics:

2.1 Precision
Precision information was born in the era of big data. The biggest feature of big data era is massive data. The target information can be hidden in the ocean of information. How to effectively show user
information from the massive information is a problem to be solved\[^2\]. Through the analysis of user behavior and knowledge demand, the smart library searches the collection resources and shared resource database to provide users with accurate knowledge services. In this way, it can save the time for users to retrieve resources and greatly improve user satisfaction.

2.2 Immediacy

When users need some information, they can get the information through the mobile terminal immediately. Compared with the traditional library services, users do not have to consider the opening hours of the library. Users can access to online reading resources immediately. Timely access to information plays a very important role in the correct decision-making and innovation speed of users.

2.3 Interactivity

Users can retrieve certain resources through the mobile platform of Smart Library. Because the library has a lot of data. So it will usually retrieve multiple results. At this time, the smart library system can automatically screen out the resources that users may need by clicking on a search result. Further update the resource list. At this point, the user may have acquired the target resource. In this process, according to the user's description and instruction, the system selects and predicts the user's demand, which is the basis for the user's next information selection. Furthermore, the smart library system can also inspire users to think about the next step or provide more relevant resources. Smart libraries can provide more abundant and systematic resources for users.

2.4 Individualization

Smart libraries can understand user preferences, user behaviors and knowledge needs. It analyzes user behavior by reading users' borrowing records and network access data. So as to form personalized and customized information service. Users can feel the humanization of Smart Library Service.

3. Development opportunities of knowledge push service in Smart Library

As one of the important service items of Smart Library to enhance competitiveness and enhance its own value, knowledge push will get rapid development in the changes brought by mobile Internet, big data and cloud computing.

3.1 The popularization of mobile terminals is an opportunity for knowledge push of Smart Library.

In the traditional knowledge service of university library, face-to-face and human-computer interaction are the most important service forms. In the mobile Internet environment, the widespread holding of mobile terminals, including mobile phones and iPads, will be a favorable opportunity for the knowledge push and upgrading transformation of Smart Library. In 2020, affected by the new crown pneumonia epidemic, the opening of primary and secondary schools in China will be delayed, and teaching activities will be changed to online, which will promote the rapid growth of online education users. In March 2020, the number of online education users was 42.96 million, with a utilization rate of 46.8%. The number of mobile online education users was 420.23 million, with a utilization rate of 46.9%\[^3\]. It is feasible and extremely urgent to develop knowledge push service with mobile terminal. Carrying out knowledge push on the mobile terminal enables the users of university library to effectively use the "fragmented time" after class to view the pushed knowledge resources. Realize learning charging anytime, anywhere. Users' dependence on and attention to the library will also increase day by day.

3.2 Commercial institutions are the driving force for the knowledge push development of university libraries.

With the development of mobile service in university library, the related commercial organizations have got great business opportunities. Their participation will provide new development opportunities for the library. E-book and literature push is an important content of knowledge push service in
university library. In this context, the cooperation between mobile reading providers and university libraries will effectively promote the progress of knowledge push service. In June 2010, the scholar company launched the mobile library, which realized the unified retrieval of all kinds of database resources and full-text reading based on various handheld terminal devices for the first time. This scheme has been put into trial use in many domestic university libraries and provincial and municipal public libraries. In addition, founder Apabi and superstar have launched their own mobile library solutions. Libraries can access all kinds of data and information through cloud sharing. This cooperation with e-book merchants and other commercial organizations enables users to really enjoy the knowledge content pushed by university libraries with mobile terminals.[4]

3.3 The alliance of knowledge management departments is the driving force for deepening the knowledge push of university library.
Mobile Internet makes the alliance of knowledge management departments more solid and communicate more closely. Take the Chinese Academic Digital Association Library (CADAL) as an example. Since its establishment in 2002, it has established two digital processing bases and more than 40 digital processing centers. CADAL has formed the world's largest digital resource network. Its full-text database has reached 2.5 million copies (items) [5]. Such alliances share knowledge services. It provides rich and valuable information resources for the development of knowledge push services. It makes the acquisition process more convenient. Under the mobile Internet environment, the continuous development of knowledge alliance will greatly promote the deepening of knowledge push content level and the improvement of the level of university library knowledge push, and provide users with more perfect knowledge push service scheme.

4. Information push service model of Smart Library
For Smart Library, the realization of mobile information push service is based on personalized user analysis system. The personalized user analysis service system can track the user's behavior, analyze the user's personal habits and extract the user's needs. Thus, it can screen, match and arrange all kinds of resources according to the needs of users. Then the final results are automatically pushed to the mobile terminal according to the user-defined way.

The whole process of information push is shown in the figure 1.

4.1 User login registration. Users only need to register in the Smart Library on the unified authentication platform. For the first time, you need to input personal basic information, choose the topic you are interested in or describe your interest by keywords. According to their own needs, customize the existing resource database, select the mode, time, cycle and so on.

4.2 Build a user model. The smart library analysis system builds a user model for each user, recording the information needs, behavior preferences and recent topics of interest of each user. Through the analysis of users' habits, personality and behavior, the information needs of users are extracted, and the user model is continuously updated.

4.3 Integrate resources to match. Personalized service system is based on the needs of users. Matching the corresponding information from the shared resource database, collection database and big data, filtering out the massive information that does not meet the needs, screening out the target information, and integrating and processing the target information, and then push it to the user terminal according to the user-defined way. Realize personalized intelligent recommendation.

4.4 User feedback and suggestions. Users evaluate the mobile information push service of Smart Library according to the content of push service and the quality of push resource. Point out the good points in time, point out the deficiencies and put forward corresponding suggestions. The library can improve and enhance the push service according to users' feedback.
5. Conclusion
As a part of smart campus, Smart Library undertakes the responsibility of improving campus cultural atmosphere. Smart library should strive to improve service quality and create ubiquitous learning atmosphere. It provides users with the opportunity to learn at any time. The smart library should dig deep into various resources. In order to adjust the content of the mobile push service in time, the smart library conducts intelligent analysis of resources. It provides guarantee for the improvement of service quality of Smart Library.

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