

# Service Innovation of University Library in the Big Data Era

**Jun Liu**

*JiLin Engineering Normal University, Changchun, China*

*\*Corresponding author e-mail: 335404171@qq.com*

**ABSTRACT.** *In the era of big data, the extensive application of data resources provides strong support for the reform and innovation of university library reader services, and provides new development ideas for the innovative development of reader services. This paper studies the challenges faced by the reader service of university libraries in the era of big data, and puts forward suggestions to improve the reader service level of university libraries. However, how to find effective information in complex information requires not only the uniqueness of university library services on the basis of maintaining common services, but also the need to strengthen the research on improving library service innovation models and methods. The university library in the big data environment, through the construction of a library service sharing platform and a cloud service model, proposes a library service innovation strategy in the big data era, improves the efficiency of the integration of book resources in the form of a regional alliance, and realizes the library Large-scale management and reservation of resources to realize the innovation of service content. Based on the service practice of university libraries, this paper analyzes the common problems in service innovation of university libraries, and proposes big data under the strategic background of optimizing service innovation of university libraries, and provides references for service innovation of university libraries. Practical results show that the innovative services of libraries need to use scientific methods and attitudes, treat big data and innovative services of university libraries from a development perspective, and be good at using big data for innovative services of university libraries.*

**KEYWORDS:** *Big Data Era, University Library, Function Transformation, Service Innovation*

## 1. Introduction

The service innovation of university libraries based on big data is mainly reflected in the two aspects of service personalization and intelligence. Therefore, college libraries have established special digital resource librarians. Through the integration and association of information and data, the data generated during the process of using library resources can be retained to analyze the information and analyze the remaining information. Make predictions based on the information

resources that need to be searched [1]. By this means, readers can be more convenient and quicker in the process of searching for books [2]. The era of big data is advancing rapidly, and the rational use of big data will become a key factor in improving competitiveness in all aspects [3]. And people in this era have changed in all aspects compared with the past, so through the technology of big data, the reading information of different readers is analyzed and classified and the reading needs are made, so as to provide readers with a better personalized service[4] . In this way, university libraries have made service innovations under the use of big data to give users a better experience [5].

Under the influence and support of big data, the work of university libraries should actively use information technology and scientific and technological means, integrate new service concepts, establish accurate management service plans, and provide teachers and students with better learning and scientific research services [6] . Seeking truth from facts combines with reader behavior big data to mine out data information that is valuable for university library management services, and lay a good foundation for the strategic development of university libraries [7]. Innovative services in university libraries have always been a challenge. In the face of this rapidly developing technological era, we can use big data to make appropriate changes to our university's libraries, and make good use of digital resources to transform the information in the library. Carry out integration classification, which is convenient for both students and managers [8].

In the era of big data, digital resources are very abundant. In order to enrich the data resource information of the library, data information resources should be purchased regularly. In order to ensure the efficiency of data resource procurement, we can actively rely on the big data information of reader behavior to analyze the data of readers' library entry, borrowing, electronic resource utilization, literature review, reference information, etc., and dig out what readers need and like In order to facilitate the purchase of the majority of teachers and students, data resources are really needed to maximize the use of data resources [9]. Using reader behavior big data information to carry out university library resource procurement work can not only provide readers with richer data information, but also maximize the use of data information and show the value of various resource information. Book big data is a kind of massive data information, covering a variety of unstructured data information [10].

## **2. Methods**

### ***2.1 Create innovative service types***

After entering the era of big data, library users put forward higher requirements for services. In order to provide users with more convenient services, library services should be reformed and innovated according to users' needs. First, most users currently prefer to use electronic materials, so in the process of providing services to users, libraries must fully use big data technology to achieve service

type innovation, and build a service and interactive platform between users and libraries. Users can use The library's network platform communicates with librarians and obtains help or services according to their own needs; the second is that the library should innovate on the current archive management, continue to carry out the electronic management of archives and materials, and create a standardized management system; 3. It is to provide targeted service channels for different individual users, so that they can use the electronic platform to search and download materials, and meet the service needs of different users for library resources; the fourth is to use big data technology in the electronic library system. Automatically collect user information, including the user's browsing traces, and store the data in the form of file management, which can provide different users with more targeted push and services.

Calculate the randomness  $P_j$  of the  $m$  distribution of instances in class  $X$ , where is the probability of each attribute  $F_j$  on the training set  $X$ , which is defined as the proportion of samples belonging to the class in class  $X$ .  $E(A_k, X)$  is given by the following formula:

$$E(A_k, X) = \sum_{i=1}^n \frac{|X_i|}{|X|} I(X_i) \quad (1)$$

$E(A_k, X)$  is the expected information of the tree rooted at  $A_k$ . The expected information is a weighted average of  $n$  values  $A_k$  of the attribute of the metric  $I(X_i)$ . The selected attribute is the attribute that maximizes the aforementioned gain. Quinlan introduced a correction of the gain measurement to compensate for this deviation. From this, the amount of information provided for the classification in the data set  $X$ , the information gain is:

$$Gain(A_k, X) = I(X) - E(A_k, X) \quad (2)$$

## 2.2 Create a digital sharing platform

If you want to show the advantages of university library management services in the era of big data, you should vigorously develop big data information expansion, and use the advantages of Internet big data to realize the construction of library sharing platform in the big data environment, and effectively provide a large number of teachers and students. Data information resources. University libraries should actively cooperate with other universities to realize the sharing of digital library resources and build a library data resource sharing coordination group. Definition 1 (Credibility): Let  $I=\{i_1, i_2, \dots, i_n\}$  be a set containing  $N$  items, transaction  $T$  is a set of items,  $T \subseteq I$ ,  $D$  is a set of  $T$ , let  $A$  be a set of items, Transaction  $T$  contains  $X$ , only  $X \subseteq T$ , that is,  $X$  is contained in  $T$ ,  $XY$  is an association rule expression, and  $X \subseteq I$ ,  $Y \subseteq I$ ,  $X \cap Y = \emptyset$ .

$$\text{Support}(X \Rightarrow Y) = P(X \cup Y) = \{T : X \cup Y \Rightarrow T, T \in D\} / D \times 100\% = a \quad (3)$$

Definition 2 (Confidence): The credibility of the association rule XY refers to the ratio of the number of transactions containing X and Y to the number of transactions containing only X, expressed as:

$$\text{Confidence}(X \Rightarrow Y) = P(X | Y) = \frac{\text{Support}(X \cup Y)}{\text{Support}(X)} \times 100\% \quad (4)$$

The Apriori algorithm is an iterative scheme based on frequent itemsets as prior knowledge and scanning layer by layer, that is, the kth itemset is used to retrieve the (K+1)th itemset. The specific steps are as follows: First, by retrieving the transaction (or transaction) record, scanning all the first item sets that frequently appear, and recording the found set as L1, and then iteratively searching for L2 and L3. This cycle continues until the item set K that does not appear frequently is found.

### 2.3 Improve the skill level of librarians

Under the background of the big data era, in the process of library function transformation and service innovation, in order to gain social recognition, it must promote its own development and enhance its comprehensive strength. In the traditional library management process, most librarians are not professionals who have been professionally studied and trained, so they cannot provide targeted services according to the needs of library users, which has greatly affected the services of the library. Quality and long-term development. Therefore, in order to realize the transformation of library functions and service innovation, it is necessary to have high-quality librarians as a guarantee force. It is necessary to further strengthen the construction of the librarian team and provide professional training for librarians, not only to strengthen the interpretation of books The basic theory and professional knowledge of library science, and also guide librarians to have a deep understanding of the historical development of the library, so that they have professional quality and library management capabilities. With the advent of the era of big data, it poses a powerful challenge to scientific researchers and college students. It is not only simple data sorting and utilization, but also a certain data processing ability and data innovation consciousness. Data literacy can not only improve the individual's scientific research ability and competitiveness, but also can be preserved as an individual's core competitiveness in the long run. As the information distribution center, university library is an important place for teachers and students to obtain data. The library also has certain technical capabilities that can guide teachers and students to obtain relevant data literacy education, can concentrate on corresponding knowledge training for teachers and students, and actively develop information services.

### 3. Experiment

#### 3.1 Research object

In order to deeply understand the combination of libraries and big data, as well as the inevitable trend and basic requirements of library development. We will investigate how university libraries define library big data, how to use big data to innovate library services, change service models, expand service channels, innovate service methods, and optimize service processes, etc., and focus on university library big data Investigate the source of digital resources.

#### 3.2 Experimental research design

This practice is aimed at dozens of colleges and universities. After the investigation of colleges and universities, the big data resources of their libraries are analyzed, and the technological development process of libraries in recent years is analyzed.

### 4. Results

In the context of the popularization of big data, university libraries should increase efforts to promote the construction of university digital resources, improve library information data, and collect and mine information data in a targeted manner to enrich and comprehensive library digital information Resources to improve library information service innovation. Therefore, using the digital resources of the library is the main way to obtain information. Figure 1 shows the proportion of digital resources in the library.

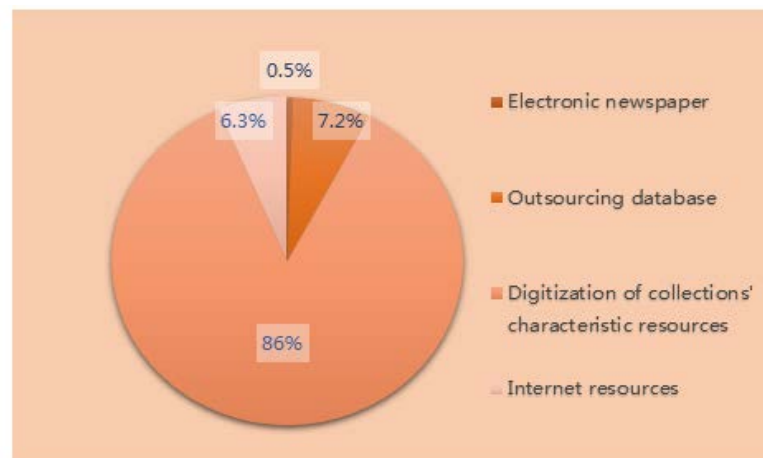


Figure. 1 The proportion of library digital resources

As shown in Figure 2, the global output of new information doubles every three years, and nearly 90% of the information is stored in the form of data. By the end of 2019, the total digital resources of the National Library of China will reach 2024.45Tb. The main sources are electronic newspapers accounting for 0.5%, purchased databases accounting for 6.3%, collection characteristic resources digitization accounting for 86%, and network resources accounting for 7.2%. With the rapid development of modern information technology, the number of digital resources in the library has doubled, and a large number of digital resources have been produced, including databases, electronic journals, e-books, web pages, and multimedia materials. The type and quantity of digital resources in some libraries have far exceeded paper resources.

*Table 1 Future technological development of academic research libraries*

	1 year or less	2-3 years	4-5 years
Technological development	Big data technology	Library Service Platform	artificial intelligence
	Digital Academic Technology	Online identification	Internet of Things

As shown in Table 1, as early as 2017, nmchorizon report: Library Edition pointed out the important technological development direction of academic research libraries in the future: developing big data technology and digital academic technology in one year or less; using two It will take three years to develop library service platforms and online identification; four to five years to develop artificial intelligence and the Internet of Things. If we develop according to the above time, as a small and medium-sized city, the development of university libraries will inevitably lag behind. Only by combining the actual situation of university libraries can we vigorously promote the development of big data. The transformation of artificial intelligence libraries. At present, the Heihe University Library has started the bidding and introduction of the RFID library intelligent service system. In the gradual advancement of intelligent projects such as access control systems, maker spaces, electronic reading rooms, multimedia seminar rooms, and conference systems, many difficulties and challenges will inevitably be encountered. Great changes will take place in the environment, conditions, quality of librarians, professional work and reader service management. There is still a long way to go for transformation and development.

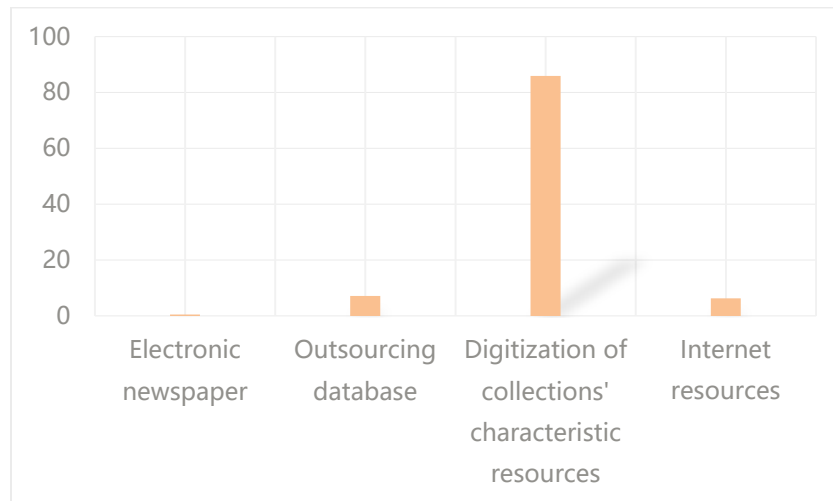


Figure. 2 Category data of library digital resources

In the era of big data, the most important management task of university libraries is to provide good services to teachers and students. In order to promote the development and innovation of university libraries, we should follow the development trend of the times, combine the actual needs of teachers and students, and use big data information technology to develop dynamic service topics. Combine the content of different documents to integrate and classify data documents. According to the actual needs of students, "postgraduate entrance examination subject data channel, final review subject channel, level 4 and 6 subject channel, professional qualification certificate subject channel, subject research channel" should be established, as long as the teachers and students are in the digital library or book Search for relevant words in library applications, they will promote data information channels and provide good learning reference services for teachers and students. At the same time, it is necessary to establish a differentiated university library management service mechanism based on school work instructions, students' actual needs and actual learning conditions. In view of this epidemic, although the start of school has been postponed, students' studies cannot be postponed. Then, in the university library, we can combine the different majors of students to carry out the "professional learning data" project, so that students can combine their professional knowledge to study materials in the university library at home. It is necessary to actively realize the innovative services of academic libraries, make them truly suitable for the needs of teachers and students, and comprehensively enhance the innovative development capabilities of academic libraries.

## 5. Conclusion

With the explosive growth of various types of information, the university library as a resource center has rapidly increased the ways and means for the entire human society to obtain resources. Digital processing has enriched many book resources. At the same time, the flow of information has greatly increased, and technology-based information has also increased the complexity of the process for users to obtain book information. Some elderly people will give up using certain new technologies. Universities should consider this factor. In order to improve service capabilities and competitiveness, university libraries should optimize services based on overall development requirements. With the advent of the big data era, the traditional function positioning and service mode of university libraries are facing many new challenges, which to a certain extent leads to the development of libraries, and it is difficult to provide high-quality services to users. Therefore, in this era of popularization of big data, we can only continuously carry out service innovation, build a digital sharing platform in a limited space, and increase the skill level of librarians. Only in this way can we improve the service innovation of university libraries. Serve readers in the best state.

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