

# Research on the Service Mode of University Library based on Data Mining

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## Abstract

**Informatization, networking, and digitization have been gradually integrated into various industries, and big data's new technology has been born in the era of massive digital information explosion. Big data is applied to many aspects of people's life. In the university library system, the application of big data mining and analysis can improve service efficiency and expand the development space. Based on the characteristics of big data, this paper discusses how to use big data mining and analysis functions to improve the service model of the university library and integrate intelligence into the development path of the library.**

## Keywords

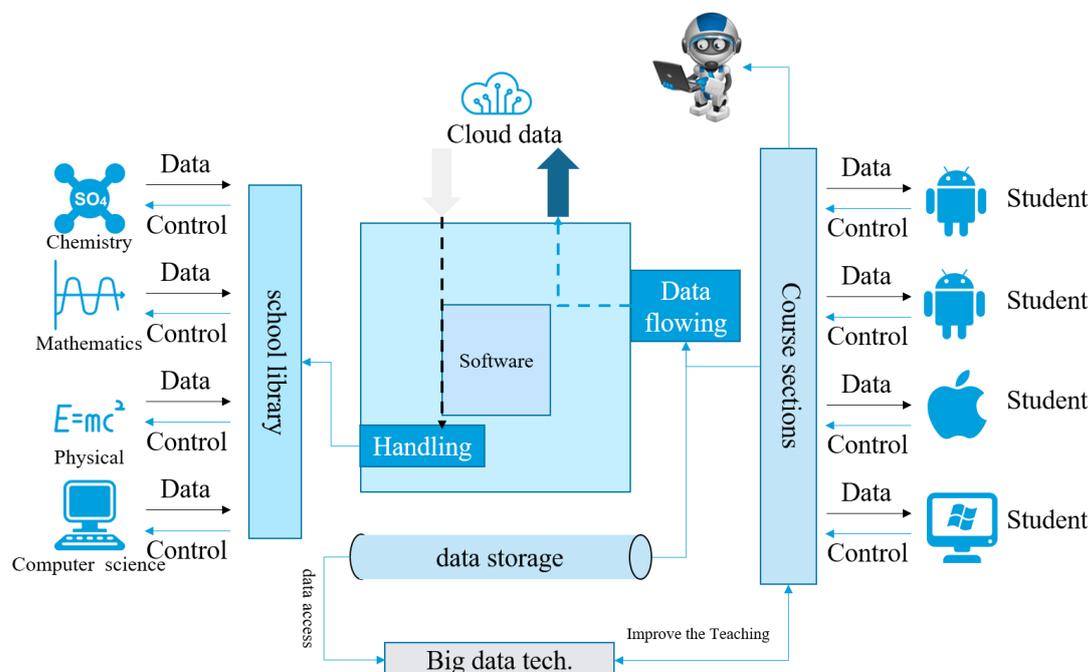
**Service Mode; University Library; data Mining.**

## 1. INTRODUCTION

With the rise and continuous development of big data, the construction and development of university libraries have also innovated the service model under the influence of big data [1]. As an important department of the development of colleges and universities, the university library plays an important role in the research and development of various disciplines, and big data has gradually joined in the information service and information resources construction in the library [2]. The arrival of the era of big data has not only changed people's life, work, and way of thinking but also exerted an imperceptible influence on the development of university libraries to a great extent [3].

The digital library of the university library is an important result of big data's influence on colleges and universities [4]. the establishment of a digital library can increase the convenience and real-time performance of library services and make the whole library more open. In the open library, readers can find the text materials they need more conveniently, and library managers can also collect data through the information of readers, summarize which books are borrowed frequently, and extract availability data [5]. With the rapid development of information, the information construction of colleges and universities in China is also booming, and more and more service facilities take data interaction as the fundamental element of development [6]. Big data has also penetrated the service field of high universities. University libraries should keep pace with the development of the times and make use of big data's advantages in mining and analysis to release data dividends so that data can be transformed into potential knowledge services, as shown in Figure 1. and use the data to predict the direction of development, to broaden the management and service quality of university libraries, and provide a more scientific methodology for personnel training in colleges and universities. Therefore, it is of great significance to explore and study the service mode and development path of the university library under the environment of big data [7]. The vigorous development of the cultural market also poses a challenge to the volume of the university library. The library of any university can not collect all the books, nor can it process and utilize all the books. Making

use of big data's convenience can help local and even national colleges and universities to form a relatively complete collection system, maximize the use of library resources, and meet the needs of readers [8]. Big data's application in the university library is a centralized library management mode, this structure is highly concentrated in the internal sources of funds, all readers can read at any time through mobile phone terminals and Internet terminals, and save a large number of books [9].



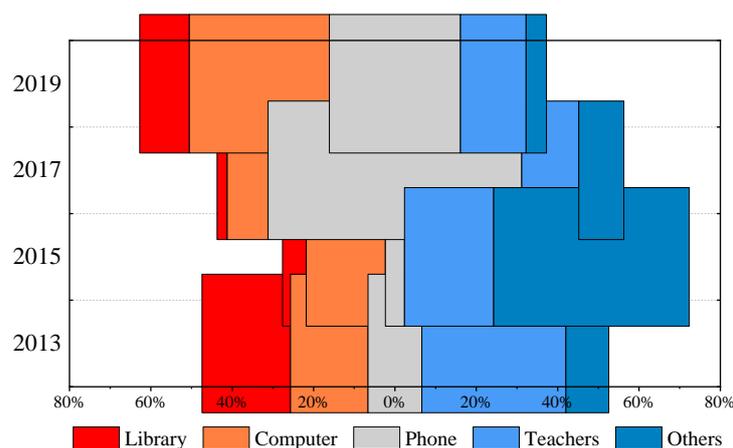
**Figure 1.** The connection between students and the school library

Under the influence of big data, fundamental changes have taken place in the service mode and content of university libraries. with the development of the Internet, the new service mode analyzed and excavated by big data will become an inevitable demand in the future. Big data's influence on the library also lies in helping to form the classification and arrangement of books, and on a unified platform, it has changed the problems of scattered collection catalogs and poor exchange of information with the outside world in the past. Big data's mirror technology also links physical books and virtual electronic materials, making it easier for readers to read. In the process of the development and improvement of information construction, data accumulation is the basis of big data mining and decision analysis system construction. Therefore, while improving and optimizing the functions of all levels, university libraries should also implement the work of co-ordinating big data resources, speeding up the research and development of core technology, intelligent decision-making, and scientific management. This is the core development direction of big data mining and decision analysis system construction.

## 2. THE ABILITY REQUIRED FOR THE CONSTRUCTION OF THE SERVICE MODE OF UNIVERSITY LIBRARY UNDER THE ENVIRONMENT OF BIG DATA

First of all, it is necessary to have big data's theoretical technology and key technology, surround big data for life cycle management, tackle key problems in key technical fields, and establish big data modeling and unstructured data analysis of the university library. improve the ability of data processing and assistant decision-making. To give full play to the functions of

big data collection, arrangement, and mining, it is necessary to use big data mining software and visualization software to create a relevant product system suitable for the university library. In the product development, we can integrate the business process of the traditional library for design, and then open up all aspects of the service management of the library. And as shown in Figure 2, as the popularize of smartphones and 4G Internet, more and more students tend to use a phone to borrow books, which is important for us to provide more convenient ways to help them get information.



**Figure 2.** The schematic diagram of the theory of multiple intelligences

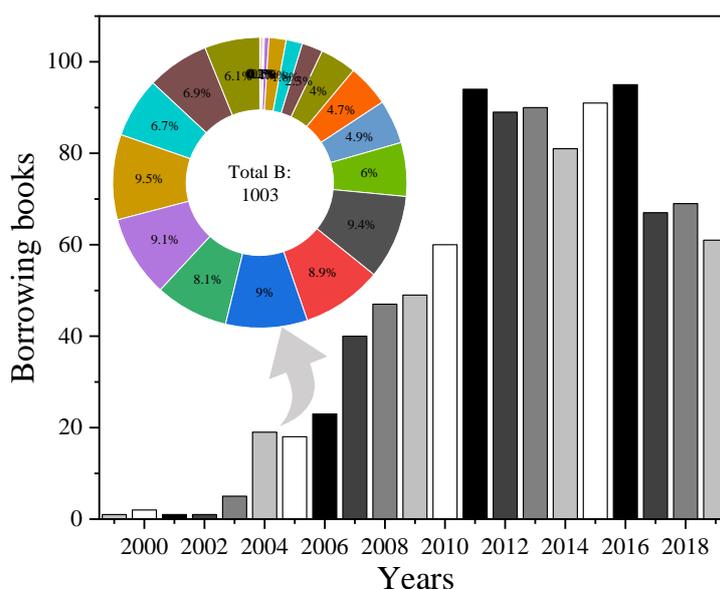
To expand the data resources of university libraries, managers need to form a library alliance with other universities, innovate constantly in the integration of resources, and improve the collection reserve of the library [10]. Based on cooperating with other high school resources, it can also ally with the publishing industry and industry. In data analysis, we can also learn from the intelligent decision-making of other universities, which is helpful for our school to better understand the implementation of library services, avoid the rigidity of management model and development bottleneck, and strengthen the development ability of core science and technology. In practice, a series of scientific data platforms have been established in China, such as the scientific data-sharing project supported by the ministry of science and technology. When the new communication system is formed, the professional library should deeply consider and study the information service environment created by scientific research. Considering how to provide information and data service in the new information environment where the original data, derived data, and scientific literature are integrated after the fusion of scientific research results; The responsibilities, roles, and roles of information institutions in the construction and operation of research data research infrastructure. Analyzing its potential value from a large number of data will become a major business of libraries in the era of big data, and the level of providing these services will determine the development level and direction of libraries in the era of big data. In particular, professional libraries should analyze the knowledge structure, basic accomplishment, and basic skills of research data scientists, and integrate them into the training plan to provide needed talents for the future society.

### 3. THE SERVICE MODE AND DEVELOPMENT DIRECTION DESIGN OF UNIVERSITY LIBRARY BASED ON BIG DATA

Under the environment of big data, university libraries can use the technologies of data mining and data warehouse to analyze the current management situation of university libraries, understand the information needs of users, and extract effective data. take it as a basis for

decision-making to improve library service and management. Therefore, in the design of service mode and development direction, we can start from the following aspects.

Students of different majors have different needs for reading. Big data mining and analysis functions can provide personalized needs for students so that each student can find a suitable bibliography. Big data's digital customization can become one of the new service contents in colleges and universities. It lies not only in the customization of book recommendation but also in the customization of information service. The so-called customization of information service means to provide a variety of information service means according to the reading characteristics of readers. Big data analysis and mining function can sum up the readers' information usage habits, technical level, and so on. The traditional university library can only provide simple data analysis, so the service mode and development direction are also limited. It has also caused the waste and idle of library resources. Big data information mining can also grasp the characteristics of readers' reading time and space, and provide library information service at the appropriate time for readers. This service model enables students in different learning periods to provide convenient information access services. Here, we list the specific borrowing books to illustrate the importance of controlling information, as shown in Figure 3. With the increase in the collecting information of students, the borrowing books show an obvious increase.



**Figure 3.** The changing of borrowing books in different years from 2000-2018

Under the influence of the development of information and technology, people's activities become more and more inseparable from mobile devices such as mobile phones. Therefore, the university library can meet the different needs of readers with the help of big data mining and analysis techniques such as unique push. Big data technology can send targeted demand information to readers regularly, to reduce the emergence of spam and reduce the time for readers to search for information on the Internet. It can also search for content and filter information according to users' interests through intelligent push, and only provide valuable information to users.

The traditional university library management only stays in the borrowing books, and rarely provides specialized consulting services. The emergence of the Internet breaks the distance between time and space, and the library can provide answer services that are not limited by time and region, which is not only an important embodiment of the service innovation ability of university libraries but also the extension and expansion of the development direction. The

provision of reference service does not necessarily cost a lot of manpower and material resources. Under the action of big data's excavation and analysis, we can provide corresponding reference and consultation according to the needs analysis of readers, rank the relevant consulting needs in a period, and then adopt a more economical and reasonable allocation of human resources, reduce the cost of management and consultation, and improve the experience of readers' consulting services.

The university library based on big data is open to a certain extent. For library managers, it is possible to speed up the grey computer system according to resources, understand the external demand, and then match the corresponding staff according to the demand, and make the service process more streamlined. At the same time, it realizes the high efficiency of management. In the process of library business, big data can also give full play to his advantages and improve the service efficiency of the library by providing data collection and mining. For example, library staff can use feedback information such as historical purchase data and reader reading data to understand the potential needs of readers for the library, and understand the future reading needs of readers in their data usage habits, to provide decision-making reference for library procurement, storage, and services.

#### **4. PERSONALIZED SERVICE OF UNIVERSITY LIBRARY BASED ON BIG DATA MINING AND DECISION ANALYSIS SYSTEM**

In the new era, many colleges and universities have applied a large number of funds to the acquisition and purchase of electronic resources, to provide a good learning environment and access to literature and information resources for university teachers and students. However, university library managers are unable to understand the utilization data of different electronic resources, and most of the data are in the hands of resource suppliers. Scientific and reasonable purchase of electronic resources can achieve the efficient use of electronic resources. Under the big data mining and decision analysis system, the statistics of the utilization rate of purchased electronic resources include the type data of the types of resources visited. For example, a university library has set up a log collection device at the exit of the campus network to collect the access URL request address and keywords of electronic resources, to form a statistical report. Also, the library needs to store and retrieve some large-scale and long-span data, to build a specific big data storage exchange and analysis model. Also, it is necessary to achieve a reasonable selection of electronic resources procurement to provide a good guarantee for the adjustment of school funds. The library of the university has formed a cost-effective factor, and the formula is as follows:  $\text{cost-effective factor} = \text{resource purchase price} / \text{utilization rate} \times \text{macro factor}$ . The above-mentioned companies have made a reasonable selection of electronic resources procurement, to effectively save expenditure and improve the efficiency of funds adjustment in colleges and universities.

As a part of the society, the university library has always been the focus of public opinion. With the rapid development of network media, the library's every move will be affected. Therefore, strengthening the attention and monitoring of the external reputation and public opinion and obtaining the external evaluation of the university library in time can promote the deficiency in the analysis platform. Also, public opinion guidance can be formed through public opinion early warning. For example, the university library can establish a data collection platform and data mining platform to analyze the network data, pay attention to the media comments about the university library in time, and urge the decision-makers to make decisions more rationally.

In the process of practical application and image research, people often only need some parts of the image. For example, in the automatic detection of electronic components, for analyzing the image of the product, objectively detect whether there is a specific abnormal state, such as

missing components or broken connection lines, often called targets or prospects. To identify and analyze the target, these relevant regions need to be separated and extracted, on this basis, it is possible to make further use of the target. Image segmentation technology refers to the technology and process of dividing an image into regions with different characteristics and extracting objects of interest. Based on the two basic characteristics of luminance value-discontinuity and similarity. Image segmentation algorithms generally select one of the features to deal with. The main application of the processing method based on the first kind of feature is to segment the image based on the discontinuous change of luminance, such as the edge of the image. The main application of the processing method based on the second kind of feature is to segment the image into similar regions according to the pre-established rules. The overall development of big data resources is the basic content of big data, a university library. Through the overall planning of internal and external data resources, make full use of the existing data resources and infrastructure platform to achieve resource integration and correlation analysis, to effectively improve the relationship between university libraries and external big data. Through the specific overall planning, establish a low-cost, high-efficiency big database setting platform, and form a strong industry data aggregation platform. On this basis, we should implement the micro-service, realize the personalized construction of the university library service, promote the all-round development of the library, connect with many systems in the university, and realize the intercommunication and sharing of the system. Also, the top-level data is set up to achieve data management and sharing. In addition to strengthening overall information planning and realizing information sharing, it is also necessary to realize the opening of social and public data resources in university libraries, truly realize "big data + micro-service", and establish personalized and customized applications [1].

The main core of the big data service system of the university library is customer, no matter it is service or operation mode. It is necessary to optimize the internal service process of the library, collect it organically, and establish a characteristic service technology. After big data's computing service is established, you also need to train the data calculation and algorithm model, import the calculation results into ADS and cloud database, realize multi-valued list query and real-time response through ADS, then generate specific BI reports, and store the other part in the cloud database, to reduce costs and improve security, as shown in Figure 4.

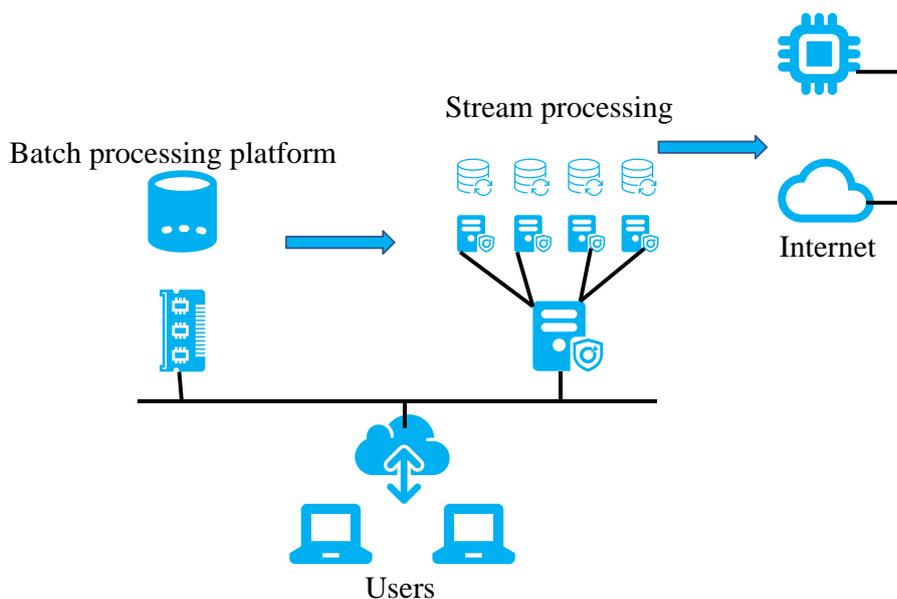


Figure 4. University library distributed big data stream processing framework

The process of big data mining and decision system analysis in a university library can be divided into four aspects: first, multi-dimensional extraction of data sources; second, evaluation data scale and sample analysis; third, determine the modeling mode according to the actual needs; fourth, determine the output mode and optimization according to the demand. The information data in a university library has the characteristics of a large amount of information and high complexity, so the library should extract data from many dimensions, including different service businesses of the library, big data storage and exchange platform, external Internet, and so on. ensure the perfection and extensiveness of the data, and lay a good foundation for later decision-making analysis. For example, install a crawler engine to complete the data extraction work. Also, the evaluation system, as the most important content in the university library system, must be paid comprehensive attention to, adopt scientific evaluation methods and evaluation system, and choose the appropriate distribution mode according to the scale to calculate and analyze the application architecture. On this basis, an Agent-oriented requirement modeling method is established to monitor and analyze the readers. In the new era, to improve the system of big data mining and decision analysis in the university library, it is necessary to realize intelligent decision-making and scientific management. The main purpose of the construction of big data mining and decision analysis systems of the university library is to help university library decision-makers to realize scientific decision-making, prediction in advance, perception in the event, and feedback after the event. Through the big data system, decision-makers can timely grasp the development of the library and the implementation of policies, and then achieve comprehensive development in the process of practical application, better complete feedback and correct policy programs, and make policies more effective.

## 5. CONCLUSION

With the rapid development of information technology, the service of the university library should keep pace with the times. By using big data mining and analysis functions, we can grasp the readers' needs for the library more quickly and accurately, and improve the utilization rate of the library and the reading experience of the readers. Big data is the inevitable outcome of the development of modern society, which can play a catalytic role in the process of decision-making. The university library itself is the aggregator of data, and the vitality and value of data should be used rationally. It has become an important force to promote the service of university libraries. In the "Micro era", big data's convenience and pertinence points out the future development trend of university libraries, releasing data dividends and making data become the basis of decision-driven. Big data analysis and mining roles should be paid attention to by the educational circles so that the data can wield advantages and improve the core competence of talent training in colleges and universities.

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