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Original Research Article

# The Application and Prospect of Big Data Technology in Library Information Management

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***Abstract:*** Information management, as an important means of information organization, element acquisition, and utilization, is a relatively important task for libraries, directly related to the development of libraries in the future. Library information management needs to have the function of comprehensively organizing materials and extracting value elements, which can analyze user needs and achieve personalized service push based on this. Big data technology has powerful processing capabilities for data, and its application in library information management can empower information management. Given the role of big data technology in enhancing the capabilities of libraries, this article introduces its application in information management and looks forward to the future development of library information management under technological empowerment.

***Keywords:*** Library information management; Big data technology; Data analysis; Policy decision

## 1. Introduction

Big data technology has strong penetration and has achieved deep integration in many fields, changing the inherent work forms and role positioning of related fields, including libraries. Libraries rely on big data technology to change the way information is stored, evolving from storage centers to digital information management models and becoming knowledge service providers for the public. Big data technology has both advantages and disadvantages for the development of libraries. The inherent service forms of libraries have undergone significant changes, during which they not only gain development advantages, but also face considerable challenges. This article analyzes the use of big data technology in library information management.

## 2. The application of big data technology in library information management

### 2.1. Data collection and aggregation

Libraries use big data technology to manage the information they hold, accelerate the speed of electronic construction, transform traditional paper materials into electronic form, establish databases, online catalogs, and social media platforms to manage the materials they hold. Big data technology is used in data information collection and management, which involves the use of data retrieval tools for data feeding. Through application programming interfaces and other tools, information is automatically retrieved and managed. During the information management period, libraries can efficiently collect data information through modern software and tools, while also complying with data privacy regulations to ensure that their rights and interests are not infringed upon.

Data processing involves a lot of work data, including filtering data, structured data, etc. Processing large amounts of related data requires the use of valuable tools such as Spark and Hadoop, which have high value in data processing. The focus of integration technology in various data processing is to input data into data

warehouses or databases, which involves data conflict resolution, data attributes, and the establishment of different data set relationships. In data processing, libraries can effectively handle data streams and improve the consistency and coherence of data information processing through integrated platforms and related tools. The library uses big data technology to create a dynamic management center for data information, accelerating the speed of data processing. Through permission settings, data is divided into different groups, improving the targeted management of information in the library.

## 2.2. Data analysis and mining

The data information generated by the library will increase over time, including digital collections, catalog searches, user interactions, and circulation records. Relevant data is crucial for libraries, providing valuable insights into resource utilization, user behavior, and certain aspects. In information management, libraries can use big data technology to effectively and quickly process information, analyze database content, and facilitate the utilization of data. In information management, libraries can use data visualization tools such as PowerBI and Tableau to express data information in a visual way, making it easier for stakeholders to obtain information directly. In data processing, libraries will use techniques such as normative analysis, descriptive analysis, and predictive analysis to deeply process the information stored in the database and provide actionable suggestions. In data processing, libraries create retrospective views of data and display models of event content through descriptive analysis. By using predictive analysis techniques to process the recorded content of events that have already occurred, predictable results can be obtained based on data. In terms of service and operation, the library processes the work data from a previous period using normative analysis to obtain analysis results on related work, and provides guidance on library service and operation.

Big data analysis and data mining are two closely related parts, and they also play a significant role in improving the level of library information management. The existence of data mining enables deep processing of library database information, utilizing different data processing techniques to search for meaningful information from multiple perspectives, including resource utilization, user needs, and information flow. Cluster analysis, association rule mining, anomaly detection, and classification analysis are all tools of data mining algorithms. They are selected according to the needs of information mining, and analyze data using a single technique or a joint approach to obtain directional results. The existence of data mining in information management plays a huge role in resource allocation, user service, and collection resource development. Based on the identification and mining of data, the obtained information can be used as a tool for libraries to predict future situations and locate user needs. It can provide personalized services for library resources, create a highly personalized reading list, and attract a large number of users.

## 2.3. Data presentation

The library utilizes data visualization tools to effectively transform data and present difficult to understand information in the form of images or charts. Libraries rely on data technology to present textual or digital content in a visual form, including the use of collection resources, user activity frequency, and so on. During the information management period, libraries change the inherent form of data management by presenting data clearly and conveying opinions reasonably, improving the operability of information presentation and increasing its value for use. Under the management of library information and the application of big data technology,

complex data information can be presented in a visual form. Through the reasonable use of visualization tools, good results can be achieved in practice.

# 3. The prospect of big data technology in library information management

## 3.1. Personalized service

The library uses big data technology as a means of optimizing services, evaluates user behavior based on the results obtained from big data analysis, determines their preferences in a certain aspect, and thus achieves personalized service project push. Library information management, based on big data technology, recommends articles, books, and other resources to individual users through content filtering, collaborative filtering, and other methods. Collaborative filtering algorithm is a representative tool in big data technology. Libraries apply it to the analysis of operational data. Based on the analysis of the stickiness between libraries and users, combined with users' preferences for resources, highly personalized services are launched, which can improve users' experience in service reception. The library utilizes big data technology to create a personalized recommendation system, which can become a tool for users to discover their favorite content. Users can use the equipment provided by the library to input key information about their favorite materials into the search bar, and the system will search for materials based on relevant elements. In the use of big data technology, libraries need to prioritize user experience and maximize the user experience.

## 3.2. Data driven decision-making

In formulating operational strategies and designing service projects, libraries need to be grounded in reality, based on sufficient understanding of future industry development directions and user needs, and provide constructive solutions. Library information management needs to use big data technology as a means to conduct in-depth research based on existing data information, so as to make better judgments about the present and even the future, find appropriate management methods, and ensure that all work can be carried out well.

In the use of big data technology, libraries use data as a driving force to formulate information, and under the operation of tools, summarize data from different sources, including external repositories, collections, and user interactions, and integrate such data into databases for analysis. In the analysis of data from different sources and types, libraries use big data technology to integrate information processing, discover the correlation of data, extract valuable elements, and serve as support for service performance and development prospects. Under the drive of data-driven decision-making, libraries can develop strategic plans that are suitable for themselves and provide operational intervention measures to improve the utilization level of their collections, promote better library operations, and achieve strategic plan goals.

# 4. Conclusion

In the era of information networks, the explosive growth of data volume has led to a rapid increase in the content of materials stored in libraries. The collection, organization, and analysis of data all test the information management capabilities of libraries, which are related to the launch and quality optimization of their service projects. Big data technology has strong data processing capabilities, and its presence in library information management provides conditions for data storage, organization, and value element extraction. Libraries need to seize the future direction in the tide of the times, fully utilize big data technology, and optimize various services.

Based on the present, libraries need to analyze future development trends, identify their own shortcomings, fully utilize technological means to seek development, and provide users with better quality services.

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