Informatization Construction of University Archives Management under the Background of Information Age

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Abstract: With the rapid development of modern computer network technology, the management of colleges and universities has also entered the information management era. How to efficiently use modern network technology and database technology to improve the informationization level of the student status file management system has also become a research hotspot of many scholars at present. Therefore, the purpose of this paper is to study the informatization construction of university archives management under the background of information age. Based on the actual requirements of information campus construction, this paper investigates the current situation and existing problems of archives management in colleges and universities. According to the present situation of archives management, an information-based university archives management system is designed, in which all students' archives are stored in the campus service center to prevent loss and facilitate management. Its purpose is to store the relevant information of students' personal files through information technology, so as to facilitate the management of students' personal files. In this paper, Hadoop is used to distribute massive data, and HBase distributed database is deployed to realize a campus archive information management system based on cloud computing model and information processing. The basic functions of the management system include registering related information, borrowing and returning files, transferring out files and inquiring files. Finally, this paper compares the information university archives management system with the traditional management system. The experimental results show that the information university archives management system has larger storage space, higher data processing efficiency, faster data processing time than the traditional management system by 50ms-100ms, and higher safety factor. This greatly speeds up the construction of the digital campus archives management system, and is an important measure of China's higher education under the informationization tide.

KeyWords: Information Age, Informatization Construction of University Archives Management, Informatization University Archives Management System, System Running Environment
1. Introduction
With the rapid development of the education industry and the continuous expansion of teachers in colleges and universities, the number of students in colleges and universities has also been increasing. During the period from enrollment to graduation, students have left a large number of student status files, including basic personal information filled in by students at enrollment, achievement information during four years of universities, rewards and punishments, information changes, etc., which are mostly stored in the archives of colleges and universities in paper form. However, the traditional archives management mode can no longer meet the needs of university administrators. With the development and progress of Internet technology, the archives management mode of college students' student status is gradually becoming information-based. The information-based archives management system not only reduces the workload of the staff, but also improves the work efficiency. The construction of information-based archives management system is becoming more and more urgent.

The concept of archival information management system originated from the western developed countries in 1960s and 1970s. Due to the rapid development of information technology, electronic documents are widely used in various fields of social life, and archives begin to be presented in a digital way, thus providing users with better archives management and information query services. In foreign countries, Agunov discussed the information management of federal digital archives, and introduced the collection and corresponding resources. Information was placed in archives appraisal and archives communication [1]. In China, this kind of archives information management system has been popularized gradually. Li Xue analyzed the storage and utilization of digital archives with big data characteristics according to the practical problems faced by archives information management, and concluded that the modern processing technology of big data not only provides support for archives information management, but also promotes the development of archives information theory and practice [2].

In this paper, aiming at the research problem of informatization construction of university archives management under the background of information age, starting from the actual requirements of informatization campus construction, the present situation and some existing problems of university archives management are investigated, and an informatization university archives management system is designed. In this system, user registration and account management, file collection, file management, retrieval management, statistical analysis and other functions are realized. The system has perfect user management function, can provide convenient and quick query function, and has various means of data input and management, which can assist in handling teaching affairs. It meets the needs of college students' archives management, and has important reference significance for further exploring the informatization construction of college archives management.

2. Technical research on Informatization Construction of University Archives Management Under the Background of Information Age

2.1 Information Age

(1) Concept of information age
The information age is the age when information produces value. Informatization is the general trend of the development of the present era, and represents the advanced productive forces. According to toffler's point of view, the third wave in the information age is the information revolution, which started from the mid-1950s, and its representative symbol is "computer", with information technology as the main body, with emphasis on creating and developing knowledge. With the decline of the agricultural era and the industrial era, human society is transitioning to the information age and striding into the third wave of civilization, and its social form is developing from industrial society to information society. The biggest difference between the information society of the third wave and the agricultural society and industrial society of the first two waves is that it no longer focuses on physical
and mechanical energy, but on intelligence[3].

(2) Characteristics of the information age

1) comprehensiveness
On the technical level, informatization refers to the comprehensive product of multiple technologies. It integrates semiconductor technology, information transmission technology, multimedia technology, database technology and data compression technology. At a higher level, it is the integration of politics, economy, society and culture. People generally use the word synergy to express this comprehensiveness in the information age.

2) Competitiveness
One prominent feature of the difference between informatization and industrialization is that informatization is promoted by market and competition. Government guidance, enterprise investment and market competition are the basic paths of information development.

3) Permeability
Informatization has brought about comprehensive and profound changes in all fields of society. It has profoundly affected material civilization and spiritual civilization at the same time, and has become the main traction force of economic development. Informatization makes the mutual exchange and penetration of economy and culture increasingly extensive and strengthened [4].

4) Openness
Innovation is the soul of high-tech industry and the magic weapon for enterprises to win in competition. Participate in competition, innovate in competition and win in innovation. Openness refers not only to the opening of society, but also to the opening of the soul. Opening is the spiritual opening of innovation, and opening is the source of innovation.

2.2 Information University Archives Management System

(1) Demand analysis
The functional components of the information campus archives management system are: archives management module and administrator management module. The functional components of the file management module are: creating files, charging files, transferring files, inquiring files, borrowing and returning files. Before borrowing or transferring files, you need to verify your identity and record the reasons for borrowing or transferring files, so as to avoid serious consequences such as losing files and revealing private information. The administrator management module is mainly the management of archives managers in campus, such as adding new managers, modifying managers' passwords or personal information, etc[5].

The business process of the system is the service process of campus archives managers to archivists. There are two ways of information campus archives service: one is to register and archive for users, and the other is to manage archives. The way of user registration and archiving is that when the archivist comes to the service front desk, the manager helps the archivist to register and archive. The archives management mode is the service mode of campus archives managers to users when users borrow or transfer out archives.

(2) Feasibility analysis

1) universality and universality
The universality of the design of the information-based campus archives management system is reflected in the fact that any archives management unit can modify the system slightly and then it can be used. The universality of the management system is reflected in the fact that every archive management unit needs to keep the archives of business personnel safely [6].

2) Maintainability
The maintainability of the information campus archives management system is reflected in the easy understanding of program code, simple and clear structure, and convenient operation of documents.

3) Economy
The economic performance of the design of the information campus archives management system is that the designed system is highly integrated as a whole, which makes the most effective use of investment funds. From the aspects of software development, software management and maintenance, management personnel training operation, etc., it has reduced a lot of manpower and saved the expenditure of material and financial resources [7].

2.3 System Operating Environment

(1) Hadoop
Hadoop is a software framework for distributed processing of massive data maintained by Apache Foundation. It has a highly reliable, efficient and scalable distributed data processing method, and can run applications on clusters composed of a large number of cheap hardware devices, providing a set of reliable interfaces for applications, aiming to build a distributed system with high reliability and good scalability. Hadoop has two core services: one is reliable data storage service provided by Hadoop through distributed file system, and the other is high-performance parallel data processing service provided by Map-Reduce technology. Clustering algorithm is often used in Hadoop operation, but its effect needs to be measured [8].

Internal information needs to be analyzed when measuring, which usually refers to judging according to some parameters in the finally generated class cluster. Usually, mathematical indicators such as information entropy and purity are used to evaluate clustering results, and the specific definition formula of these indicators is as follows:

\[
Entropy = \sum_{i=1}^{k} \frac{n_i}{N} \left( -\sum_{j=1}^{q} \frac{n_i^j}{n_i} \log \frac{n_i^j}{n_i} \right) \tag{1}
\]

\[
Purity = \sum_{i=1}^{k} \frac{1}{q} \max(n_i^j) \tag{2}
\]

In which \(q\) refers to the number of original classes of data, and \(n_i^j\) refers to the number of data in the \(j\) class contained in the generated \(i\) data class cluster. In the most ideal case, \(Entropy = 0.0\) and \(Purity = 1.0\).

(2) HBase
HBase is a distributed and column-oriented open source database, which is a subproject of Apache Hadoop project. Unlike the general relational database, HBASE is a database suitable for unstructured data storage. It is a highly reliable, high-performance, column-oriented and scalable distributed storage system. Using HBase technology, large-scale structured storage clusters can be built on cheap PC Server [9]. HBASE is an open source implementation of Google Big Table. Similar to Google BigTable, it uses GFS as its file storage system, while HBASE uses Hadoop HDFS as its file storage
system. Google runs Map-Reduce to process massive data in BigTable, and HBASE also uses Hadoop Map-Reduce to process massive data in HBASE [10].

Multi-objective decision algorithm is the key algorithm of HBase. On a given data set, each dimension has a corresponding information degree function, that is, for any dimension, some data sets can be eliminated according to the result of \( V_i \) in the middle of calculation, and the normalization formula is given:

\[
T = \sum_{i=1}^{d}(a_i * v_i)
\]  

Where \( a_i \) is the weight factor of each dimension and \( t \) is the target normalization result.

3. Experimental research on the Informatization Construction of University Archives Management Under the Background of Information Age

3.1 Experimental Data

In this paper, 50 students were randomly selected from colleges and universities to conduct a questionnaire survey, and 1000 students' file data were tested. The total size of the file data was 5G.

3.2 Experimental Process

In this paper, some students were interviewed in colleges and universities, and some questionnaires were distributed. In this way, we can know the students' views and suggestions on the current archives management system in colleges and universities, and some specific needs of the students. Then, a total of 1000 student file samples are sent to the information university file management system and the traditional management system for preprocessing, accessing and querying. These archive data exist in all databases in the archive management system of information-based colleges and universities respectively, so as to test their storage capacity. In addition, it is necessary to register relevant information, borrow and return files, transfer out files and inquire about files according to the actual situation. Test the practical application effect of information-based university archives management system. This paper mainly compares the actual application effect of the two systems by recording the time needed to process the same amount of data after the preprocessing operation.

4. Experimental analysis of Informatization Construction of University Archives Management Under the Background of Information Age

4.1 Pre-processing Performance of Information University Archives Management System

Under the same working conditions, this paper tests the difference of data preprocessing performance between the information-based university file management system and the traditional file management system. First of all, we test the response time of the two systems with different number of files. The experimental results are shown in Table 1 and Figure 1.

| Number of files | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| New system response time(ms) | 51  | 112 | 186 | 256 | 437 | 574 | 781 | 869 | 984 | 1134 |
| Traditional system response time(ms) | 213 | 324 | 578 | 732 | 943 | 112 | 146 | 162 | 1840| 1987 |
From the experimental results of preprocessing students' file data by the two systems, it can be clearly seen that the preprocessing response time of the information university file management system proposed in this paper is faster than that of the traditional file management system. At the same time, with the increase of the number of students' archives, the response time of traditional archives management system is obviously higher than that of information university archives management system. This is precisely because the information-based university archives management system proposed in this paper makes more comprehensive and in-depth use of information processing technology, which can effectively identify and classify massive data, and is more organized and efficient in preprocessing. Information processing technology can deal with these meaningful data professionally. Therefore, in the face of a large number of data, the information university archives management system proposed in this paper can still deal with these data in an orderly manner, with high processing efficiency.

4.2 Practical Application Effect of Information University Archives Management System

Based on the actual file management process and daily needs of colleges and universities, this paper verifies the practical application effect of the information-based university file management system proposed in this paper. We store and query these 1000 student files with the information university file management system and the traditional file management system proposed in this paper, in which the number of student files stored and queried increases every time. In this paper, the storage and query time of the two systems are visualized, and the curves are fitted according to the mean value respectively. As shown in Figure 2.
Figure 2. Comparison of storage and query capabilities

From the experimental results, we can see that there is a big gap between the two systems in storage and query operations. With the increase of data, the time of storing and querying data in the information-based university archives management system proposed in this paper increases gradually, and the increase is smaller than that in the traditional archives management system. At the same time, the time of storing and inquiring data in the information university archives management system is generally 50ms-100ms less than that in the traditional archives management system. This is because the information-based university archives management system proposed in this paper can start from the actual needs of archives management, combine with information technology and efficient and stable operating environment, and can classify and store massive data in its own huge storage space in an orderly manner, and can respond quickly according to the categories when querying, and query the required archives data.

5. Conclusions

Under the background of information age, this paper studies the informatization construction of university archives management. Based on the actual requirements of information campus construction, this paper investigates the present situation and some existing problems of archives management in colleges and universities, and designs an information university archives management system. The system has perfect user management function, can provide convenient and quick query function, and has various means of data input and management, which can assist in handling teaching affairs. Through real-time data collection and comprehensive analysis of all kinds of information, the system can realize intelligent management, improve the efficiency of specific application scenarios, and meet the management needs of college students' archives. This has important reference significance for further exploring the informatization construction of university archives management.

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