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Research on the Application of the Culture Resource Management Based on Big Data Technology

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Abstract*:* Culture resource is the key factor to support China's culture power, which is also the basement and fountainhead of China's culture and culture industry development. Nowadays, we focus on developing digital work on material culture and intangible cultural resource by big data analysis technology. It is an unprecedented opportunity and challenge for deep mining and understanding well about China's culture. This paper proposes how to strength culture resource management and give some effective suggestions.

Keywords Big data; Culture resource; Data mining; Data analysis

INTRODUCTION

Culture resource is the core element of a country's cultural strength, and also the basis and source of national culture development [Moriyama *et al.*, 2017]. Our country has carried out various digital work on many kinds of cultural resources, which provides the conditions and basis for us to make use of big data analysis technology to recognize and tap the Chinese culture. This paper puts forward some suggestions for strengthening the management of culture resources, such as general idea, technical framework and relevant countermeasures.

BIG DATA AND BIG DATA ANALYSIS TECHNOLOGY

Big Data

Big data means large amounts of data. But there is no clear definition of how big a quantity of data is big data [Howe *et al.*, 2011]. It is generally assumed that the magnitude of big data should reach at least over a terabyte [Manyika *et al.*, 2011]. Once the amount of data is above this level, it will be difficult for us to use existing IT technologies and tools to effectively perceive, acquire, manage, process and utilize data within tolerable time.

In addition to multi-quantities, there are two other features of big data: the first feature is that there is a large number of data mode, including structured data, semi-structured data, and unstructured data; the second feature is that the generation of big data is very fast [Walker *et al.*, 2014]. Big data is often generated dynamically and rapidly in the form of data streams, and it has a strong timeliness. Only by grasping the control of data stream, users can make good use of these data and fully tap the value of them.

In recent years, with the development of the Internet, Internet of things, cloud computing and integration of three networks, big data mining has become the hot topic of industry, academia and government, and is changing our lives, work and mode of thinking in different ways [Madden *et al.*, 2012].

We should strengthen the use of big data with cultural connotations and characteristics, especially from the angle of improving the management and utilization of various cultural resources.

Big Data Analysis Technology

The big data technology can be divided into large data analysis technology, big data engineering, big data science and big data applications and other fields. At present, big data analysis technology and big data applications have been widely used in many fields. However, big data engineering and big data science have not yet been studied in depth [Fan *et al.*, 2014]. Big data engineering refers the systems engineering for the planning, construction, operation and management of big data. By observing the development and operation of big data networks, the laws of big data and their relationship with natural and social events can be found and validated, which is called big data science [Marx *et al.*, 2013].

Compared with traditional database applications, big data has many characteristics, such as complex data types and difficult in query. Architecting Big Data: Challenges, Studies and Forecasts published in Chinese Journal of Computers lists several important features that big data analysis platform needs to have, analyzes the current mainstream implementation platform, including parallel database, MapReduce and hybrid architecture based on both platform, and points out their respective advantages and disadvantages. At the same time, it also introduces the research status in all directions and the author's efforts in big data analysis, and makes a prospect of future research.

Big data technologies include massively parallel processing (MPP) database, data mining grid, distributed file system, distributed database, cloud

computing platform, the Internet and scalable storage system [Hashem *et al.*, 2015]. In order to carry out big data analysis, computer information processing technologies such as Chinese information processing, pattern recognition and knowledge mining, as well as related hardware and software systems, are all important core technologies.

CULTURE RESOURCE MANAGEMENT

Culture resource management is for the management of cultural assets, including the historical heritage, technological heritage, social heritage, architectural heritage, innovative technology and cultural assets. Therefore, for a country, cultural resources are unique assets that are formed in the course of its civilization development, and are unique and non expandable.

Cultural resources represent the core content and symbolic elements of a country's cultural soft power, as well as the basic materials and sources for the creation of various cultural and artistic products. Therefore, we should attach importance to the management, protection and utilization of cultural resources from a strategic point of view.

Cultural resources include many forms and kinds. On the whole, it can be divided into tangible and intangible assets. It can also be classified from multiple perspectives, such as renewable, time and so on. In accordance with the current classification of cultural industries in China, the culture resource management involves cultural heritage protection service, cultural study, community service, library and archive.

THE DEMAND OF CULTURE RESOURCE MANAGEMENT FOR BIG DATA ANALYSIS TECHNIQUE

With the continuous development of digital cultural resources and information, all kinds of digital culture resources have been constantly established and improved, which objectively establishes a huge database with big data characteristics [Demirkan *et al.*, 2013]. This helps us utilize the advanced information technology, such as big data analysis and so on, to realize the integration, sorting, and analysis of these cultural resources information. From this point of view, our traditional culture, such as Zhang Junmai's writings and statements, will always be displayed, and this show thanks to big data technology.

The big data of culture resources can be divided into two categories, including the new big data of culture resources, and the big data of historical culture resources based on digitization. From the point of view of culture resource management, these two kinds of big data all exist and have great application value. Zhang Junmai argued that new cultural resources could not be created without the protection of old cultural resources, and that the old cultural resources could not be protected without careful treatment of the innovation of cultural resources. Due to the existence of big data platforms, each culture can be interpreted and spread. And in the process, Zhang Junmai's "cultural salvation" proposition, despite its subjectivity, has been spread. Moreover, this kind of communication has played an important role in today's society.

New Big Data of Culture Resources

According to the different sources of data, the new big data of culture resources can be divided into two categories: random information and industry information.

Random information refers to a large number of random data generated by Web searches, downloads, clicks and uploads based on the Internet and Internet of things. It can also be referred to as unstructured data or random big data. An important purpose of mining and analyzing these data is to analyze the behavior of cultural consumption. The analysis of cultural consumption characteristics and preferences of different Internet users will help to better understand the market demand of various cultural products and cultural activities, which is of great significance to improve the productivity of the cultural industry.

Industry information is structured data or ordered large data, such as media resources library and digital publishing library, which are consciously collected and classified according to certain plans and rules. This kind of data has the standard format, and it is of great value to all kinds of cultural information service and the research of historical documents.

Big Data of Historical Culture Resources Based on Digitization

The big data of historical and cultural resources is a kind of big data information that is planned to digitize all kinds of historical and cultural resources. The effective management and full mining of such data may be a more important application perspective and demand for big data analysis technology. With the application of digital technology in cultural resource management, all kinds of museums, libraries and other social organizations are taking digital measures to protect the material culture and the non-material cultural heritage, so as to better realize the protection, preservation and utilization of historical and cultural resources. Therefore, we can greatly improve the research efficiency of Chinese cultural connotation, characteristics and history. Furthermore, we can get many results that can't be obtained or imagined only by traditional research methods. There have been some precedents for the use of big data analysis techniques for painting identification, restoration of ancient literature and analysis of historical relics, and some amazing results have been

achieved. For example, the identification accuracy of the painting of Van Gogh, Bruegel and other masters reached more than 95%. The automatic repair efficiency of the machine named “The Dead Sea Scrolls” has been comparable to the results of hundreds of human experts in the past century.

Big data analysis technology will make cultural resources more prosperous and diverse. Big data analysis technology will help us to further deepen our understanding of the history of Chinese culture, identify the Chinese culture "gene" and continue the context. What’s more, it helps us understand that China's cultural construction should strengthen the protection, inheritance and dissemination, and helps us determine the national cultural development strategy. These resources will form a systemic element of the cultural model. For example, Zhang Junmai's cultural proposition, as an open system, will certainly fit into the world's cultural system.

THE ESTABLISHMENT OF THE BIG DATA ANALYSIS SYSTEM FOR THE MANAGEMENT OF THE HISTORICAL CULTURE RESOURCE

Status and Problems

The history of Chinese civilization for thousands of years has left us rich heritage and resources. At present, many museums, libraries and protection organizations of the intangible cultural heritage in China are carrying out digital work for the historical and cultural resources in different ways and for different applications, which has objectively formed an unprecedented and rare big data collection of Chinese cultural resources. However, because these digital resources are scattered in different units and departments, there is no uniform format standard, and a series of new "information islands" have been formed, which is difficult to give full play to their proper role.

Under the current system, a data interchange center or platform should be constructed to integrate all kinds of data resources through a certain technical means and appropriate sharing mechanism. And on this basis, we should give full play to the advantages of computer data processing, pattern recognition, knowledge mining and other large data analysis techniques. Furthermore, we should provide better and more efficient information services for users of all kinds of cultural research, cultural and artistic creation and cultural management.

Big Data Analysis Framework for the Historical Culture Resource Management

Historical culture resources are characterized by diverse structures, fields of application and users. According to the data source of the historical culture resource and its characteristics, the big data analysis system for the historical culture resource management should be a data management platform whose data source and application side are open , and it can realize the sharing of data providers and users. The frame structure is shown in figure 1.

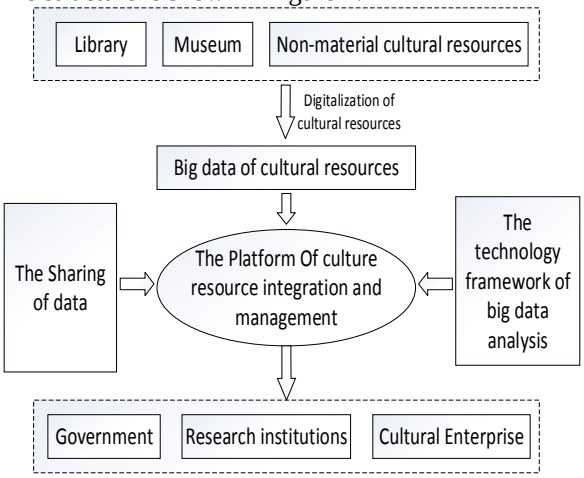

Figure 1. The framework of digital culture resources collection based on big data analysis

Technical Framework of the Data Interchange Center and the Key Problems to be Solved

In order to establish an open and shared data interchange center, the technical system framework needs to be established, as shown in figure 2. The main technical problems that need to be solved are:

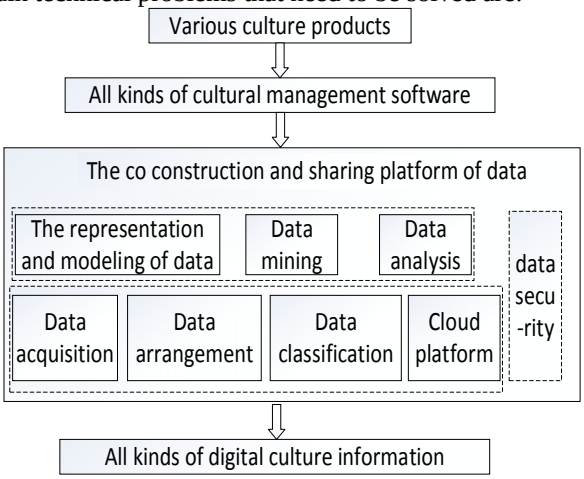

Figure 2. Big data analysis technology framework of digital culture resource

(1) The establishment of digital standard

Digital standards are a series of reusable rules, guidelines, or characteristic documents that need to be followed by digital design. There are many ways to collect cultural big data, including video, images, paper versions and so on. Therefore, we need to establish a unified digital standard and data format for storage and reutilization, including basic standard, digital design standard, digital acquisition and analysis standard, digital testing standard, digital management standard, digital support standard and information technology security standard.

In order to realize the full digitalization of cultural big data, besides the design of digital standards and specifications, the standards and specifications must be solidified into the relevant software, databases and

graphics libraries, which can ensure the normal operation of the system.

(2) The design of a unified cross platform middleware

Due to the diversity of cultural data collection and the large time span of data acquisition, we need a unified cross platform middleware. This cross platform middleware adopts a multi tier service model that includes architecture as a service, platform as a service, and software as a service, and provides services using the cloud computing environment.

(3) The efficient data sharing

Virtualization technology provides an effective means for dynamic configuration and efficient sharing of resources [Sandryhaila *et al.*, 2014]. Different cultural resource data can be processed on the same host, or stored in the same storage device in the cloud. The cloud platform is often constructed by the popular virtual machine manager, which is highly open and provides strong support for the upper application.

(4) The integrated utilization of basic technologies corresponding to the big data analysis of culture resource

The computer information processing technologies that include Chinese information processing, pattern recognition and knowledge mining, as well as the related hardware and software systems, are important core technologies for developing big data analysis. Strengthening the integrated application of related research results in these fields is an important technical basis for the realization of big data analysis.

For multimedia and other data streams, the distributed graph computing engine oriented large data analysis and mining can support the delivery of the large-scale message. Its intermediate calculation results can be saved adaptively and optimized on demand, so as to achieve the unification of efficiency and scalability. What's more, it can also ensure the effective use of cultural big data.

RELEVANT COUNTERMEASURES AND SUGGESTIONS

The sharing and utilization of all kinds of digital cultural resources not only need appropriate technical support, but also need to strengthen top-level design, and make innovations in the organizational management model and guarantee measures.

Strengthen the Systematic Planning of Cultural Digital Resources Management in China

A systematic study of the management and utilization of our cultural digital resources should be carried out jointly by the cultural, scientific, technological and publicity departments. These departments should also make clear the overall objective, task and development strategy, and propose organizational mechanisms, business models and technical standards, so as to promote the management and utilization of the big data of the cultural resources.

Organize the Implementation of National Cultural Resources Management and Sharing Special

All kinds of cultural enterprises and research institutions should work together around the strategy and objective of the national cultural resource management and development. They should carry out the construction of various historical and cultural digital resource databases based on big data technology, the research on Value Mining and the development of comprehensive utilization products.

Establish a Virtual Platform for National Digital Culture Resource Management

It is necessary to establish a virtual platform for national digital culture resource management which is open to data providers and users. The decision-making management of the platform can adopt the alliance mechanism, which is composed of the data providing units and the key application departments. They are responsible for the development of various standards and rules relating to the digitization of cultural resources. The operation and management of the platform can be undertaken by the third party technical support department. It is mainly responsible for providing technical support for the integration and comprehensive utilization of the big data of the culture resources.

Carry out Various Forms of Application Demonstration

It is very significant to select a number of key cultural topics and organize systematic cultural studies. In addition, we should give full play to the role of the market and all kinds of cultural enterprises. The development of cultural and artistic products based on Chinese history should be carried out, so as to enhance the cultural connotation of Chinese cultural products and the international influence of Chinese culture.

CONCLUSION

In this paper, the application of big data technology in culture resource management is studied. First of all, the large data and big data analysis techniques are introduced. Secondly, this paper expounds the relevant content of cultural resources management. Thirdly, from the two perspectives of new culture resources and historical culture resources, this paper illustrates the need of culture resource management for big data analysis technology. Then a big data analysis system oriented to the application of historical culture resource management is established. Finally, relevant countermeasures and suggestions are put forward according to the above research contents. The results show that the potential of big data technology in culture resource management is still huge.

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