Big Data Technology in Museum Exhibition Digitization

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Abstract: Today, museums have become a very important part of people's lives. In the exhibition of cultural relics, the level of display technology is directly related to the development and service quality of museums. With the development of science and technology, the exhibition activities of museums are gradually developing towards intelligence, networking and digitization. Big data technology plays an important role in the digital construction of museums and is widely used in museum business. This paper studies the digital museum which uses digital technology to display cultural relics and the application of big data technology in digital museum. In order to better understand the application of big data technology in museum exhibitions and its help, this paper carried out a survey in a digital exhibition museum with big data technology, counted the flow of people in the museum before and after the application of big data technology, and formulated a questionnaire to investigate the feelings of museum staff and visitors on the application. The results show that big data technology can effectively improve the effect of Museum digital exhibition.

Keywords: Big Data, Museum Digitization, Digital Technique, Cultural Relics Exhibition

1. Introduction

Museums [1] are the main platform for displaying national cultural heritage [2] and history. Each country has its own unique historical heritage and cultural background [3, 4]. With the rapid development of economic construction [5, 6], China pays more attention to the inheritance of history and culture. In the new century, with the rapid development of science and technology, a large number of industries use the Internet. Many industries have obtained good development opportunities by using big data technology, and museums are no exception.

Big data [7] is not a new technology. This technology has four characteristics: first, as the name
implies, it has a huge amount of data, ranging from TB to Pb; second, big data technology requires many types of data, including audio, video, logs, pictures, geographic location information, etc. Third, the authenticity of data, the accuracy and authenticity of data sources [8, 9] will directly lead to the correctness of the analysis results. If the data source is complete and true, the final analysis results and decisions will be more accurate.

This paper studies the application of big data technology in Digital Museum exhibition [10]. Through the questionnaire, it can be seen that after the application of big data technology, the staff of the museum can carry out the cultural relics exhibition work in the museum more efficiently, and the visitors to the museum can also get a better viewing experience and better feel the history and culture in the digital exhibition supported by big data.

2. Digital Museum and Application of Big Data Technology

2.1 Digital Exhibition of Museums

The main purpose of Museum exhibition activities is to let the public understand the relevant information of cultural relics collection, carry out reasonable, safe, purposeful and planned design, and implement comprehensive projects in art, sound, color, visual image and space environment. Exhibition has a high demand for technical means, which requires exhibition design to reflect the characteristics of human biochemistry. With the advent of the information age, digital technology has penetrated into all aspects of people's life. Digital technology is also widely used in museum exhibitions to show culture to visitors in digital form. The exhibition activities of museums will develop in the direction of integration, networking and digitization.

The application of digital technology is based on the basic conditions of computer. The information and images of the exhibits are digitized by computer. In the process of visiting the museum, the public has strong autonomy and can freely choose the contents and routes to visit. The digital display can directly display the information about the exhibits. To some extent, product display breaks through the limitation of space conditions, and is an extension of traditional display mode. It not only reduces the damage to cultural relics collection, but also fully demonstrates the essence of cultural relics collection.

2.2 Application of Big Data in Digital Museum

"Big data" refers to very large-scale data, which cannot be collected, processed, stored, analyzed and managed by traditional data tools. The volume and types of such data are very large. Big data of museums mainly includes collection data and audience data. From the functional level, museum data can be divided into four categories: collection related data with collection as the core; management data generated by museum internal business work; communication data composed of cultural communication, educational activities, digital communication tools and their feedback mechanism; online and offline user behavior data generated in the process of providing services for the audience. Only by making rational use of big data technology can we take data as a good helper in museum management and use data to promote the organization of various activities in museums.

3. Experimental Correlation Analysis
3.1 Experimental Background

The progress of computer and communication industry is obvious. The innovation, management, dissemination and statistical technology of digital resources have also been improved accordingly, and digital museum has emerged as the times require.

Big data is now being hotly discussed by all sectors of society. With the advent of the Internet era, a variety of intelligent terminal devices have been widely used. The Internet, microblog, WeChat and other social media, monitoring devices and various sensors produce a large amount of data all the time. Whenever people share information on the Internet, open different applications, or browse any web page, they collect data into the ocean of big data. The arrival of big data era is a rare opportunity for museums. We should seize the opportunity to change the old ideas and bring new development to the museum.

3.2 Experimental Design

In this paper, the Museum of big data technology is studied. The museum has been operating on big data technology for a month. Starting from the month before the museum applied big data technology to carry out digital exhibition work, this paper takes a week as a time period to count the flow of people in the museum before and after the application of the technology, so as to get the impact of the technology on the operation of the museum. The experimental results are shown in Table 1.

| Week | Before | After |
|------|--------|-------|
| 1    | 5512   | 6901  |
| 2    | 6078   | 7355  |
| 3    | 5834   | 7814  |
| 4    | 5890   | 8005  |

4. Discussion

4.1 Application Analysis of Big Data Technology in Museum Digital Exhibition

As shown in Figure 1, generally speaking, the attitude of museum staff towards the introduction of big data technology is recognized, and most of the staff are satisfied with the use of big data technology to assist their work. Among the employees surveyed, 62.1% were very satisfied and 27.5% were satisfied. These people accounted for the majority of the total number of employees interviewed. Only 8.2% of employees think that this technology has not brought obvious effect, and the effect is very common, only 2.2% of employees think that the application of this technology is very poor. The above results show that: the application of big data technology in Museum exhibition digitization can bring obvious benefits to the work of museum staff.
As shown in Figure 2, after the application of big data technology, tourists are generally satisfied with the digital display effect of the museum. Among them, 59.3% of tourists participated in the survey and the exhibition effect was very satisfactory, 30.3% were satisfied, only 9.1% of tourists thought that the application of big data technology after cultural relics exhibition was not different from ordinary exhibition, and the effect was very general, only 1.3% of tourists thought that the application of big data technology after museum experience was very bad. The above results show that: the application of big data technology in Museum exhibition digitization has a good effect on improving the exhibition effect of Museum cultural relics, and can better attract tourists for the museum.

Figure 1. Analysis on the Use of Big Data Technology by Museum Staff

Figure 2. Analysis of Digital Exhibition Experience of Museum with Big Data Technology
4.2 Digital Development Trend of Museum Exhibition

The popularity of digital technology, computers and Internet communications has led to a devastating social change. The information age of cloud concept and big data is synchronized with the electronic age, which changes the way we think about life, work and consumption. It has injected fresh blood into the development of all walks of life and brought endless challenges.

With the continuous progress of digital technology, it has become an inevitable trend to apply it to the exhibition activities of museums. Therefore, we should fully understand the advantages of digital technology in exhibition activities, and combine it with the exhibition activities of museums, so as to meet the needs of the public and ultimately achieve the purpose of improving the effect of exhibition activities.

In terms of display design, it is more avant-garde than other industries. Digital exhibition can not only interact with the scene, but also has its own strong comprehensive display characteristics, which is more in line with the acceptance habits of people in the information age. Digital exhibition represents the development direction of modern exhibition mode. The application of high-tech equipment such as precise projection, collage touch screen, digital tracking and dynamic capture, hologram and other high-tech equipment has become the new favorite of museums, which marks the transformation from traditional display mode to new digital display mode. Integrating digital technology and visual interactive function, it is easy to operate, low investment and strong liquidity. It breaks through the limitations of traditional exhibition venues and museum exhibitions, reflects the characteristics of innovation, from static to dynamic, the organic combination of exhibition and environment, story dissemination, exhibition information, intelligent controlled places, etc.

Exhibition is a public art discipline. Each of our artistic creation should aim at serving the public. In today's globalization, we must keep pace with the times, attach importance to humanistic spirit, expand cultural connotation, break through boundaries, and break through self-limitation. The digital application of Museum exhibition art is the absorption and utilization of new technology. Whether digital display or digital intelligent control, the digital process of museum display is not a flash in the pan prosperity, but needs to overcome difficulties and difficult exploration. After giving up the blind enthusiasm of futurists for technology, we hope that we can be as brave as Duchamp, cage and other artists, and become a design worker who has the courage to explore. To study the science and technology aesthetics of art, reconstruct the solemnity and sanctity of art in the Renaissance, and make art and science return to their "respective" state. At that time, the free digitization will bring the museum exhibition into a new beautiful realm, that is, "Avant grade but not obscure, avant-garde but not decadent, noble but not elegant, popular but not vulgar".

4.3 Application of Big Data in Museums

Now we are in the era of big data. Many enterprises are collecting all kinds of data to seize the opportunities brought by this era of big data. In the face of the information revolution, do museums want to be a part of this revolution? From the experience of the past few years, museums in China are very conservative in various fields. In foreign countries, museums have been operating like commerce. It is because of this entrepreneurial management that foreign museums have been fully developed. The traditional museum promotion mode is nothing more than a variety of exhibitions, which can be seen in
newspapers or media. In addition, there is no other effective means of promotion other than word-of-mouth. Although the museum is not a profit-making organization, for the museum, its collection is the content, its pursuit is the concept, and its universal value is the value of its existence. In order to better serve the public, the museum should improve its popularity, gradually integrate with the market, and package itself into an elegant and well-known "commodity" and sell it to the public. The arrival of big data era is a rare opportunity for museums. Museum managers should seize the opportunity and work hard for the bright future of the museum.

Digital museum is a non-profit organization and place. It is the collection, collection and collection of ancient and modern treasures of human history and civilization. This is actually the origin of the exhibition. The progress of computer and communication industry is obvious. The innovation, management, dissemination and statistical technology of digital resources are also improved, and digital museum emerges as the times require. Chinese civilization has a long history and has unlimited natural and cultural resources. How to deal with such a large number of data and various resources, efficient and accurate collection, rapid management and effective communication, is the main direction of digital museum technology research. The complementary of digital resources is big data technology. Big data technology itself is also data, its particularity lies in that it is the description of data itself, and has its own specific definition and application in various fields.

However, in practice, while big data technology has made great achievements in popularizing science, there are also many problems: information island; the emergence of relevant legal issues; the lag of science and technology policies; the limited development of scientific and technological organizations; and it is impossible to establish an effective multi governance system. These problems are not only problems of big data technology itself, but also problems of policies, systems and institutions. Objectively, it restricts the development, popularization and application of big data technology.

With the advent of the era of big data, the growth rate of the amount of data is gradually accelerating, reaching a new height, and even far more than the total amount of data generated by human beings before. The data shows that in 2011, the total amount of data generated in the world reached 1.8zb (the 21st power of 10), and the indispensable data forms in modern life, such as pictures, videos, music, etc., accounted for more than half of the total data. What's even more shocking is that in the past few years alone, we've created 20000-year-old data. Today, the number is still increasing. In a few years, the amount of data will soon reach the terrible 35zb (Moore's law of big data). What is more shocking is the power and influence of big data in the "network virtual world", especially in unstructured data such as images and videos. The Internet used to be anonymous, asymmetric and unreal, but today it is symmetric, real and effective. In the face of the current situation that big data is penetrating and influencing the "network virtual world", some features of the original "network virtual world" of the Internet are gradually replaced by the current "big data world" of the Internet.

Facing the inevitable wave of big data, it is inevitable to use big data reasonably, effectively, comprehensively and appropriately. However, the application of big data is a systematic project, involving not only technology, but also policies, environment, laws and regulations, public management, etc. Only through multi-party coordination can the value of big data be brought into play, serve the economic development, improve the level of public service and management, and form the value chain of big data. In practical application, there are still many problems in the application of big data technology in digital museum. It mainly includes the following three categories:
4.3.1. team building

How to find the required core data from the massive data, how to find the appropriate data pattern, how to find the association between various data, which requires technical personnel to have high data insight. Whether operating big data projects independently or cooperating with third parties, museums need a team that understands data management. At the same time, the museum has a team of talents with excellent professional knowledge. Therefore, team building is the top priority in the application of big data technology in museums.

4.3.2. construction cost

The construction of big data application system needs strong software and hardware foundation. Powerful hardware and software can bring efficient data processing and analysis capabilities, fast data storage and disaster recovery capabilities, and high-speed and accurate data acquisition capabilities. At the same time, the level of technical personnel is very high, which requires the museum to invest more material and labor costs. In view of the current situation of museums, many museums do not have the conditions for independent construction and can cooperate with a third party.

4.3.3. security and privacy issues

In the era of big data, data security and data privacy are widely concerned. Although it is easy for people to access data, they are also worried about the risk of privacy leakage. We can't avoid this problem. The application of big data technology in museums collects a lot of audience data. Some of this data will involve private data about the viewer. How can we store these data correctly? We can use data encryption to save, and sign a confidentiality agreement with the data manager to establish a hierarchical protection mechanism.

5. Conclusions

This paper introduces the concept of Museum digital exhibition, studies the application of big data technology in Museum exhibition digitization, and conducts a survey in a museum where the technology is applied. Questionnaires are distributed to the staff of the museum and tourists visiting the museum to understand the use of the application. Based on the questionnaire, this paper forecasts the development trend of digital exhibition in museums, and puts forward some problems that should be paid attention to in the application of big data technology in Museum digital exhibition.

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