

Research on Visual Management Application Framework of Smart Campus Based on Big Data

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Abstract: In response to the problem of long inquiry period in traditional university information management, the design of intelligent university information system based on large-scale information system is studied. and the system of intelligent university information system is designed. By creating the visual image of campus information, information system, book information, and classroom information system, the visual system of intelligent school information system has been established. Compared with the traditional information management system, the comparative experiments have shown that this method can reduce the time of inquiring information while enlarging the focus of school information, providing intelligent campus space for teachers and students.

Keywords: big data background; Smart campus; Information; visualization

1 Introduction

With the popularization of new information technology, information resources construction of universities is facing many challenges. The forms of information resources in various business centers of universities gather in the large information area of universities, and the cloud patterns of application of cloud affect the development of traditional information resources in universities^[1]. The concept of 'big data' was initially proposed in a formal paper by the international consulting firm McKinseyCompany. In a research paper entitled "Big Data: The Future of Innovation, Competition, and Production", McKinsey pointed out that "the analysis of big data in the world today is the foundation to promote new product development." The idea of big data is the arrival of the era of "big data". Along with the wide application of large-scale data in many industries, the changes caused by people are increasing day by day, and their effects are also becoming more and more profound. Information has become a strategic resource Whoever has more information will have a future^[2].With the advancement of higher education and the development of digital universities, colleges have accumulated more and more information in daily management and information service of students.Based on the traditional educational management model, this system is independent of each other. However, in the large information environment of universities, the extraction, fragmentation, and interfusion of these information are broken, the correlation between information increases, information becomes more complex, and information is sometimes in both time and space.This paper provides information support for the application of mass information technology in ideological and political education in colleges. Information technology is not

only thought highly of self-teaching for ideological and political education in universities, but also with the development of technology such as Internet of Things and cloud computing, it can provide more service for college students. In the context of large-scale information, the current information management system in universities has begun to emphasize the resources and application value of large-scale information resources, as well as the transformation of the meaning and objectives of the digital campus construction. In order to understand the challenges faced by digital campus construction, Yu Changhong proposed to deeply integrate information art with college education and teaching, put forward new ideas from four aspects: educational ideas, educational concepts, educational methods and educational means, and put forward new goals, policies and directions of college management under the environment of big data in colleges and universities. With the continuous development of "cloud, large, hardware, and mobile" technology, the development of information technology in colleges has been expanded from digital universities to the idea of intelligent schools. The development of information technology in colleges has been a focus of attention. Through the research on the development direction and information characteristics of intelligent universities, the architecture combining physical space and digital space is proposed, and in-depth research has been made on the key technologies needed for the construction of intelligent schools in universities^[3]. The innovation of information technology in the era of large-scale information has played an important role in improving college student management and the continuous development of business process. This requires universities to further reform and improve their division of labor in university information management, establish professional team, promote digital management in universities, integrate various business enterprises in the field of information, and really combine the theoretical research of large-scale information with the practice of university information management to ensure the security and digitization of university information, thus effectively promote the gradual progress of university information management. The popularization of information technology has led to the development of intelligent schools in the field of compulsory education, promoting the development of university education to intelligence, science, and society. The construction of intelligent schools has certain practical significance and practical value, which can ensure the students' quality of study from the perspective of teachers' and students' psychology. Therefore, it is necessary to study the design of intelligent campus information system in the context of large-scale information, in order to create a more systematic and creative education and a better understanding for university teachers and students^[4].

2 Smart Campus and Big Data

The word "smart campus" comes from "smart earth". It is sublimated from the rapid development of educational informatization and the construction of digital campus. The depth and breadth of information application contained in smart campus far exceeds that of digital campus, which fully embodies the characteristics of "smart".

2.1 Definition of smart

In different fields such as Internet of Things and educational technology, experts have given different definitions of smart campus. Professor Jiang Dongxing of Tsinghua University believes that a smart campus should have high-speed interconnected ubiquitous network and

mobile intelligent terminal applications. With the help of information technology, team cooperation can be more convenient, collective knowledge can be fully manifested, and internal and external business wisdom can be integrated. Intelligent school is a personalized service for teachers and students, which can understand the physical environment based on the network, automatically recognize learners' learning and personality characteristics, provide communication services for teachers and students, effectively evaluate, evaluate, and make intelligent decisions on the teaching process, consider the open education and teaching environment and a simple and comfortable environment. It can be seen that the smart campus takes service as the concept, covering all levels of network, Internet of Things, education and teaching, and campus activities, which embodies the integration of intelligent application and human service^[5].

2.2 Basic characteristics of smart campus

According to the definition of smart campus, smart campus mainly includes the following basic features:

One is to have a high-speed ubiquitous network. It includes wireless and wired networks, and mainly uses high-speed wireless networks. The second is to have a more comprehensive understanding of the resources that can better understand the environmental factors, that is, to build the Internet of Things to achieve the real-time perception of the products. Third, it has an integrated management information system platform to realize multi-business cluster integration, which embodies the one-stop service management concept. Fourthly, it is possible to quickly store, mine, and analyze a large amount of data, that is, the processing and application ability of large-scale data. Fifth, it can provide convenience for team collaboration while still considering personal requests. That is, the implementation of the strategy should be people-oriented, provide convenience for teaching, school life, and school management for teachers and students.

2.3 Definition of Big Data

With regard to big data, many international research institutions have described it, among which McKinsey's explanation of big data is as follows: "It is a data collection whose scale greatly exceeds the capabilities of traditional database software tools in terms of acquisition, storage, management and analysis."

2.4 Basic characteristics of big data

From McKinsey Institute's description of large data sets, it can be seen that large data sets have the following characteristics: first, the data sets are large. The data storage capacity of large data sets is very large, ranging from hundreds of terabytes to tens of thousands of petabytes, and even the scale of EBs. Second, the speed of data flow is fast. On the one hand, with the continuous expansion of data applications, data volumes have increased significantly; and On the other hand, consumers have a high demand for access, processing, and transmission of data, and the data processing speed should be very fast. Third, data types are diverse. Large data sets will generate more data from a variety of perspectives. According to social information, it is divided into procedural, semi-procedural, and non-procedural information, and is divided into data exchange, interactive information, and hearing information according to the generation mode; In terms of data structure, it can be divided into

text, image, sound, video, spectrum, etc. categories. and so on. Fourth, the data rate is low. Although there are many files, only a small fraction are useful. Fifth, the data analysis is correct. The existence of a large number of data models makes the excavation and analysis of data appear more accurate and scientific, the retrieval and prediction of the true color of things. This is also the future development of large data warehouses^[6].

2.5 the relationship between smart campus and big data

Intelligent schools based on perceptual learning have many intelligent IOT listening devices, and real-time hearing information has become one of the important information resources in intelligent schools. Communication and digitization of school teaching and textbook resources is one of the major forms of information, and different forms of information generated by teachers and students' life and various management methods are also one of the major forms of information. It can be seen that the teaching, research, and various aspects of life in intelligent schools are inseparable from the mass data. The application of data mining and analysis based on large data sets is an important part of the concept of intelligent teaching, living, and service in intelligent schools. The intelligence level, the implementation of the intelligence management system, and the school management of the intelligent schools all rely on the analysis and prediction of the massive data. It can be seen that the mass information is the core and foundation of the intelligent campus construction.

3 Visual design of smart campus information under the background of big data

3.1 Smart Campus Visual Display Information Selection under the Background of Big Data

Under the background of big data, through the real-time linkage of three-dimensional navigation map and panoramic display map, the detailed information of the appearance and interior of each scene in smart campus can be displayed in many different angles and orientations. Panoramic photos are used to display the internal information of buildings on campus, and programming language is adopted to integrate 3D visualization technology with Internet of Things technology and hypermedia link technology, so as to develop a visual display platform for smart campus, through which users can feel the feeling of being in the world without stepping, which is convenient for users to browse the 3D scene of smart campus. As shown in Figure 1, the corresponding teacher's three-dimensional panoramic information is located by querying the classroom corresponding to the course, and then the related multimedia information or monitoring video information is found by identifying various elements in the scene. The visual student information management module can also be used to check the attendance of students in class. Visual book information management is a kind of dynamic book information display, which uses panoramic technology to simulate and display all the scenes in the library, and users can have an overview of the panorama from different observation angles. When users find the book they need, they can view the relevant information of the book, such as author, abstract, introduction and so on ^[7].

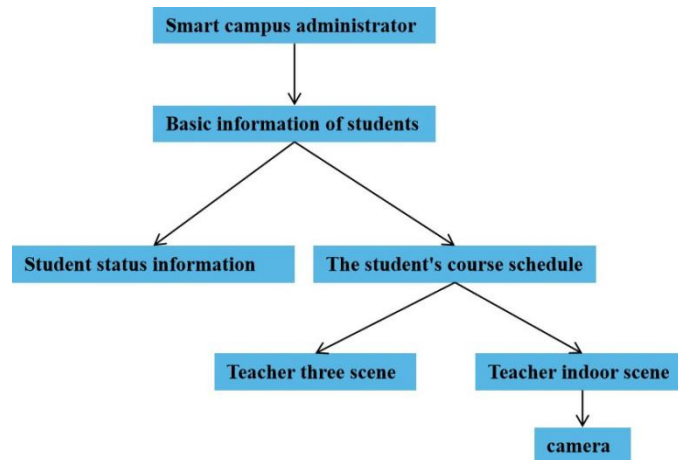


Figure. 1 Visual management of students' attendance information

3.2 Smart Campus Information Visualization Scene Construction

In this paper, sketchup software is used to model the information visualization scene of smart campus, and B/S architecture is used to develop it. According to the selected visualization information, the main data types of smart campus information visualization are determined, as shown in Table 1. Based on the data in Table 1, a three-dimensional model of the smart campus is established to show the overall layout of the campus, the building model and the internal infrastructure model of the building, and the internal information is displayed by using panoramic image display technology to provide users with a sense of reality [8].

Table 1 Main data types of information visualization in smart campus

data	type	name	describe
three-dimensional model	Model data	Teaching building and experiment Building, student dormitory, Office building and administration building	Campus teaching building, laboratory building, student dormitory, etc.
three-dimensional model	Model data	Fertility field, basketball Field, activity center, etc.	Campus stadium, basketball court, activity center.
DEM	raster data	Two-dimensional navigation chart	Using digital orthophoto to describe three-dimensional visualization information
DLG	Vector data	vectogram	Using digital lines to plan maps and provide attribute information.
Panoramic data	lossless compression image data	terrain	Internal scene information of buildings in the campus.

4 Experimental demonstration analysis

Select some school campus information, multimedia information, student information, book information, classroom information and other related parameters and introduce them into the simulation experiment software. Randomly set 50 users with different needs, and query the corresponding information according to their needs in the traditional campus information management system and the smart campus visualization system under the background of big data. Using the intelligent school curriculum as the experimental group and the traditional school management information as the control group, completes the comparison and draws the comparison of the experimental results according to the experimental results, as shown in Figure 2. By analyzing the two comparison lines in Figure 2, it can be concluded that the query time of the experimental group is shorter than that of the control group, which is still within 10 seconds; The shortest query time of the control group is 16.27s. Through this comparative experiment, it is proved that the platform constructed in this paper can not only realize the visual query of information by users, but also effectively shorten the information query time and enhance the interactivity, which has practical application value^[9-10].

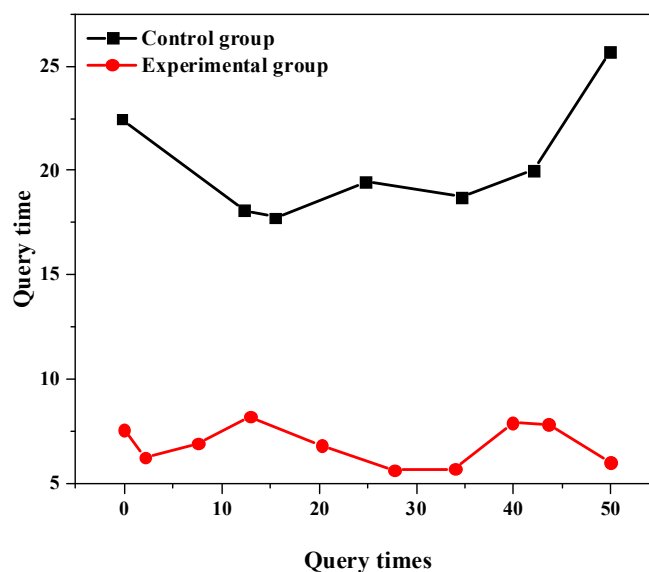


Figure.2 Comparison chart of experimental results

5 conclusion

An intelligent campus information visualization system based on the background information is proposed to solve the shortcomings of the traditional campus information management system, achieving the integration of multi-source information. However, the system still has some shortcomings, such as not taking into account user privacy protection when performing

video surveillance. Therefore, in the next research, it is necessary to introduce the technology to realize the video process, and do more research on the user's personal protection and ensure the information security.

Acknowledgement:

1. Projects of Teaching Researches supported by Department of Education of Anhui Province, Studies on Construction Route of Ideological and Political Education in College English Teaching, 2019jyxm0859

2. Model Courses of Ideological and Political Education in College English Teaching supported by Department of Education of Anhui Province, College English, 2020szsfkc0874

3. Special Project in Ideological and Political Education supported by Wanjiang University of Technology, Penetration Strategies of Ideological and Political Education in College English Teaching, WGKCSZ21003ZD

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