

The Construction of Smart Campus in the Environment of Internet of Things Cloud Computing and Big Data



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Abstract With the progress of science and technology in modern society and the rapid development of information technology, colleges and universities now generally carry out information construction and gradually enter the era of big data information. In the new era, big data, as a new database processing technology, plays a very important role in the construction of smart campus. The information construction of colleges and universities has developed from the original digital campus to the present stage of intelligent campus. Internet of things, cloud computing, big data, mobile Internet, and other technologies are all popular in smart campus. In today's big data background, people need to build smart campus in the way of innovative and innovative thinking in work, life, and learning. On the other hand, the construction of smart campus will certainly make the reform of college education and teaching more in-depth and effective.

Keywords Big data · Cloud computing · Smart campus · Internet of things

1 Introduction

With the rapid development of science and technology information in the twenty-first century, the construction of campus network in colleges and universities is also following the pace of the times, gradually moving from digital to intelligent, paying more attention to the personalized and humanized service for users, and more reflecting the intelligent service. Nowadays, the information construction of

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the smart campus has achieved very good results and gradually formed a comprehensive service-oriented smart campus integrating Internet of things, big data, cloud computing, intelligent perception, and other technologies, so that the campus has certain intelligent advantages, ideal new learning, working, and management environment, so as to provide better learning atmosphere for teachers and students. Comparing the big data in the smart campus network with the traditional data, it will be found that the smart campus under the big data is not only the query and collection of data, but also the collection, sorting, and analysis of a large number of data to make an accurate prediction of the development of things. Therefore, the big data has become the most popular and main application direction [1, 2].

2 The Connotation of Smart Campus

With the progress of science and technology information, colleges and universities are also advancing with the times. From the initial electronic campus, digital campus gradually formed the information construction of intelligent campus. It combines cloud computing, Internet of things, virtualization, and other information technologies, breaks the previous space restrictions, and integrates some scattered and independent information and resources into an organic whole with a high perception and service ability, which can realize a comprehensive sense of the environment, as well as network interconnection and personalized services for teachers and students. Furthermore, it provides a stable intelligent guarantee for the teaching management, normal operation, and public service of the school. Among them, smart campus embodies three core features: first, setting up cloud service platform in the campus can provide better service environment for teachers and students; second, processing scattered data in other fields, such as school management, through a unified interface, and finally converging in the data sharing center to realize network interconnection; third, in the campus environment of intelligent services, It can realize the communication and docking between the school and the external environment [3, 4].

3 Analysis on the Combination of Big Data, Cloud Computing and Internet of Things Technology in the Construction of Smart Campus

Under the background of big data, the intelligent campus needs to analyze a large number of unstructured data and then realize the intelligent teaching management system. In terms of data analysis ability, data processing speed, data acquisition, and the realization of complex data types, it is required to be more rigorous and meticulous. With the continuous progress of smart applications, traditional OLAP data analysis has been unable to meet the construction of smart campus, while in

the context of big data, in-depth analysis such as path analysis, time series analysis, graph analysis can better meet the information construction of smart campus.

3.1 Combination of Smart Campus Construction and Big Data

Data center information sharing is the foundation of smart campus. Only when the construction of smart campus is combined with big data technology, can the teaching, management and service level of colleges and universities be improved. This paper analyzes the application of big data technology based on campus card. "Campus card" is an important part of the construction of digital campus in colleges and universities, and it is a main line running through various application systems in colleges and universities. Generally speaking, "campus one card" is a "one card" used by teachers and students. This card integrates ID card, student card, work card, loan card, medical card, meal card, wallet, telephone card, and passbook. It mainly has the functions of identity recognition, comprehensive consumption, financial services, public information services, etc., and realizes "one card in hand" on campus, Go all over the campus. "One card on campus" can not only manage the daily activities of teachers and students, but also provide important information for teaching, scientific research and logistics services, bringing efficiency and convenience to the work, study, life and school management of teachers and students. The campus card system is not only connected with the school intelligent perception equipment, but also connected with the financial system and integrated with various application information systems of the school. Campus card carries all kinds of application information and accumulates a large amount of data. These data are simply stored in the database and are not used reasonably. So how to mine valuable information from the huge database of the campus card system for targeted analysis, help schools optimize resource allocation, assist teaching, and improve management is the key to the combination of smart campus construction and big data technology (Fig. 1).

3.2 Combination of Smart Campus Construction and Cloud Computing

At present, the information construction of colleges and universities has made initial achievements, with a good network environment and related application systems, innovative teaching mode, and improved the teaching quality and service level of colleges and universities. However, there are still some problems in the informatization construction. For example, some schools pay more attention to hardware investment than software configuration, some pay more attention to project engineering, and neglect technology update. These non-coordinated ideas restrict the

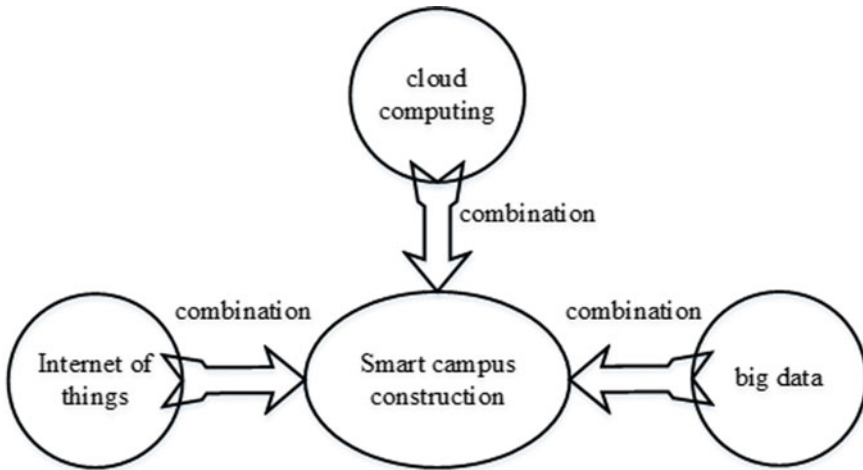


Fig. 1 Construction of smart campus in colleges and universities

informatization development level of colleges and universities, resulting in a large number of physical facilities that cannot be expanded and idle, resulting in waste of resources, Originally, according to the construction principle of “on demand, one by one, independent,” the informatization construction lacks unified planning, the application system is independent, forming an information island, and the data is difficult to exchange and share. Cloud computing is a network-based computing mode. It uses non-local or remote servers for distributed computing, network storage, virtualization, and load balancing. Based on the dynamic flow of resource pool, it provides super strong, fast, and accurate services for computer systems across heterogeneous, time, and region. Cloud computing provides a highly integrated, efficient and intelligent network application platform for the construction of smart campus.

3.3 Combination of Smart Campus Construction and Internet of Things

The Internet of things is the Internet connected with things. It uses local networks or Internet and other communication technologies to connect sensors, controllers, people, machines and things in a new way, forming the connection between people and things, things and things, realizing intelligent identification, positioning, tracking, monitoring and management. The Internet of things provides the physical basis for the smart campus. Realize information, remote control, and intelligent management. The Internet of things is an extension of the Internet, which is widely used in the information construction of colleges and universities. For example, build a safe campus through Internet of things technology. The school installed cameras

and sensors in different areas, implemented access control management, carried out identity recognition and location detection, effectively controlled potential hazards and ensured the safety of the campus environment. Using Internet of things technology to supervise the use of campus water, electricity and other energy, to realize the intelligent management of campus energy consumption, effectively avoid unnecessary waste and save resources. Through the Internet of things technology, to create a high-quality teaching communication environment. Internet of things technology breaks the traditional teaching mode, makes the classroom lively, provides more abundant knowledge resources and experimental simulation for teaching activities, expands the teaching vision, and improves the teaching quality. The construction of smart campus is closely related to the technology of Internet of things.

4 Research on the Construction Goal of Smart Campus

In the context of big data, to build a complete university smart campus, we need to fully consider all kinds of needs of the University, have a complete and integrated service concept, gather all kinds of information to realize the Internet sharing, provide teachers and students with efficient, humanized and personalized campus services, develop in many ways, and improve the management, education, teaching and campus services of the university, make the scattered data into a whole, realize the integration of all kinds of resources, optimize the various configurations of the campus, and deeply develop the information construction of the school. There are several contents in the realization of smart campus: first, we should recruit talents, train them intensively, and establish a smart and innovative talent training mode. With the progress of science and technology, the rapid development of Internet technology, the traditional college education model has not adapted to the rapid development of the Internet era, the traditional classroom teaching and online classroom teaching integration, in order to cultivate innovative, intelligent talents. Second, establish sound and innovative scientific research institutions. With powerful big data technology, smart campus can play an important role in scientific research in colleges and universities. Third, establish an integrated management and service system of wisdom and innovation. As the core part of the campus, under the background of big data, the intelligent campus applies other related technologies to effectively manage all kinds of data and information in the campus system, as well as to integrate the digital office system and all kinds of information management systems. In order to achieve campus construction facilities, teaching management information, hardware equipment, student management information, information life services, security management, and other comprehensive intelligent management.

5 Conclusion

In order to adapt to the new era of rapid development of information technology, the traditional education concept and education mode must be changed, and the construction of smart campus has been generally recognized by the society. The application of big data technology to identify and analyze university data, make full use of data value, make the decision-making ability of the system more intelligent, and the use of big data technology will be fully reflected as the core part of the smart campus. Although in use, we will also face a variety of problems, but we believe that with the progress of science and technology, the development of the times, big data can really be integrated into our campus, to provide teachers and students with more personalized, and humanized intelligent services.

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