Application of Big Data Technology in Campus Security Management under the Background of Information Age

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Abstract. To explore the construction of safety management in universities against the background of big data is not only an important way to ensure the personal and property safety of teachers, students and staff, and to promote the construction of safe campuses, but also an essential part to realize long-term social harmony and stability. This paper based on big data technology, this paper establishes a visualization application platform to comprehensively improve the informatization and intelligence level of the university's safety management, and the system was tested. The test results show that the response time of the system performs well, and the actual response time is no more than 3 seconds. The system recovery trial user login response time is 0.057s, and the completed login user format is 258 per second. The system realizes the refinement, digitalization, automation and mobility of campus security management, so as to improve campus security and provide support and data basis for the information construction, talent reserve and information decision-making of smart campus.

Keywords: Information Age, Big Data Technology, Campus Security Management, Security Management Platform

1. Introduction
In recent years, our country in the construction of safety management of colleges and universities has achieved obvious results, to prevent illegal crime, protect the personal and property safety of teachers and students played a positive role, but examine the actual safety management running, it is not difficult to find more safety management construction in the initial stage of the formal the effectiveness of the overall system, fusion and integration are yet to be improved, especially in the safety management of intelligent, digital and visual degree is not high, to a certain extent, restricted the control efficiency of the play. At present, the human society is entering a new historical development stage -- the era of big data. In this information age with data as the core, the value of data is being continuously mined and paid more and more attention to. The public security organ and colleges should keep up with the trend of the times development, break through the traditional management mode, actively use new technology, new methods, according to the developing direction of intelligent, three-dimensional, visual, comprehensive innovation safety management of colleges and universities, maximize the science and technology and data resources into realistic combat.
effectiveness, continuously improve the perception of the safety problems in colleges and universities, forecasting and prevention capacity [1].

In recent years, more and more education foreign experts have gradually expanded and increased their attention to campus safety management, and conducted in-depth research based on the current campus safety management system. Giannakas campus security events for the clear and clear definition, which not only include mental health, healthy body, also includes the basic facilities construction, safety, accident prevention, besides should also include the teachers' strike, relationship between teachers and students, sports health hazardous and exposure, and so on, they also think that with the virtual network, war, social news public opinion direction, such as the external factors on the campus internal environment and the impact of students' psychological, also should be divided into the campus security incident category [2]. Kashif pointed out, based on the study on the correlation of campus security, that the maintenance of campus security by schools is not only limited to a certain method, but also requires the full use of various tools and forces. For example, schools can establish a good relationship with families, and can use Internet information to make publicity pages and release relevant tips in a timely manner [3].

The innovation of this paper lies in the application of big data in the construction of safety management in colleges. That is to say, big data thinking and big data analysis technology are integrated into the construction of safety management in colleges and universities, so that the dividend of big data can be comprehensively, thoroughly and deeply released in the administration of colleges and universities, and the core combat effectiveness of public security prevention and control work in colleges and universities can be improved.

2. Campus Security Management under Big Data Technology

2.1 Overview of Big Data Related Technologies

(1) Big Data Technology

With the rapid rise of the Internet and the Internet of Things, its information technology has been widely used in various fields of people's life, resulting in the generation of massive data. In particular, in recent years, the emergence of various Internet devices and apps has generated a lot amount of data, which is difficult to represent using TB and PB in data scale. How to make good use of these data to play a good role, enterprises and schools have been highly concerned. However, in order to better store and analyze data, many enterprises need to invest a lot amount of funds to purchase storage equipment and employ a lot of personnel to manage, so as to promote the use of massive data by enterprises and schools [4]. Because traditional data analysis methods cannot meet the needs of Internet informatization, the era of big data has come. a lot of enterprises and university researchers have started to engage in massive data mining research. Under the big data technology, they use all the data they have for analysis and processing at a fast speed.

Big data technology has been rapidly expanded and developed under the joint promotion of computer-related technologies, and has become the focus of attention of enterprises and universities. Collect massive data through Internet of Things technology and artificial intelligence technology, and then adopt machine learning and cloud computing algorithm analysis on the big data platform to promote common development among them [5]. At present, enterprises, universities and relevant research departments are constantly increasing the development and use of big data technology.

(2) Association Analysis Algorithm

Association Analysis: To explore the hidden relationship between data from massive data sets. Data mining is an important field for researchers to analyze data, among which association rules are widely used. It aims to find correlations among data in big data. However, the hidden relationship between data is not directly revealed, so it needs to be mined to find it [6]. The probability that two sets of terms occur together is what we call the degree of support of the two sets of terms in the association.


\[ Support(A \Rightarrow B) = p(A \cup B) \]  \hspace{1cm} (1)

Where, in the case of one itemset occurring, the probability that another itemset also occurs the confidence with which we associate the itemset.

\[ Confidence(A \Rightarrow B) = P(B|A) \]  \hspace{1cm} (2)

In association rules, in order to better measure the quality of the results, a good boundary is set, namely the minimum support degree and the minimum confidence degree. Only when it is higher than the minimum support and the minimum confidence, can the basic requirements of association rules be better met [7].

The number of transactions in an item set that exists in a transaction data set is the number of counts of the item set support. It's also going to be the frequency of this item set.

\[ Support(A \Rightarrow B) = \frac{\text{Support_count}(A \& B)}{\text{Support_count}(A)} \]  \hspace{1cm} (3)

2.2 University Security Management Platform under Big Data

Under the background of big data university security management platform construction based on the information exchange and data sharing, big data and cloud computing technology as the core, comprehensive intellisense technology, Internet technology and mobile technology, such as the Internet, establish visualization application platform, realize all kinds of prevention and control of integrating and optimizing the allocation of resources, promote the informatization and intelligent level of public security prevention and control comprehensively.

In the context of big data, the platform technical architecture of university safety management is composed of intelligent perception layer, data transmission layer, data processing layer, support service layer, subsystem support layer, business application layer, data specification and standard system and operation, maintenance and security system [8].

(1) Intelligent perception layer. By zigbee (also known as purple bee, short distance wireless communication technology), RFID (radio frequency identification technology) and WSN (wireless sensor networks), SoC (system of chip level), IPcam (web camera) and so on all kinds of sensors, sensor network and intelligent mobile terminal real-time acquisition of various kinds of data, realize the active state of school teachers and students, all kinds of equipment running status and the interaction between people and the surrounding environment condition such as real-time perception, to provide huge amounts of data for public security prevention and control, intelligent perception layer is the precondition of the technical architecture and crime safety management of colleges and universities.

(2) Data transmission layer. Comprehensive use Wi Fi, HSDPA (high speed downlink packet access, an Internet protocol), IPv6, 4 g / 5 g and the Internet of things, and campus network such as wired and wireless network communication technology, real-time transmission data collected, images, audio, video, etc. Various kinds of structured and unstructured data, achieve full freedom of access, Internet and application [9]. The data transmission layer is the network foundation of the technical architecture of the safety management.

(3) Data processing layer. Comprehensive utilization of data storage, cleaning, calculation, management, mining, analysis and other technologies, centralized processing and classified management of the collected data, to provide reliable data support for early warning, analysis and decision-making of public security prevention and control. The data processing layer is the data foundation of the technical architecture of the safety management, as well as the core and hub of the whole intelligent safety management.

(4) Support service layer. On the basis of data processing, a support service platform for the application system of the entire safety management is built by using various technical software, providing common technical support for the subsystem support layer and the business application
layer [10]. The supporting service layer is the technical foundation of the technical architecture of the safety management.

5) Subsystem support layer. This layer gathers subsystems of different applications of public security prevention and control, provides platform development technology linking business application layer, and realizes cross-regional and cross-departmental interactive application of public security prevention and control in colleges and universities.

6) Business application layer. The business application layer is directly oriented to all kinds of terminals and prevention and control entities, providing them with specific prevention and control services, including visual alarm management, simultaneous release of alarm, air alarm, comprehensive display of resources, flat command and dispatch, and grid patrol management.

Specification and standard system and operation maintenance and safety system. In the safety management, norms and standards mainly include data standard system, information base standard system, information security standard system, infrastructure standard system, management standard system, etc. The operation, maintenance and security system includes operating system security, data security, network security and application system security, etc., which jointly provide stable and safe guarantee for the intelligent application of the security safety management in colleges and universities.

3. Campus Security Management Platform Test
The following describes the system's test environment and system deployment in detail, as well as the test plan in detail. Finally, the function test of the campus security service management system and the performance test of the research information full-text retrieval module are carried out.

3.1 Test Environment
In the laboratory environment, the campus security service management system was designed and functional coding was realized. In order to make full use of various resources of the laboratory, the development and testing of the system made use of multiple high-performance PCS and servers of the laboratory.

The laboratory environment mainly includes the following two categories of servers: servers for the database category and servers for the Web business.

The database that activates the educational electronic ID service, the database of campus security service management system, etc., are all deployed on the laboratory database server. The user identity authentication service, credential identification verification service, security system application, etc., are all deployed on the Web server.

3.2 Test Description
The purpose of functional test is to verify the functions developed by the system, compare the business logic through functional test cases, and check whether the system functions are consistent with the actual needs of users one by one. The scope of functional test mainly includes user real-name authentication, campus security on duty, campus public security prevention, household registration management of teachers and students on campus, research information management and other key functions.

The system was subjected to 3000, 5000 and 7000 access stress tests to verify the gradient performance of the system for different user visits. And select the campus security service management system in the practical application of the frequency of use and the highest requirements for the system performance of the core function points: research information full-text retrieval as a performance test sample.

4. Test Results of Campus Security Management Platform

4.1 Pressure Test
Table 1. Stress test statistics

| Virtual users | 60S | 120S | 180S | 240S | 300S |
|---------------|-----|------|------|------|------|
| Response time  | 19.2| 37.6 | 43.3 | 59.7 | 71.1 |
| Number of system processing | 12  | 11   | 13   | 12   | 11   |

As shown in table 1 and figure 1, by analyzing the pressure testing figure, when the system's traffic to increase or decrease, the system of concurrent corresponding actual here also stepped up, but even in the 7000 times per second visit, the response time of the system is also good, the actual response time is not more than 3 seconds, can fully meet the requirements, from the side can verify that the system can completely meet the demand of user's access. Analysis of the number of processing per second of the system shows that the actual situation of processing will not change with the increase of CPU utilization of the system, and the performance is good.

4.2 Recovery Test

Table 2. Test the overall performance of the client

| Test project               | Test results |
|----------------------------|--------------|
| Login response time        | 0.057s       |
| Virtual number of users    | N/A          |
| Number of logins completed per second | 258/s |

As shown in table 2, recovery test is mainly to verify the response cycle of failure occurs when the system, system of shorter recovery time illustrate the robustness of the system, the more the system recovery test focuses on: the WEB server close, power system, and database services, through the operation of the server can reflect the real recovery system, in the process of actual system operation, if there are any offensive or abnormal system collapse, usually through the restart the system server implementation fast recovery of the business. The test user login response time is 0.057s, and 258 logon user formats are completed per second. The test results show that the system recovery time is short and the performance is good when the system fails.

4.3 Full Text Search Test
As shown in Figure 2, the time of Lucene full-text retrieval is far less than DB Like. It can be seen that Lucene has the advantages of fast response speed and high matching degree, and can quickly locate relevant security research information. The full-text search function of research information developed based on Lucene can well meet the information search requirements of security staff, and the function and performance can meet the design requirements, reaching the expected goal.

5. Conclusions
In this paper, a three-dimensional, information-based and all-round safety management is formed with big data technology as the support, command center as the leader, six prevention and control networks as the framework, and five operational mechanisms as the guarantee. Transformation of traditional work idea, this paper sets up the big data thinking, a sense of big data, the top design, as a whole and improve the relevant mechanism of the safety management, address the underlying, institutional and systemic problems, continuously strengthen the big data platform and team construction, comprehensive, thorough, depth, release the big data dividend, let every public security prevention and control personnel in colleges and universities deeply feel the full depth of the big data bonus release, make the core of the safety management of colleges and universities to effectively improve battle effectiveness.

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