

Research Article

Motivation of Student Management Subjects in Universities Based on Network Intelligence

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With the intelligent development of the society and the development of the big data era, the network intelligence applications in various fields have deeply penetrated them, and colleges and universities, as the place where information technology is most widely used, have been profoundly affected by the network intelligence. In this context, besides the traditional use of digitalization, informatization, and networking to assist in managing students' studies and life, the work of the main body of student management in colleges and universities is also gradually developing towards intelligence. In the research of this study, through the application and development of network intelligence, the intelligent research of college student management is carried out by using the technical advantages of massive data access, so as to improve the motivation of college student management subjects through intelligence, make students feel the orderly and reliable humanized management while improving the efficiency of student management, and provide sufficient technological guarantee for college management.

1. Introduction

The level of technology in student management directly determines the quality of future talent training, and the move towards intelligent student management is both a challenge and an opportunity [1]. Intelligent management will further improve efficiency and allow students to enjoy the convenience of technology and feel the orderly stability and humanity of management, which will bring benefits to their physical and mental health, the overall development of personal qualities, and innovative thinking. At present, the problems of intelligent student management work under the vision of big data are as follows: the data information management system is not yet fully unified, and there is the phenomenon of information silo [2]; the intelligent data monitoring is not strict enough; there are problems such as low level of quantitative analysis and utilization and the lack of high-level technical personnel, which seriously affect and

restrict the process of intelligent student management in colleges and universities.

The development of intelligence is both an opportunity for the external community to promote student management by virtue of intelligent research and development and human-machine collaboration and a challenge for internal student management by the strategic goal of intelligence and increased student self-awareness. The advantage of intelligent student management is the use of artificial intelligence to avoid the error rate of manual labor and thus improve efficiency [3]. The development of intelligent student management under the Internet is an effective result of data mining and analysis, but it is also a change in the way of life and thinking. Since intelligent technology is a new and general technology, there are hardware facilities and soft resources and other conditions restrictions, as well as the establishment of the relevant student management system, all of which have

posed challenges to the intelligent development of student management to a certain extent.

Based on the concept of “application-driven, connected everything,” the intelligent network provides more initiative, adaptability, and diversity for enterprise business applications. It solves the horizontal connection problem by using “intelligent perception and life” to build a broad panoptic connection system. The “network reorganization and flexible expansion” approach is used to build a flexible network from the bottom up.

2. State of the Art

2.1. Intelligent Technology. Intelligence is the eternal pursuit of information technology development, and the main way to achieve this pursuit is to develop artificial intelligence technology [4]. In the past 60 years, since the birth of artificial intelligence technology, although it has experienced three ups and two downs, it has made great achievements. 1959–1976 was the stage based on artificial knowledge representation and symbolic processing, which produced expert systems with important applications in some fields [5]; 1976–2007 was the stage based on statistical learning and knowledge self-representation, which produced various neural network systems [6]; in recent years, the stage based on environmental self-adaptation, self-gaming, self-evolution, and self-learning has started. The research based on environmental self-adaptation, self-gaming, self-evolution, and self-learning, which started in recent years, is forming a new stage of AI development, meta-learning or methodological learning stage, which constitutes a new generation of AI. The new generation of AI mainly includes big data intelligence, population intelligence, cross-media intelligence, human-machine hybrid augmented intelligence, and brain-like intelligence.

The world’s major industrial countries have planned ahead. In the late 80s, smart manufacturing was proposed, and the world began to carry out a lot of research on it, starting with smart manufacturing technology, and later, with the development of the economy and the changing needs of society, people began to conduct in-depth research on smart manufacturing technology. In the world’s major industrial powers, the implementation of “smart manufacturing” is an important means to revitalize the manufacturing industry. Since the financial crisis, the governments of the United States, Germany, and Japan, and relevant experts have proposed the development of intelligent manufacturing to revitalize the manufacturing industry. The United States officially launched the “Advanced Manufacturing Partnership” in June 2001, which includes industrial robots.

Intelligence reflects the quality attributes of an information product [7]. When we say an information product is intelligent, we usually mean that this product can accomplish what only an intelligent person can accomplish or has reached a level that only humans can achieve. Intelligence generally includes perception ability, memory and thinking ability, learning and self-adaptive ability, and behavioral decision-making ability [8]. Therefore, intelligence can

usually be defined as making objects with sensitive and accurate perception functions, correct thinking and judgment function, adaptive learning function, effective execution function, etc. Network management is an inevitable product of the development of computer networks. Early networks were mainly local area networks, while the emergence of the Internet broke the geographical limitation of networks and the cross-regional wide area networks developed rapidly, at which time network management was no longer limited to ensuring the transmission of files, but to guaranteeing the normal operation of network objects connected to the network, as well as monitoring the operational performance of the network and optimizing the topology of the network. As IT business changes become more and more challenging [9], the work in the field of information technology becomes more and more complex, to manage a mixed network of various architectures, how network administrators set oil painting equipment and network configuration to give full play of the network system to the advantages, and with it, the emergence of intelligent network management system can take the pulse of the network, view the network connection relationship of the whole network, monitor the possible problems of various network devices in real time, detect where the bottlenecks of network performance are, and automatically handle or remotely repair them.

2.2. Problems of Intelligent Student Management. First of all, there is a lack of corresponding supporting intelligent development systems. Intelligent management of college students in the background of big data is in the initial stage, lacking practical national policy documents, and the rules and regulations of school administrators in this regard are also relatively old, not using the convenient and effective technology of intelligent management to drive the overall development of college students; meanwhile, there is the phenomenon of loose management and unknown rewards and punishments in colleges and universities, which leads to the learning process of students. The polarization is serious; the excellent students are always excellent, but the generally unconscious students are self-indulgent and uncontrolled, which is against the original purpose of educating people in colleges and universities.

Secondly, the Internet of Things is a new development direction and breakthrough on the basis of the Internet. Smart Earth refers to the full application of the new generation of IT and Internet technologies to all industries, and then, through supercomputers and cloud computing, it enables human beings to work and live in a more refined and dynamic way, thus enhancing the level of wisdom in the world. The concept of “Smart Earth” [10] further elaborates that the Internet of Things is interconnected, as shown in Figure 1. Through the intelligent sensing information network system of radio frequency identification, infrared sensing, positioning system, scanner, and other sensing facilities, the Internet of Things carries out network communication and information exchange, realizing the interconnection of dialogue and communication between things,

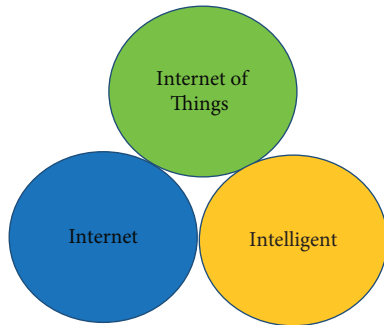


FIGURE 1: Three elements of smart Earth.

thus making the digital information era to the intelligent transition and upgrading. Colleges and universities are the concentrated place of talent training and cutting-edge technology application implementation and should strengthen the capital investment of IoT infrastructure [11], such as the increase of information collection by GPS module of student card in the construction of student management system, the research of information storage and transmission by the server on the Internet, and the construction of a platform for school management personnel or parents to inquire about student location information through the Internet.

Finally, as a group of higher information use, college students are affected by various fragmented information, such as all kinds of knowledge, microblogging, WeChat, public number on the network, various short articles, short videos, and other information of varying quality; students generally develop a kind of reading habit; it is difficult to form a systematic scientific knowledge system. In addition, because fragmented information tends to simplify complex issues, students can only recognize some appearances of things, but do not know their principles and inner essence and the relevance of other things. The development of informationization of student management directly affects whether students in colleges and universities in intelligent management can use data and information in high quality, fully grasp the opportunities of intelligent development, truly analyze the principles, backgrounds, and applications behind the phenomena, convert them into knowledge systems when searching and processing information, and then realize resource sharing through secondary fine processing [12].

2.3. Intelligent Construction Framework. Intelligent campus construction is a long-term, complex, and huge system project, which not only has a large implementation time span but also involves various organizational departments of the university, and must have a corresponding management structure and supporting policies to ensure smooth implementation and real benefits. The framework of intelligent campus construction is to form a digital teaching environment, research environment, and living environment with teachers and students as the core and around the three elements of an intelligent campus: resources, management, and services, relying on a data center and campus

service center application system. Intelligent campus construction is a long-term construction process, involving research, overall planning, system construction, and maintenance improvement, and is a process of continuous improvement and enhancement, as shown in Figure 2.

According to the network condition of the campus network, the overall solution of campus network security should be established based on PKI security structure, and the overall authentication, transmission encryption, information encryption, data integrity protection, VPN technology, and a variety of security technologies such as firewall and secure proxy server should be an integrated solution [13], as shown in Table 1. The establishment of a PKI-based system can provide a foundation for network information security, but to truly realize the security of the whole system, it is necessary to gradually transform the existing application system so that authentication, identification, and audit are integrated into the details of each application.

PKI is a public key system. It uses the characteristics of public key algorithms to establish a system for certificate issuance, management, and use to ensure and achieve authentication, information encryption, data integrity, and denial prevention. The architecture, implementation methods, and communication protocols of PKI systems are all possible.

MALL security is only e-mail security; e-mail is obtained by attackers or tampering with e-mail, virus e-mail, spam, etc., which are seriously endangering the normal use of e-mail and even cause serious damage to computers and networks.

2.4. Intelligent Implementation Basis. The application of intelligence on the campus mainly responds to the following four aspects: first, intelligent monitoring system; second, intelligent classroom; third, one-card system; fourth, perimeter protection system. The campus computer network system is the operation platform of the “digital campus” and is an indispensable support environment for campus teaching [14], research and management systems, network multimedia teaching systems, campus cards, and other application systems. By adopting advanced and mature network technologies, such as 10-gigabit ethernet link backbone technology and sFlow traffic monitoring technology, we can build a broadband IP campus network with a high technical starting point and safe and reliable, manageable and maintainable, scalable, and providing comprehensive and distinctive services with certain service quality assurance.

According to the understanding of the security requirements of the school campus network and application system, we have established the following technical general framework for the specific design and implementation consideration of the network system project. (1) From the vertical consideration, information security is divided into network infrastructure, intelligent trust and authorization service layer, and security application layer; network infrastructure and intelligent trust and authorization service layer form the basis of the security application layer [15]. (2)

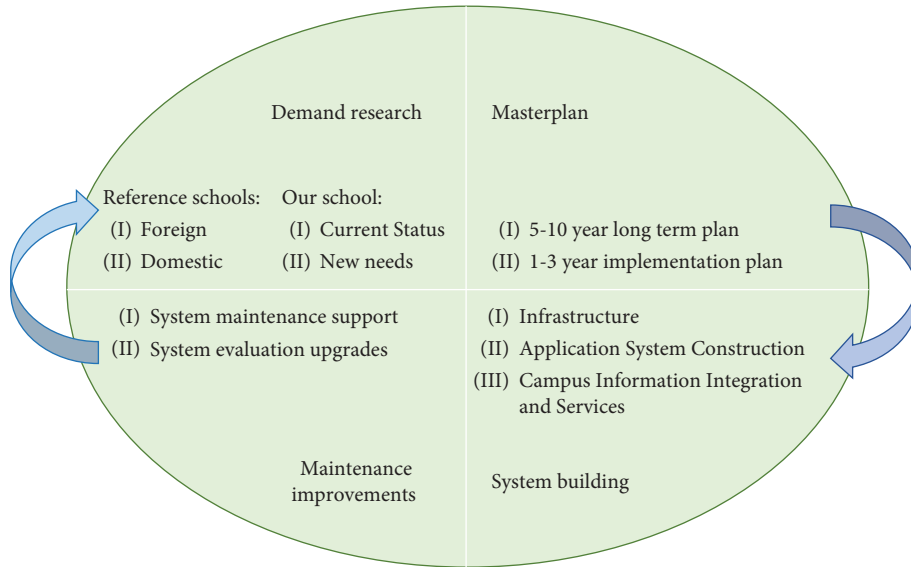


FIGURE 2: Campus intelligent construction process.

TABLE 1: Application authentication system.

Serial number	Targeted questions	Purpose of the application authentication system
1	Security isolation of each local area network internal application and information distribution website	Add a security proxy server and implement access control based on the authentication system
2	Security of remote endpoints accessed via dial-up	Identity and permission-based access control
3	MAIL security	Centralized public and private key management system for easy deployment of e-mail authentication and encryption systems
4	Database security	A flexible multilevel and multiscope security database system based on an authentication system can be easily established
5	Host or network-based data encryption and decryption technology	Centralized key management and distribution system to improve the management intensity of data encryption and decryption

From the product and technology, information security not only involves specific information network equipment but also mainly involves information security strategy and management; it reflects the modern information security concept of technology as a supplement and management as the main focus. The specific implementation must follow the overall design, distribution implementation, and continuous improvement of the information security concept. According to the network model, generally speaking, the needs for network security are shown in Table 2.

In addition, for the specific characteristics of the campus network, the specific targeted contents of the campus intelligent network are shown in Table 3. With the list of security problems and proposed measures for the current campus network, the construction of a perfect authentication system based on the PKI system will greatly enhance the security capability of the whole network, and a network security system can be fundamentally established.

3. Methodology

3.1. Measures for Intelligent Development of Student Management. First of all, the intelligent management of students in colleges and universities must form a responsive system in order to achieve long-term sustainable

development. On the one hand, the state should provide a responsive system guarantee from the macropolicy to help the intelligence and encourage universities to implement intelligent management, and on the other hand, student management personnel of universities should keep pace with the times, actively synchronize with the mainstream technology development of the society, and be ready to adjust and improve student management. In addition, each university should highlight its individuality and create different intelligent management systems according to its characteristics [16]. For example, students' management in liberal arts colleges can use intelligence to sense the talents and specialties of each student at any time, while science colleges focus on highlighting students' active participation in the construction of intelligent laboratories and intelligent student management, so as to truly customize the intelligent management of college students under the vision of big data.

Secondly, since China lags behind the international average in certain core technology fields of big data and artificial intelligence, as the cultivation place of high-end talents, colleges and universities should introduce high-end technical talents extensively, especially the teachers who meet the development needs of today's intelligent era. A team of experienced backbone teachers can make the management of college students more scientific, reasonable,

TABLE 2: Network model protocols and technologies.

OSI seven-layer protocol	TCP/IP protocol	Security requirements and key technologies
Application layer	Process layer	Application confidentiality requirements: the main technologies are SHTTP, PGP, SMIM, development-specific protocols, etc.
Representation layer	Transport layer	Confidentiality of the transmitted data: the main technologies are SSL protocol and public key-based authentication and symmetric key encryption technology, etc.
Session layer	Network layer	Access control requirements: the main technologies are packet filtering, IPSEC protocol, VPN, etc.
Transport layer		
Network layer		

TABLE 3: Network security targeting table.

Serial number	Targeted questions	Recommended measures
1	Network access control	Integrated use of firewall, VLAN, and VPN technologies to achieve website access control within and between LANs
2	Security of remote endpoints accessed via dial-up	Deployment of link encryption or IP encryption or VPN technology
3	Storage security	Deploy file encryption system on key machines
4	Security of the operating system	Security hardening of NT servers and new installations are recommended to use secure operating systems
5	Antivirus	Deployment of hierarchical network antivirus workstations and client software
6	MAIL security	Deploying an e-mail encryption system

and efficient, and a team of excellent young teachers can convey new vitality and provide new directions for the management mode of the school [17]. Meanwhile, major universities should pay attention to recruiting talents in intelligent management and do scientific research and projects in intelligent management; firstly, pilot in our university to accumulate experience, and then, other universities gradually implement it with the actual situation and their own schooling characteristics, so as to continuously develop technology and truth in practice.

Third, the construction work of the Internet of things in colleges and universities should be unified planning, gradually building or introducing the successful Internet of things construction experience of other colleges and universities, especially schools with the Internet of things majors should do a good job of advanced and open construction of the IoT blubber laboratory [18], which can keep in touch with the development of society and facilitate upgrading also to student management in the case of retaining privacy real-time monitoring, tracking, and positioning. Universities actively exchange experiences of IoT construction, share the efficacy and convenience brought by successful IoT construction to intelligent university student management, and send relevant experts to guide how to implement relevant equipment systems for IoT construction if necessary, enrich data sources, and provide scenarios for intelligent applications to be landed.

Finally, to gradually build a unified comprehensive information platform for student management, college administrators should gradually integrate the scattered and fragmented information resources of students' daily life, continuously analyze and dig deep into the potential motives behind these data and information, and provide powerful data support for those concerned to make decisions.

3.2. General Structure of Intelligent System. The construction goal of the campus intelligent weak power system project is to establish an intelligent campus with advanced technology, comprehensive functions, and easy operation and can cover all functional areas [19]. The architecture of the weak electrical system implementation focuses on the following areas: campus security system, emergency broadcast system, campus computers, network system, and integrated cabling system. As shown in Figure 3, the whole safe campus monitoring system mainly includes the following parts: school security monitoring center, front-end video monitoring system, and communication transmission system. (1) Security monitoring center: the security monitoring center is the general control room of the system, which is the control and management center of the whole monitoring system; (2) video monitoring system: front-end video monitoring points can be divided into school entrance video monitoring points, channel video monitoring points, and large activity area video monitoring points according to the site conditions; (3) communication transmission system: the project goal is to establish a technologically advanced, comprehensive, and easy to operate system which can cover all functional areas of the intelligent campus, such as channel video monitoring points and large event area video monitoring points [20]. The process included in edge detection using the Canny operator is as follows.

In the first step, the Canny operator low pass filters the image with the first-order derivative of a two-dimensional Gaussian function, which is given by

$$G(x, y) = \frac{1}{2\pi\sigma^2} \exp\left(-\frac{x^2 + y^2}{2\sigma^2}\right). \quad (1)$$

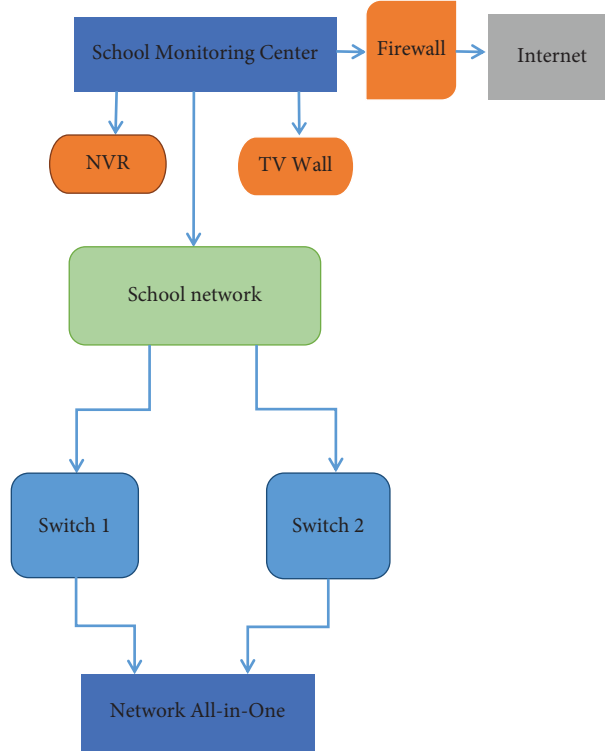


FIGURE 3: Overall system architecture.

The second step calculates the amplitude and direction of the gradient. Using the divisibility of the Gaussian function, the two filter convolution templates of G are decomposed into two one-dimensional determinant filters, which are then convolved with the image $f(x, y)$ separately to obtain the output:

$$E_{x/y} = \frac{\partial G}{\partial x/y} * f(x, y),$$

$$A(x, y) = \sqrt{E_x^2(x, y) + E_y^2(x, y)}, \quad (2)$$

$$\partial(x, y) = \arctan \left[\frac{E_y(x, y)}{E_x(x, y)} \right].$$

Then, $A(x, y)$ and $\partial(x, y)$ reflect the magnitude of the gradient amplitude and the direction angle at the point (x, y) on the image, respectively.

3.3. Intelligent System Hardware Facilities. In order to further strengthen the security of the school, the school area is divided into entrances and exits, perimeters, and channels in a total of three areas, as shown in Table 4. The core layer is located in the security center server room, responsible for the entire network video surveillance service data traffic exchange, and can be connected to the remote network through the security policy. The core switching area mainly deals with the convergence point data traffic exchange; the switch requirements should be able to all IP packets for wire-speed nonblocking

TABLE 4: Intelligent monitoring configuration.

Precautionary area	Coverage locations
Entrance and exit	School entrance Main entrances and exits of teaching and office areas
Perimeter	School campus perimeter
Passage	Teaching and office area main corridors and passages

forwarding, while being able to work for a long time without failure. For each network, a hard disk recorder is configured with a 21.5-inch LCD monitor for real-time display of images of each monitoring point, which can be a multiscreen split display or cyclic switching display. Campus intelligent system hardware facilities include many subsystems, such as a security prevention system, multimedia teaching system, computer room project, communication engineering system, and weak electricity pipeline project.

The campus integrated wiring system should follow the principles of practicality, flexibility, modularity, expandability, standardization, and reliability. Each room is designed with one network and one conversation, and considering line redundancy, two network cables are laid in each room. In order to meet the requirements of the structured cabling system, according to the above design principles, a super category 5 structured cabling system should be used, with a single set of a wiring system that

TABLE 5: Integrated wiring standards.

EIA/TIA-568	Civil building cable standards
EIA/TIA-569	Communication access and space standards for civil buildings
IEEE 802.3	Bus-based Ethernet LAN standard
IEEE 802.5	Loop LAN standard
ANSI FDDI	Fiber distributed data interface high-speed local area network standard
TPDDI	Copper wire distributed data interface high-speed LAN standard
ATM	Asynchronous transfer mode standard
RS232 RS422	Asynchronous and synchronous transmission standards

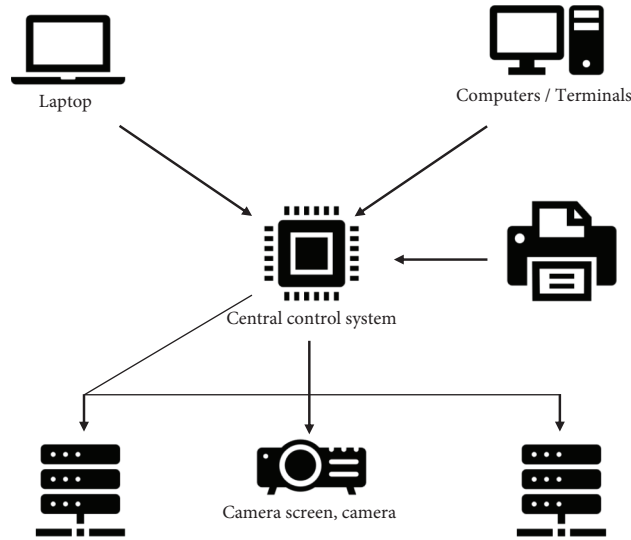


FIGURE 4: Intelligent student teaching system.

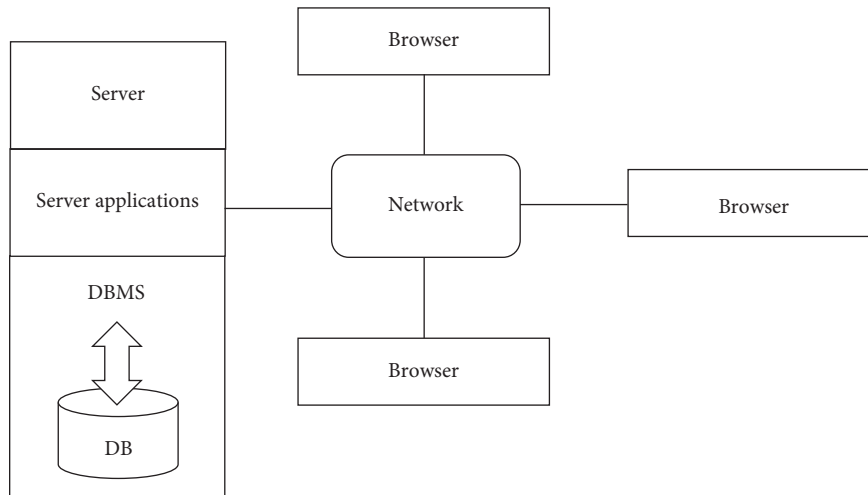


FIGURE 5: System development B/S model.

integrates the entire communication, including the wiring needed for voice, data, image, monitoring, and other equipment, as shown in Table 5.

3.4. *Application of Intelligent System in Campus Teaching.* The introduction of computer technology and communication technology into all aspects of teaching, thus triggering a major

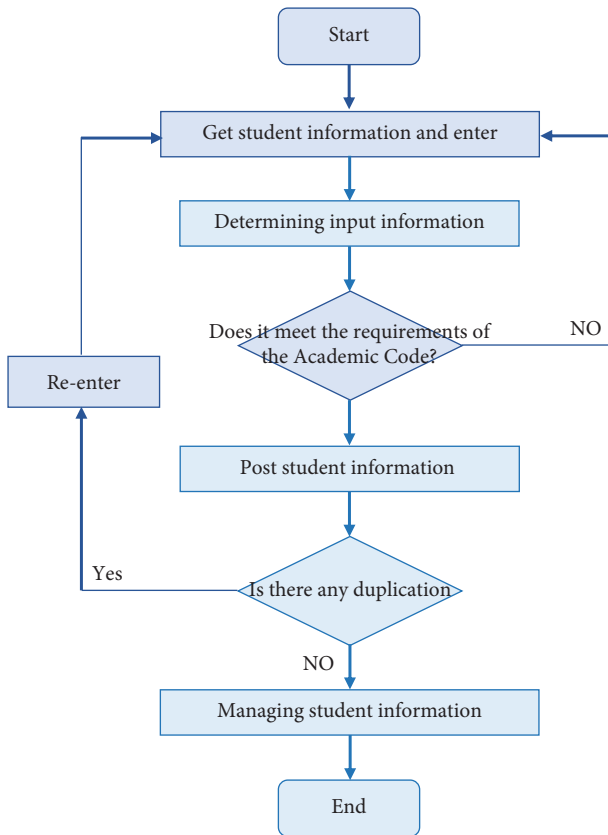


FIGURE 6: Flowchart of student information management.

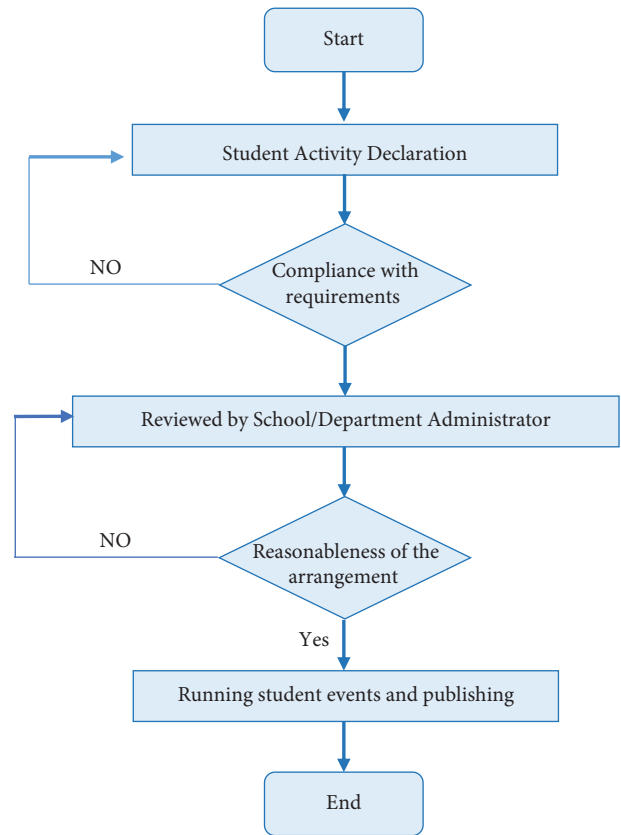


FIGURE 8: Flowchart of student activity management.

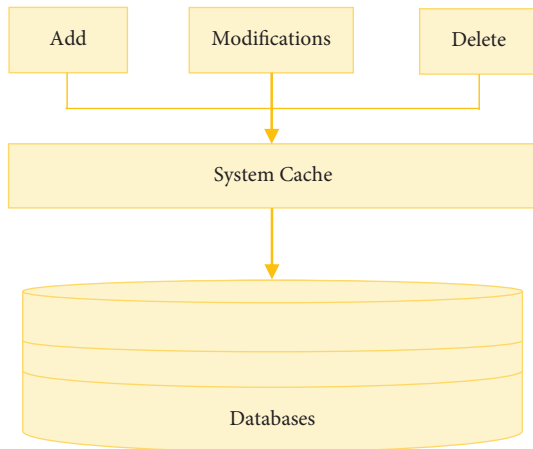


FIGURE 7: Flowchart of scholarship management.

innovation in teaching methods, teaching methods, and teaching tools, plays an immeasurable role in improving the quality of teaching and promoting the development of modernization of education. In this program design, multimedia teaching, courseware teaching, seminars, and large screen display functions are fully realized and convenient to access the Internet so that various images, audio, and video are perfectly displayed, as shown in Figure 4.

4. Result Analysis and Discussion

4.1. Student Management System Design. The basic architecture of intelligent student management information

system: regarding the development of the system, an intelligent student information management system adopts the language as the core development language of the system [21]. In terms of development model selection, MVC three-layer development model is mainly adopted. Presentation layer (UI) mainly refers to the interface that interacts with the user. It is used to receive data input from users and display the data needed by users after processing. Business logic layer (BLL) is the bridge between the UI layer and DAO layer and realizes the business logic. Data access layer (Dao) deals with the database, mainly realizes adding, deleting, changing, and checking data, submits the data stored in the database to the business layer, and saves the data processed by the business layer to the database. As for the framework template of the front page design, easy-ui is mainly used. As for the backend database, MySQL is mainly used. As for the development framework, SSM framework is mainly used. The system development model is shown in Figure 5. In terms of functionality, Spring can achieve the integration of all the project's frameworks. In terms of transaction control, Spring can achieve the function of managing beans. Spring MVC framework: SpringMVC is a module provided by the Spring framework. The MVC three-tier development model is mainly to achieve the separation of the data layer, business layer, and representation layer so that it simplifies the development of Web applications, but in terms of core development implementation, MVC layered development model is mainly request-driven to achieve the purpose of data control forwarding.

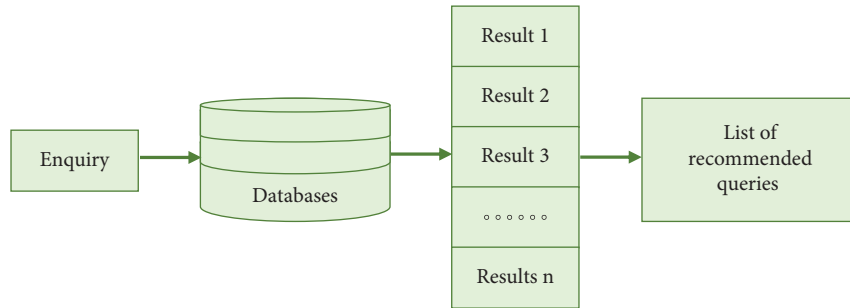


FIGURE 9: System query recommendation process.

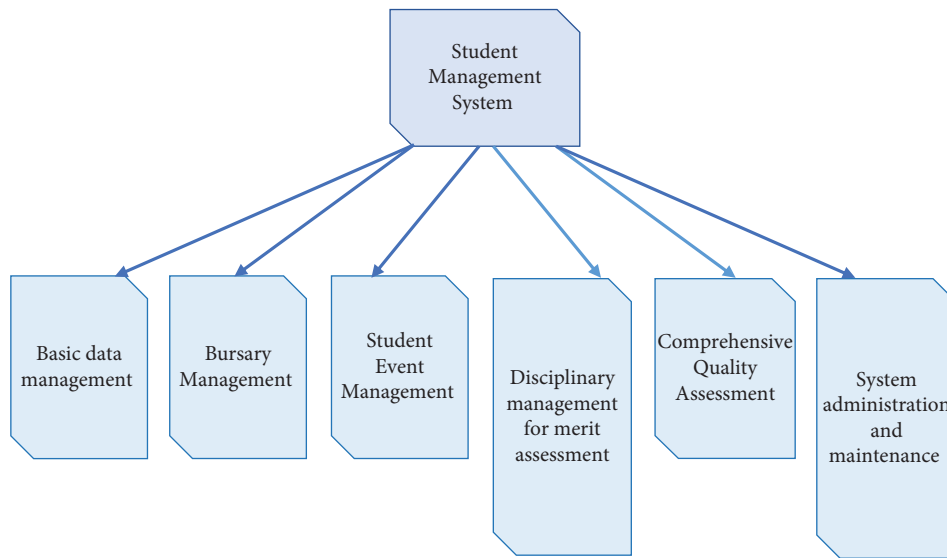


FIGURE 10: Composition of the student management system.

Basic data management is mainly to view the basic information of the students under their control, to modify and improve the student information [22]; you can query all student information, the information can be modified, and you can view the details of the student, as shown in Figure 6.

Scholarship and grant management business are divided into two parts, declaration and approval, each corresponding to students and counselors and departmental administrators at all levels, to declare and approve students' scholarships and grants; with Ajax technology to achieve rapid modification of scholarships and grants, dynamic refresh effect, the process of scholarship and grant management is as shown in Figure 7.

Student activity management business is for declaring and approving students' activities, each corresponding to students and counselors, departmental administrators at all levels, to manage students' activities at school and design the main processes of student activity management, as represented in Figure 8.

To manage the login account permissions in the whole system, only the school-level administrator has the

permission to use this module, system log management; you can turn on and off log monitoring and monitor all users of the system operating system at any time; the process of querying the recommended system log information is shown in Figure 9.

4.2. Student Management System Functions. Student information management system is a management software developed for a large amount of work processing work in the school student office, mainly for school student information management; the overall task is to realize the systematization, scientific, standardization, and automation of student information relations; its main task is to use cell phones and computers for daily management of various student information. Analysis of the need to develop a student management information system to a large extent: the student management information system should be a comprehensive system that dynamically manages all data and information of students in a networked and informative way, as shown in Figure 10.

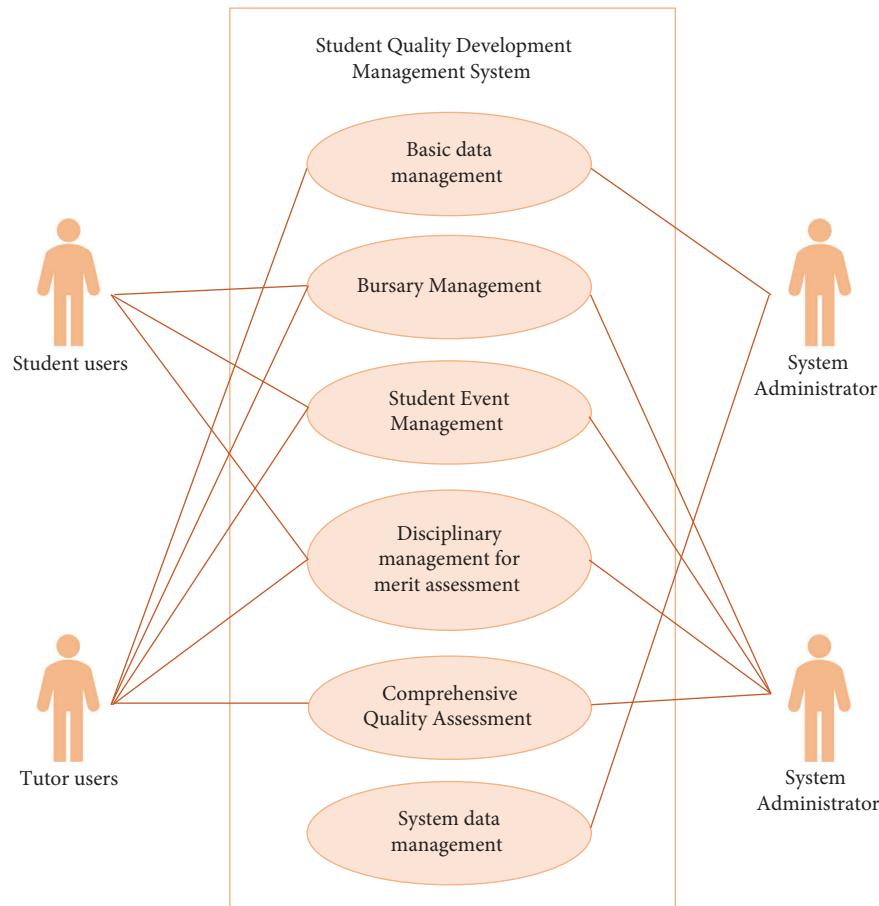


FIGURE 11: Student management system use case.

Meanwhile, in this intelligent student management system, according to the research results, we divide the users into four categories, such as student users, counselor users, system administrators, and department administrators. Each user role exercises different operation rights in the system, and the detailed functional requirements of users are shown in Figure 11.

The student management information system can ensure the following goals. (1) The system will ensure the practicality, reliability, advancement, and applicability of the system and strive to operate concisely and simplify the operation process. (2) The system will achieve classification and grading management of each submodule, dynamic management of the database, and classification of data to prevent data confusion. (3) The system is capable of simple query and compound query according to different conditions selected by the user, and the system development focuses on user experience. (4) The system is capable of classifying and summarizing the results of the user query, realizing the export function, and finally realizing the printing of reports. (5) The system focuses on data security and is capable of backing up the data and recovering the data deleted by mistake. (6) The import and export function of the data.

5. Conclusion

The research and application of an intelligent student information management system are mainly based on the actual needs of work and future expansion needs; the main architecture is mainly based on a three-layer framework, separating the representation layer, business layer, and data layer, and the development method of the prototype can improve the security and confidentiality of data in the process of network environment transmission, further enhancing the transparency of student information management and informationization. The level of student information management is further improved. The student management information system can better balance the supply and demand of student information resources in colleges and universities, make the management of student information and the selection, award, and punishment of financial aid in colleges and universities more scientific, fair, and efficient, and finally realize the process of accurate and efficient management of student information. It can integrate the data and information of various departments effectively to the maximum extent, which largely meets the needs of student information intelligent management of student work managers.

The informatization and intelligent construction of colleges and universities is an important reflection of the comprehensive strength of schools, so it is necessary to improve the understanding of the informatization of schools and improve the management of school teaching work. Colleges and universities should improve the intelligent construction of students' campus life and create an intelligent one-card of the campus, strengthen the intelligent technology training for teachers, and make continuous improvements to the school's faculty. We strive to create a college campus network with informatization, science, and intelligence and realize the integration of intelligent campus construction in colleges and universities, so as to facilitate the learning and life of college teachers and students.

Data Availability

The labeled dataset used to support the findings of this study can be obtained from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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