Hindawi
Mobile Information Systems
Volume 2022, Article ID 9087983, 12 pages
https://doi.org/10.1155/2022/9087983

Research Article

Construction and Data Integration of College Student Management Model Based on Human-Computer Interaction Data Acquisition and Monitoring System

Tingfei Wang

Zhejiang Industry Polytechnic College, Shaoxing, Zhejiang 312000, China

Correspondence should be addressed to Tingfei Wang; tingfeiwang@zjipc.com

Received 25 April 2022; Accepted 27 May 2022; Published 22 June 2022

Academic Editor: Muhammad Muzammal

The research on the management mode of students in colleges and universities is helpful in cultivating students' autonomous learning, self-education, and self-service ability. However, there are still some deficiencies in the construction of college student management model. This paper aims to study and analyze the construction and data integration of college student management mode under the data acquisition and monitoring system based on human-computer interaction. Firstly, this paper analyzes the human-computer interaction technology. Robots participate in human activities and coexist with people, which is called human-computer interaction. Human-computer interaction technology mainly includes voice interaction, image interaction, data interaction, and action interaction. Then, the sensor data acquisition algorithm based on cooperative communication is analyzed, and finally, the management mode of students is experimentally explored. The composition of the management system of college students is realized by establishing the management subject, management object, and management environment of students. The experimental results of this paper show that, in the investigation of the student union management system, 43% of the participants chose "the system exists, but it needs to be improved," and 31.5% of the participants chose "the system is perfect." "The system is not perfect" accounted for 14.8%, and 89.2% of the participants believed that there was a system. Obviously, whether it is the system, the enforcement strength, or the standard level, there is still room for improvement. We can strengthen the connotation construction of the student union and improve the management function of the student union, deepen the understanding of the status and role of the student union, build a standardized evaluation system for the student union, and strengthen the internal organization of the student union.

1. Introduction

The in-depth research on the management of students in colleges and universities can cultivate students' self-directed learning, self-directed teaching, and self-service ability. With the deepening of the socialization trend of higher education, college student associations have gradually become the "second grass-roots organization" outside the class, which can enable students to grow and finally integrate into the society. The student union is not only an important carrier for college students to carry out extracurricular activities, but also a broad stage for comprehensively cultivating the quality of college students and an important position for the construction of campus culture. It helps improve students' self-ability, establish students' awareness of mutual assistance and cooperation, an open and inclusive attitude, and a sense of responsibility to serve the society. Especially the post-90s college students have a strong sense of personality, democracy, and participation. In this way, how to use the platform of student union to effectively carry out the education and management of local regional college students, make use of the particularity of local regions, and explore a set of management mode of college student associations suitable for local regional students is worthy of our research and discussion.

Through the analysis of the current situation of student management, the construction of the management mode guarantee system, and the research on the countermeasures and measures to promote the construction of the management mode, this paper establishes a college student management mode that adapts to the local reality. It then establishes a model to meet the social needs of local regional college graduates in a considerable period of time. Accelerating the formation of the social model of graduates from local colleges and universities to deepen the reform has certain reference value and significance for promoting the development of local regional college student associations.

This paper selects colleges and universities that can represent four types of colleges and universities: public undergraduate, private undergraduate, public junior college, and private college as the research object. A questionnaire was designed for the function and management of student groups to obtain first-hand information, and an experimental study was carried out on the model of building student management. Among them is the survey of student management system. 43% chose “the system exists, but needs to be improved,” 31.5% “the system is perfect,” 14.8% “the system is not perfect,” and 89.2% “have rules and regulations.” In this regard, we can strengthen the internal organization construction of students by strengthening the connotation construction, optimizing the functions of student management, and deepening the understanding of the status and role of student groups.

The innovations of this paper are as follows: (1) human-computer interaction technology is introduced. Human-computer interaction technology includes voice interaction, image interaction, data interaction, and action interaction; (2) a sensor data acquisition algorithm based on cooperative communication is proposed; (3) a questionnaire analysis is carried out on the construction of the management mode of student union.

1.1. Related Work. According to the research progress abroad, different researchers have also made corresponding cooperative research on the management mode of college students. In order to make students’ health management more scientific, standardized, and effective, Wang H put forward big data technology to build student health information management model. He combined the data collection, supervision, data analysis, and data application of students’ health and gradually improved the National Students’ health monitoring and evaluation system [1]. In view of the constraints of simultaneous shortage and idleness of students’ physical exercise and gymnasium facilities, Wang proposed a gymnasium operation and management mode based on College Students’ behavior model for the purpose to inspire the innovation of university gymnasium management mode [2]. According to the management mode of “EPC + construction unit,” taking the construction project of bid section I of Shaanxi Beijing No. 4 gas transmission pipeline project as an example, Liu studied the actual use of “EPC + construction unit” in the project construction management stage. He analyzed the advantages and disadvantages and gave improvement suggestions and put forward the management mode of “EPC + construction unit.” While improving the fine management in the construction process, it reduces the project cost and improves the efficiency of project management [3]. However, these scholars did not integrate the relevant data.

Some scholars also have corresponding research on data integration. Jung and Chung proposed a clustering process based on social data mining for large data integration. The method they proposed uses the traditional static model information and the information extracted from the social network to establish a reliable user model and applies different weights according to the relationship between users [4]. Obrenović et al. had proposed a new method and algorithm to identify conflicting and testing merging of subschema and integrated database schema against checking constraint [5]. Wang et al. proposed a server integration analysis model of virtualized Internet data center based on queuing theory. According to the characteristics of these service workloads, the model can provide the maximum number of integrated physical servers required to ensure QoS, and the request loss probability is the same as that of dedicated servers [6]. These scholars still lack some technical demonstration in the construction of college student management mode and data integration. We find that the construction of college student management mode based on human-computer interaction technology is very effective. In this regard, we consulted the relevant literature based on human-computer interaction technology.

Many scholars have also made corresponding research progress in human-computer interaction. Correia N N has proposed an audio-visual user interface (AVUI), a new UI that connects interaction, voice, and images. He expanded the concept of a graphical user interface (GUI) by adding interconnected sounds and images. Correia and Tanaka aimed to locate AVUI in the identified related fields, human computer interaction (HCI), voice interaction design, cognitive psychology, and audio-visual art, and determine the benefits of AVUI in these fields [7]. Neto et al. focused on the research and development of mobile applications and analyzed the huge research challenges of human computer interaction with [8] in Brazil. In order to enhance the functions and user satisfaction of these network intensive electronic social applications, Devi and Easwarakumar believed that it is necessary to develop more accessible and unnoticeable and user-friendly human-machine interaction modes. These allow people with different abilities to seamlessly access information and interact naturally and intuitively with these new intelligent spaces anytime, anywhere [9]. Rozado et al. demonstrated the open source accessibility software face switch to help disabled objects interact effectively with hands-free computers. Face switch enhances gaze interaction through video-based facial gesture interaction. Emerging multimodal systems allow target selection through gaze pointing and facial gestures for target specific action commands to interact with the user interface [10]. However, these scholars have not studied the construction of college student management mode and data integration under the data acquisition and monitoring system based on human-computer interaction. They only discussed its significance unilaterally.

2. Method

After years of development, student union have become an important part of campus culture and an effective way for college students to develop in an all-round way. At the same time, we should also see that there are still some problems in student management, especially in local and regional colleges and universities. Only by fully understanding the current situation and existing problems of student management can we build a more reasonable and effective student management model. This paper aims to study and analyze the construction and data integration of college student management mode under the data acquisition and monitoring system based on human-computer interaction.

2.1. Monitoring System. At present, the monitoring system can be divided into centralized architecture and distributed architecture according to the hierarchical structure of monitoring objects and the local autonomy of monitoring nodes. The centralized architecture is generally suitable for small-scale cluster environment monitoring with a relatively single resource type and a relatively small number of monitoring nodes due to its relatively simple structure. The distributed architecture is relatively complex and is generally suitable for environments with complex resource structures, such as data center environments containing various heterogeneous resources.

The centralized system adopts a simple two-tier C/S structure, which is mainly composed of monitoring server and monitoring agent. The centralized architecture periodically collects the running status data of the monitoring node by installing and running the agent program on the monitoring terminal node and implements the management and maintenance of the terminal equipment status by executing the operation instructions issued by the monitoring server. The agent program is responsible for monitoring and managing the running status of the terminal node. Once the terminal device or system application fails during the running process, the agent program will upload the timely collected fault information to the monitoring server and wait for the monitoring server's control instructions. By executing the control instructions issued by the monitoring server, it can give corresponding feedback to the fault. Since the data of all monitoring nodes must be aggregated to the monitoring server for processing, the singleness of the monitoring server and the performance bottleneck also determine that the architecture cannot bear the infinitely increased number of monitoring nodes.

The distributed architecture can be regarded as a hierarchical extension of the centralized architecture. One main monitoring server and multiple domain monitoring servers process the data information of all monitoring nodes together by dividing all monitoring nodes according to physical or logical areas, setting up a domain monitoring server in each area to independently handle the monitoring tasks in this area, and finally reporting the collected monitoring information to the main monitoring server.

2.2. Human Computer Interaction. The activities between robots and humans and getting along with people are called human-computer interaction. The main purpose of human-computer interaction is to open an important knowledge channel for communication between human and robot. Figure 1 shows the basic mode of human-computer information interaction. In the early stage of the development of computer technology, human beings mainly carried out man-machine communication through signal lights, small pieces of paper containing information, and other methods. However, due to the rapid development of computer technology, the emergence of human-computer interaction interface has greatly improved the communication efficiency. But this is far from meeting the needs of modern human-computer interaction. But in recent years, the birth of intelligent robot has made a great contribution to the development of modern human-computer interaction. Intelligent robots can realize discourse interaction, gesture interaction, picture communication, and even emotional communication with people [11].

Through the development in recent decades, modern human-computer interaction technology has roughly included the following aspects: (1) voice interaction: TTS technology can also make the machine sound. Its success is based on the theoretical basis of linguistics and psychology, using hidden Markov model with the support of word processor to convert text information into language output [12]. Because TTS is widely used in computer human-computer interaction, it can help people with cognitive impairment read text information on the computer, or even just to improve the readability of text documents. (2) Image interaction: taking image as the main medium of human-computer interaction is a cognitive skill based on robot vision function. The image human-computer interaction technology is to use the camera and other hardware equipment as the visual function of human eyes, so that the robot can complete the data processing and observation of the surrounding natural environment. Computer vision skills mainly involve the collection and extraction of image information, image transmission, and postprocessing. In fact, the image acquisition process is to convert the image seen by human eyes into matrix storage, and the process is reversible. Image transmission process and postprocessing skills mainly involve image separation, image sharpening, image coding and decoding, image feature extraction, etc. [13]. Image processing technology is widely used in the field of robot, such as target positioning based on image information processing and recognition technology and pattern recognition based on image information processing. (3) Data interaction: data interaction is the most traditional, but it is also one of the most important means of human-computer interaction. It uses people to input interactive instructions to the computer until the machine completes the command and realizes the goal of human-computer interaction through continuous data exchange [14]. The input and output data are not limited to any one format, but at the same time, the input and output content is extensive. It can control not only instructions, but also language and graphics. (4) Action interaction: in addition to the three

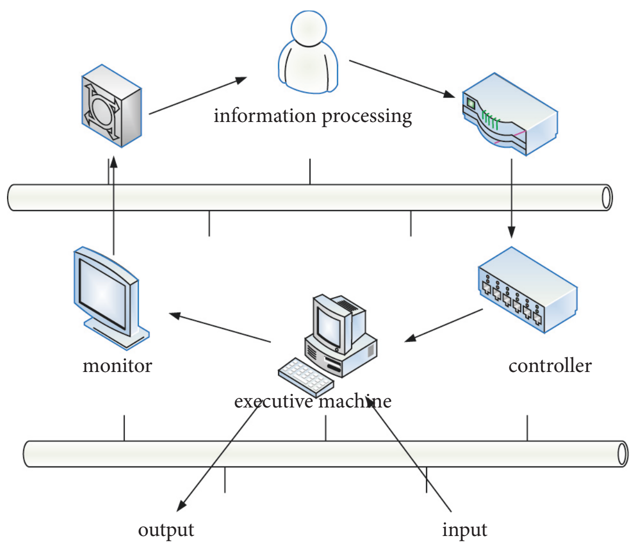

Figure 1: Basic mode of human-computer information interaction.

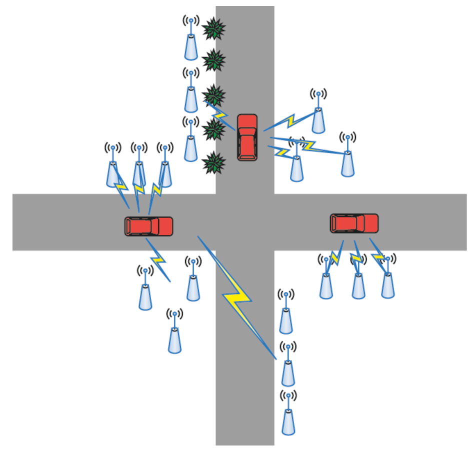

Figure 2: Static sensor data acquisition algorithm based on Cooperative Communication.

basic human-computer interaction methods introduced above, some people will also use their own limb activities to interact with robots to achieve more efficient human-computer interaction. Dynamic interaction usually refers to the preset dynamic target of human-computer interaction after the body actions collected by sensors are processed by the robot. Dynamic interaction requires robots to have quite powerful cognitive functions and capture body movements [15]. Dynamic interaction also has a great demand for artificial intelligence, because there are usually a large number of human joints captured, so the amount of information processing will be relatively large.

2.3. Sensor Data Acquisition Algorithm Based on Cooperative Communication. Based on cooperative communication, a low-energy static sensor data acquisition algorithm is proposed in this paper. It minimizes the energy consumption of each static sensor on the premise of meeting the efficiency of network data acquisition. The basic idea of this algorithm can be vividly expressed in Figure 2. In the Figure, every three static sensors form a cluster, and each cluster node independently decides whether to adopt cooperative communication. The three clusters at the bottom right of the Figure are close to the mobile node, so they are independent and communicate with the mobile node. The three clusters on the upper left are far away from the mobile node, or there are trees blocking the signal, so cooperative communication is selected to upload the data to the mobile node with low energy consumption. In this algorithm, whether to adopt cooperative communication and how much energy consumption can be used to send data to meet the requirements of data acquisition have become the key issues of research. Firstly, starting with the data acquisition model of static sensor, the definition of data acquisition efficiency of static sensor is given. Secondly, the energy consumption expressions of independent communication and cooperative communication are given, and the concept of optimal communication radius is derived. We will further discuss the calculation formula of the optimal communication radius of static sensors under the motion model of each mobile node. Finally, this paper will discuss the optimal cluster size of static sensors when the optimal communication distance is known.

Static sensor data acquisition network model for mobile wireless sensor networks: supposing that there are p clusters of static sensor nodes in the area where the wireless sensor network is located. A node cluster contains k nodes, and the maximum distance between nodes in the cluster is l_0. Each node in the cluster can adopt either independent communication mode or cooperative communication mode. The so-called independent communication mode means that each node independently and directly communicates with the mobile nodes within the communication range without information interaction with other nodes in the cluster. The cooperative communication mode, that is, each node, interacts and shares information with each other and adopts the sending cooperative communication mode to communicate with the mobile nodes within the communication range. The node selects the communication mode with low energy consumption between the two modes. The reason why static sensors are clustered in advance is that cooperative communication requires all cooperative nodes to complete information sharing and phase synchronization before communication. In mobile sensor networks, when mobile nodes are in motion, the time to communicate with cooperative nodes is limited. Preclustering enables each cooperative node to complete data sharing and phase synchronization in advance before data communication with the mobile node, so that it can communicate with the mobile node in time.

Q mobile nodes follow a certain motion model to move in the network and collect data. The communication distance between the mobile node and the static sensor is set to s. This communication distance can be achieved by two modes: independent communication and cooperative communication. Assuming $l_0 \ll s$ here, in cooperative communication, this communication distance can be calculated from the geometric center of the cooperative node.

When the mobile node enters the communication range of the static sensor, it is considered that the data of the static sensor is successfully collected by the node.

The static sensor data acquisition efficiency R of mobile wireless sensor networks is defined as the probability that the static sensor data of the whole network will be collected within a given time limit W_{MAX}, i.e.,

$$R = R\left\{ \cap_{n=1}^{PK} X_n \right\}. \quad (1)$$

The event X_n indicates that the sensor n data is successfully collected within the time limit W_{MAX}.

In the application of data in mobile wireless sensor networks, there are usually some restrictions on the data acquisition efficiency of static sensors in the whole network in a given time. For example, in the metropolitan environmental sensor monitoring network, the data acquisition efficiency of the environmental monitoring sensor should reach a certain proportion within a given time, so as to realize the monitoring and panoramic recovery of the urban environment. The network data acquisition efficiency is limited to E; that is, when $R > E$, the static sensor data acquisition algorithm can be considered to meet the application requirements.

Noting that the definition of data acquisition efficiency here refers to the fact that all data of all static sensors in the whole network are collected, rather than only one piece of or some sensor data. When $r > e$, that is, the probability of all data collected in the whole network is greater than the network limit, the data acquisition probability of each sensor is greater than E. The reason for this definition is that $R = R\{ \cap_{n=1}^{PK} X_n \} > E$ and $R\{X_n\} > E$ have very different meanings. The former can ensure that all data of the whole network are collected with a probability greater than e, while the latter only guarantees the acquisition probability of each sensor. When the data acquisition events of each sensor are independent of each other,

$$R\left\{ \cap_{n=1}^{PK} X_n \right\} = \cap_{n=1}^{PK} R\{X_n\}. \quad (2)$$

If the $R\{X_n\} > E$ network is not guaranteed, only the $R\{ \cap_{n=1}^{PK} X_n \}$ network is guaranteed to collect data.

Static communication energy consumption optimization sensor: set the W_l transmission time of each static sensor in the mobile wireless sensor network, and the energy consumption of data is u. According to the network model, each sensor node always selects a communication mode with low energy consumption between independent communication mode and cooperative communication mode, that is,

$$U = \min\{U_{NS}, U_{SS}\}. \quad (3)$$

U_{NS} and U_{SS} are the energy consumed by the static sensor to send W_l -length data, respectively.

The following optimization problems can be solved:

$$\text{subject to } R = R\left\{ \cap_{n=1}^{PK} X_n \right\} > E. \quad (4)$$

This is to minimize the energy consumption of each static sensor under the limitation of the network on data acquisition efficiency.

In the independent communication mode, the energy consumption of the sensor is only the energy consumption of data transmission, i.e.,

$$U_{NS} = W_t R_w^{NS}. \quad (5)$$

In the communication mode, the power consumption L is the required distance to the mobile sensor R_w^{NS}. The power consumption includes two parts: one is the power consumption R_{RX} of all power amplifiers during data transmission, and the other is the power consumption R_S of other circuit units during data transmission. R_{RX} is a function of transmission power R_{out}. Assuming that the communication link between the sensor and the mobile node is an h-loss AWGN link, then

$$R_{\text{out}} = \frac{R_r^{NS}}{F_w F_l} \left(\frac{4\pi}{\beta} \right)^2 l^h. \quad (6)$$

R_w^{NS} is the effective received power at the receiving end of the mobile node. It can be considered that when the signal power at the receiving end is greater than R_w^{NS}, the data can be effectively received and successfully decoded with a very low bit error rate. F_w and F_l are transmit and receive antenna gains, respectively. β is the wavelength of the transmitted signal, and l is the communication distance between the static sensor and the mobile node.

$$R_{RX} = \frac{\gamma}{\delta} R_{\text{out}}. \quad (7)$$

γ is the peak to average ratio of transmitted signal, and δ is the drain efficiency of RF power amplifier, noting that the value of γ is determined by the data modulation mode. In subsequent simulation, MQAM modulation can be adopted. At this time,

$$\gamma = 3 \frac{\sqrt{Q} - 1}{\sqrt{Q} + 1}. \quad (8)$$

The loss calculation formula of other circuit units is as follows:

$$R_S = R_{DAC} + R_{mix} + R_{filt}, \quad (9)$$

R_{DAC}, R_{mix} and R_{filt} are the power consumption of D/a converter, mixer, and filter at the transmitter, respectively.

To sum up, the communication power consumption of independent mode sensor is as follows:

$$R_w^{NS} = \frac{\gamma}{\delta} \frac{R_l^{NS}}{F_w F_l} \left(\frac{4\pi}{\beta} \right)^2 l^h + R_S. \quad (10)$$

At this time, the energy consumption of W_t data sent by the sensor is as follows:

$$U_{NS} = W_t \left\{ \frac{\gamma}{\delta} \frac{R_l^{NS}}{F_w F_l} \left(\frac{4\pi}{\beta} \right)^2 l^h + R_S \right\}. \quad (11)$$

In the cooperative communication mode, the energy consumption of sensors includes not only the energy consumption of data transmission, but also the energy consumption of shared data and synchronization of nodes in the local cluster. In this paper, an adaptive optimization cooperative communication algorithm is proposed. In this algorithm, the cooperative node selects the data and location of the node actually participating in the cooperation according to the bit error rate requirements of the receiver. The research shows that the number and location of nodes participating in cooperation have a direct impact on the efficiency of cooperative communication. If the number of cooperative nodes is not selected properly, or the mutual position of cooperative nodes is not suitable for the enhanced superposition of signals, it will reduce the efficiency of cooperative communication. Therefore, an adaptive optimization algorithm is designed to determine the optimal number of nodes participating in cooperative communication according to the BER requirements of the receiver. If the number of cooperative nodes exceeds the optimal number, it will not bring further efficiency gain. Secondly, the cooperative nodes are ranked according to the factors such as node signal quality and energy consumption reserves, and the optimal nodes are selected to participate in the ranking. This sorting basis can also be modified according to the application requirements. The analysis shows that this adaptive optimization cooperation algorithm can effectively reduce the energy consumption of cooperative communication nodes on the premise of ensuring reliable cooperative communication, balance the energy consumption of cooperative nodes in the network, and prolong the network life.

This paper adopts this adaptive optimization cooperative communication algorithm. In the cooperative communication mode, the energy consumption of each static sensor is as follows:

$$U_{SS} = KW_t R_w^{SS} + (2K+1)W_q R_{ks} + KW_t R_{ks}. \quad (12)$$

R_w^{SS} is the power consumption of the static sensor sending data to the mobile node, W_q is the synchronous communication time of the nodes in the cluster, and R_{ks} is the communication power consumption of the nodes in the cluster. The first item in the above formula represents the energy consumption of the static node sending data to the mobile node. Here, it is assumed that the static sensor only combines the sensors in the cluster to send shared information without data fusion and summary. Therefore, the data transmission duration is the sum of the data duration W_t of each sensor. The second item is the energy consumption of synchronous communication of nodes in the cluster. The third item is the energy consumption of sharing information among nodes in the cluster.

Both R_w^{SS} and R_{ks} can be obtained by a calculation method similar to R_w^{NS}. The calculation formula is as follows:

$$\begin{aligned} R_w^{SS} &= \frac{\gamma}{\delta}\frac{R_l^{NS}}{F_w F_l}\left(\frac{4\pi}{\beta}\right)^2 l^h + R_S, \\ R_{ks} &= \frac{\gamma}{\delta}\frac{R_l^{NS}}{F_w F_l}\left(\frac{4\pi}{\beta}\right)^2 t_0^h + R_S. \end{aligned} \quad (13)$$

To sum up, the energy consumption expression of static sensor in cooperative communication mode is as follows

$$U_{SS} = KW_t\left\{\frac{\gamma}{\delta}\frac{R_l^{NS}}{F_w F_l}\left(\frac{4\pi}{\beta}\right)^2 l^h + R_S\right\} + (2K+1)W_q R_{ks} + KW_t R_{ks}. \quad (14)$$

Figure 3 shows the relationship between energy consumption of sensor nodes and the distance between sensor and mobile node in independent communication mode and cooperative mode. It can be seen from the curve that when the distance between the sensor and the mobile node is close (less than 200 in the Figure), the energy consumption of independent communication mode is low. This is because when the distance is small, there is little difference in energy consumption between cooperative communication and independent communication, and cooperative communication also needs to consider the energy consumption of local shared data and synchronization. At this time, if cooperative communication is adopted, the energy consumption generated by local sharing information and synchronization is much greater than that saved by sending data by cooperative communication. As the distance increases, the energy consumption of independent communication increases. At this time, using cooperative communication to send data will effectively reduce the energy consumption of sensors. It can also be seen from the Figure that the size of sensor node cluster also has a great impact on the energy consumption of cooperative communication. When the communication distance is short, the cluster with a small number of nodes is used for cooperative communication, and the energy consumption is low. If there are too many nodes in the cluster, the shared data and synchronization within the node will consume a lot of energy and reduce the energy consumption efficiency of the sensor. When the communication distance increases, a large number of nodes cooperate to reduce energy consumption. Therefore, in the design of static sensor data acquisition algorithm, the design of the number of sensor cluster nodes is also the key.

It can be seen from the above Figure that there is a key distance l_0 in the selection of sensor communication mode. When the communication distance between the sensor and the mobile node is $l < l_0$, the independent communication can obtain less energy consumption; when using $l \geq l_0$, cooperative communication can reduce energy consumption. Therefore, the expression of static sensor energy consumption is as follows:

$$\begin{aligned} U_{NS} &= W_t\left\{\frac{\gamma}{\delta}\frac{R_l^{NS}}{F_w F_l}\left(\frac{4\pi}{\beta}\right)^2 l^h + R_S\right\}, \quad l < l_0, \\ U_{SS} &= KW_t\left\{\frac{\gamma}{\delta}\frac{R_l^{NS}}{F_w F_l}\left(\frac{4\pi}{\beta}\right)^2 l^h + R_S\right\} + (2K+1)W_q R_{ks} + KW_t R_{ks}, \quad l \geq l_0. \end{aligned} \quad (15)$$

According to the above formula, the energy consumption of static sensor is directly proportional to the communication distance between sensor mobile nodes. Therefore, in order to minimize the energy consumption of

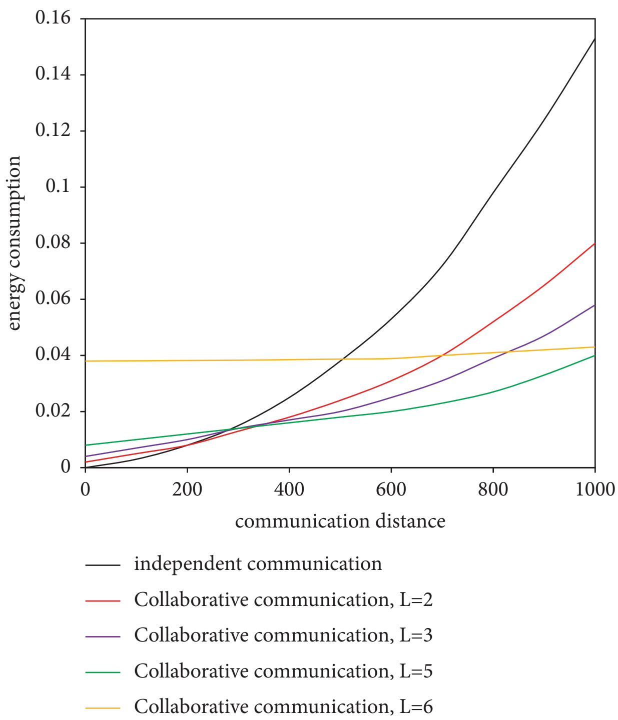

FIGURE 3: Comparison of energy consumption between independent communication and cooperative communication.

sensors, we only need to minimize the communication distance l when the data acquisition efficiency is limited.

$$\begin{aligned} &\text{minimize}\, U \leftrightarrow \text{minimizel}, \\ &\text{subject to}\, R = R\left\{\cap_{n=1}^{PK} X_n\right\} > S. \end{aligned} \tag{16}$$

So far, we have introduced the transformation of static sensor energy consumption optimization into sensor communication distance optimization based on data acquisition algorithm.

3. Experimental Results and Analysis

Management system refers to an organic whole formed by the integration of managers, management objects, and other elements according to management objectives. The composition of college student management system is realized by establishing student management subject, management object, and management environment. The main body of management is mainly composed of two parts: the manager and the management organization. The management object mainly refers to the student members and the activities they participate in. The management environment is composed of the internal and external environment. This paper selects colleges and universities that can represent four types of colleges and universities, public undergraduate, private undergraduate, public junior college, and private college as the research object, and designs questionnaires for students' management to obtain first-hand information.

3.1. Main Body of Student Management in Colleges and Universities. Managers refer to those who use their work experience and professional knowledge to take responsibility for the contribution to the organization, so as to have a substantive impact on the operation process and results of the organization. Modern ideas emphasize that leaders should be responsible to the team, not just power. As one of the two organic components of the management body, managers achieve organizational goals by making plans, leadership, and control in the organizational system. Judging from the existing data analysis, the administrators of college students mainly refer to the instructors of the students and the student cadres in the management organization.

As the core of student union, student leaders are the embodiment of cohesion in the process of managing student union' development. As shown in Figure 4, 18% of the respondents chose "senior and junior" and 48.9% chose "junior and sophomore." The data of sophomores and junior accounted for 23.6% and 9.5%, respectively. "Outstanding comprehensive ability" accounted for 51.1%, "strong interests and hobbies" accounted for 33.8%, and "high professional level" accounted for 12.1%. It can be seen that outstanding comprehensive ability and strong interests are the important qualities that the person in charge of student union associations should have.

Students' instructors are an important guarantee for perfecting professional construction and can effectively promote the healthy development of students. As shown in Figure 5, only 21.6% of the respondents chose "full-time and professional," 44.6% chose "professional and part-time," and 15.4% chose "neither professional nor part-time." In the process of guiding students to carry out activities, 36.7% of the people chose "serious and responsible," 30.2% of them chose "rarely actively participate in student union work," and 33.1% of the people chose "basically ignore" and "other" options.

3.2. College Student Management Object. The management objects of students mainly include student members and the activities they participate in. As shown in Table 1, the proportions of males and females among the respondents were 30.2% and 69.8%, respectively, which shows that the proportion of males and females among college students is unreasonable. The enthusiasm of freshmen to participate in activities is high, accounting for 67.2%. The number of sophomores accounted for 23.0%, and the cumulative percentage of freshmen and sophomores reached 90.2%. The number of junior and senior students accounts for 9.9%, and the number of members of student union shows a decreasing trend with the increase of grade. The proportion of students in lower grades is too large, which is not conducive to the construction of student union. The lack of backbone is not conducive to the accumulation and inheritance of student union culture.

As shown in Figure 6, among the purposes of students participating in student union, "exercise their own ability" and "develop interests and hobbies" account for 57%, and "spend their spare time" and "others" account for 18.7%. It

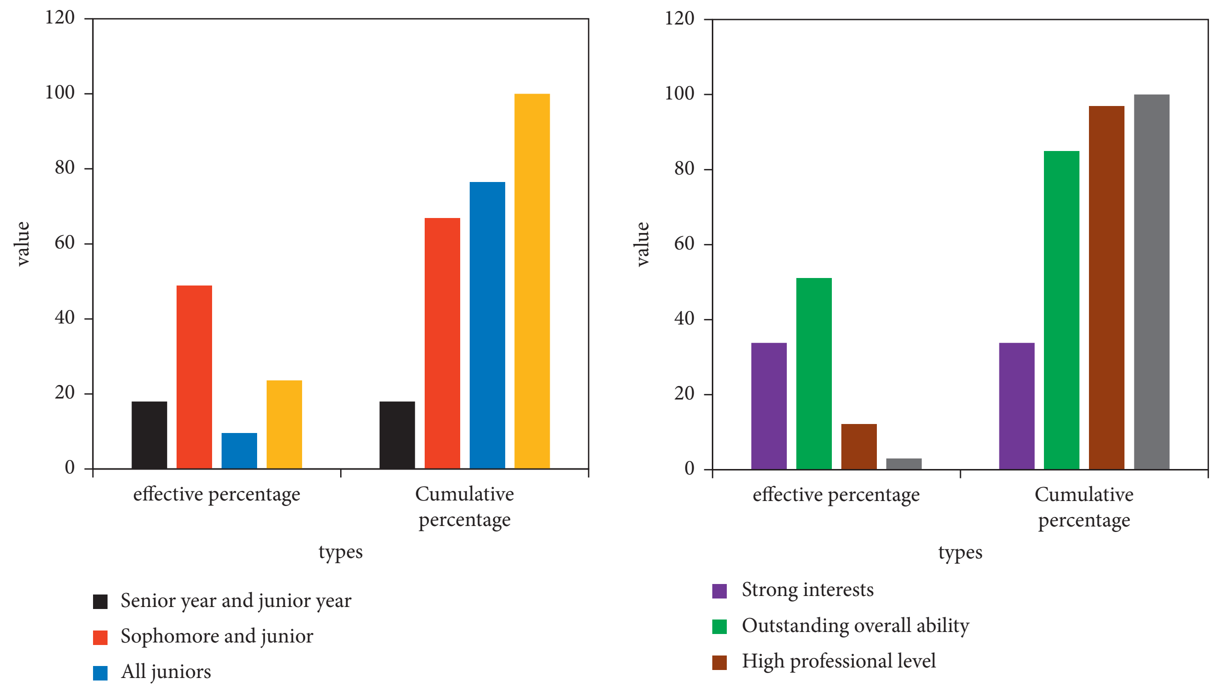

FIGURE 4: Current cadre rank distribution and the conditions that the main person in charge should have.

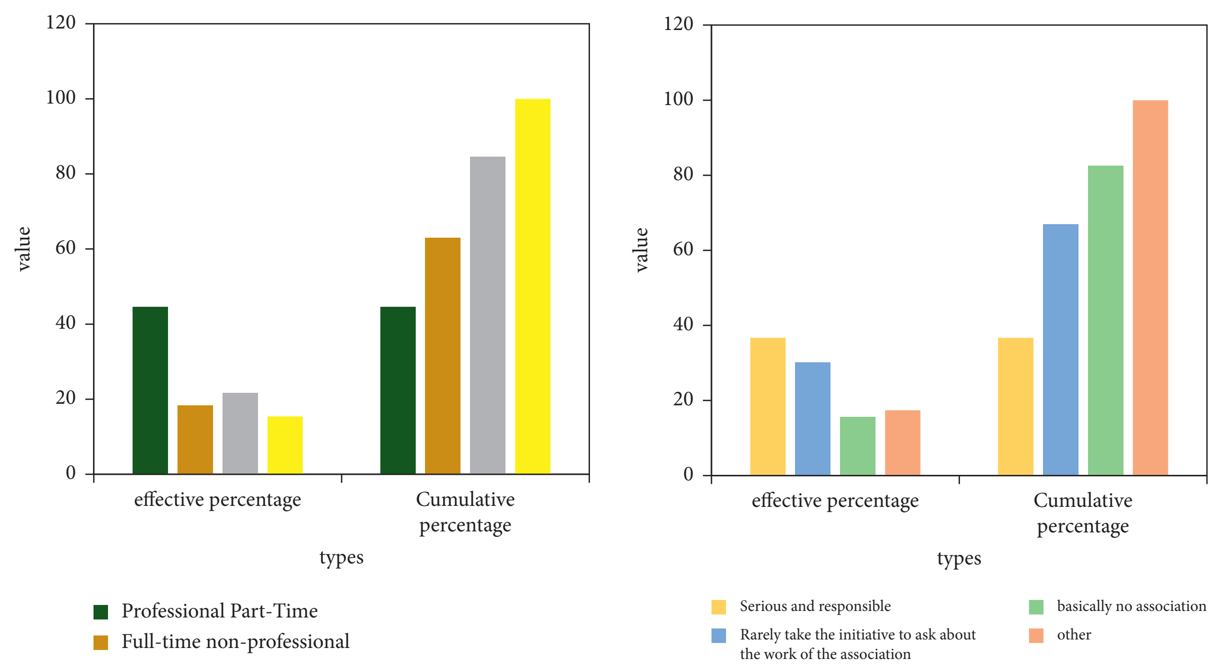

FIGURE 5: Job status of community instructors and their instructors.

TABLE 1: Basic information of student members.

Grade	Effective percentage (%)	Cumulative percentage (%)
Freshman year	67.2	67.2
Sophomore year	23	90.2
Junior year	4.3	94.4
Senior year	5.6	100

can be seen that the motivation of college students to participate in student union is diversified and more pragmatic. In the survey on the meeting held by student union, only the leaders and backbone of student union participated in the meeting, accounting for 30.8%, and ordinary members also participated in 25.6%. It can be seen that the interest of community members in participating in community meetings is not high, and its essence is the lack of effective management system and reasonable incentive measures.

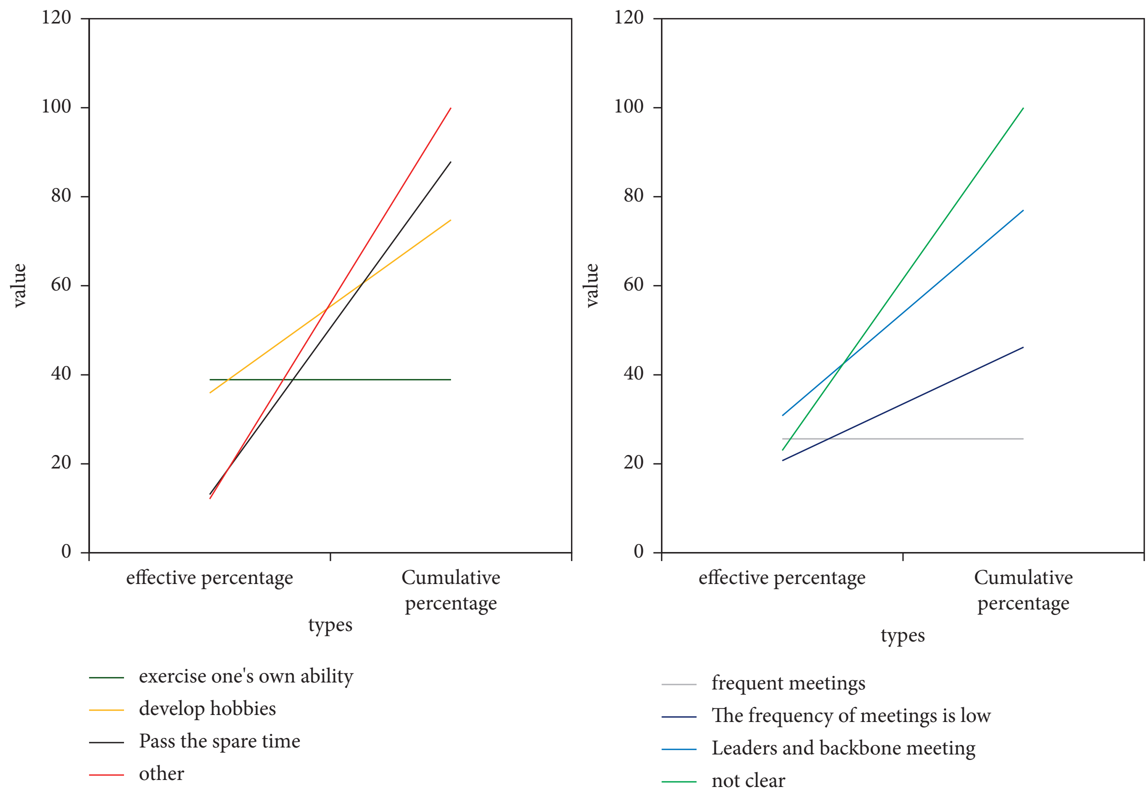

Figure 6: The purpose of students joining the club and the work of the club.

Table 2: University student activities.

	Effective percentage (%)	Cumulative percentage (%)
The event is rich, high quality	32.5	32.5
There is fewer activities, quality can	38	70.5
The event is frequent, the quality is not high	16.1	86.6
Less activity, poor quality	13.4	100

From the analysis of the results of the investigation on the development of student activities in our school, as shown in Table 2, the respondents felt that “the connotation of the project is colorful and the quality is high” accounted for 32.5%, “the project is few and the quality is OK” accounted for 38%, and “the cumulative percentage of the quality is OK” reached 70.5%. Although the proportion of holding activities with good quality is relatively large, the quality of activities held by associations is not high, and even the situation that there are no activities also accounts for a considerable proportion.

In Figure 7, 47.5% of the data chose “planning activities for the next semester during the holiday,” 39% of the data chose “planning for the first and last semester,” and 13.4% of the data chose to carry out activities without plan. Among the respondents, 24.9% thought that “according to the actual situation of the school, combined with hot spots” should be paid attention to when carrying out student union activities, 43.9% thought that “combined with professional characteristics, active academic atmosphere,” 24.3% thought that “can absorb more students and affect more students,” and 6.9% thought that “leading fashion and trend.” The above data fully shows the diversified needs of college students in the post-90s.

As shown in Figure 8, the key factors for the success of student union and student union activities, “interaction between principals and members” accounted for 43.6%, ranking first. The second is “the ability and sense of responsibility of the person in charge,” accounting for 32.1%; “Member attitude” accounted for 20.3%, and “others” accounted for 3.9%. In terms of the average time spent on community activities every week, 66.2% are 1-2 hours, and only 10.2% are 10 hours or more.

3.3. Management Environment of College Student. The external management environment and internal management environment of students constitute the overall management environment of the student union. The realization of the external management environment mainly includes two parts: the funds of the student association and the type of the student association. The management system of the student body, the exchange and exchange of the student body, and the general election of the student

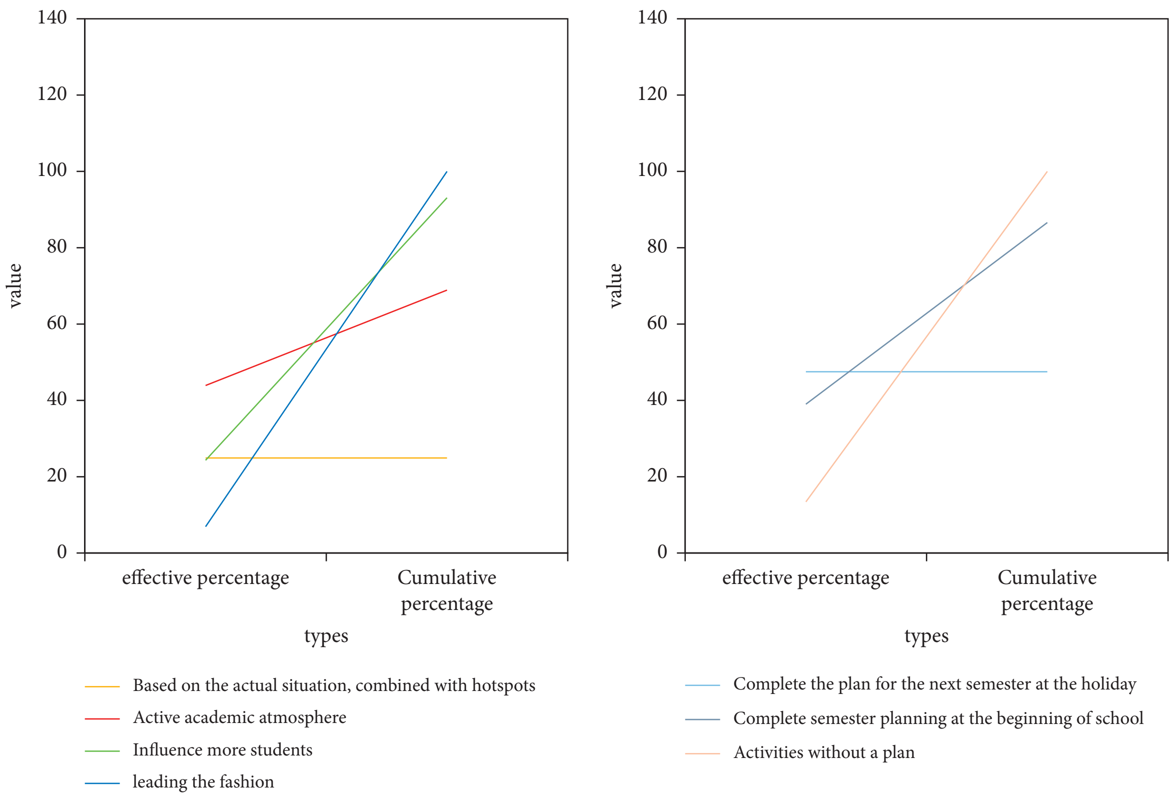

FIGURE 7: Event highlights and event planning completion time.

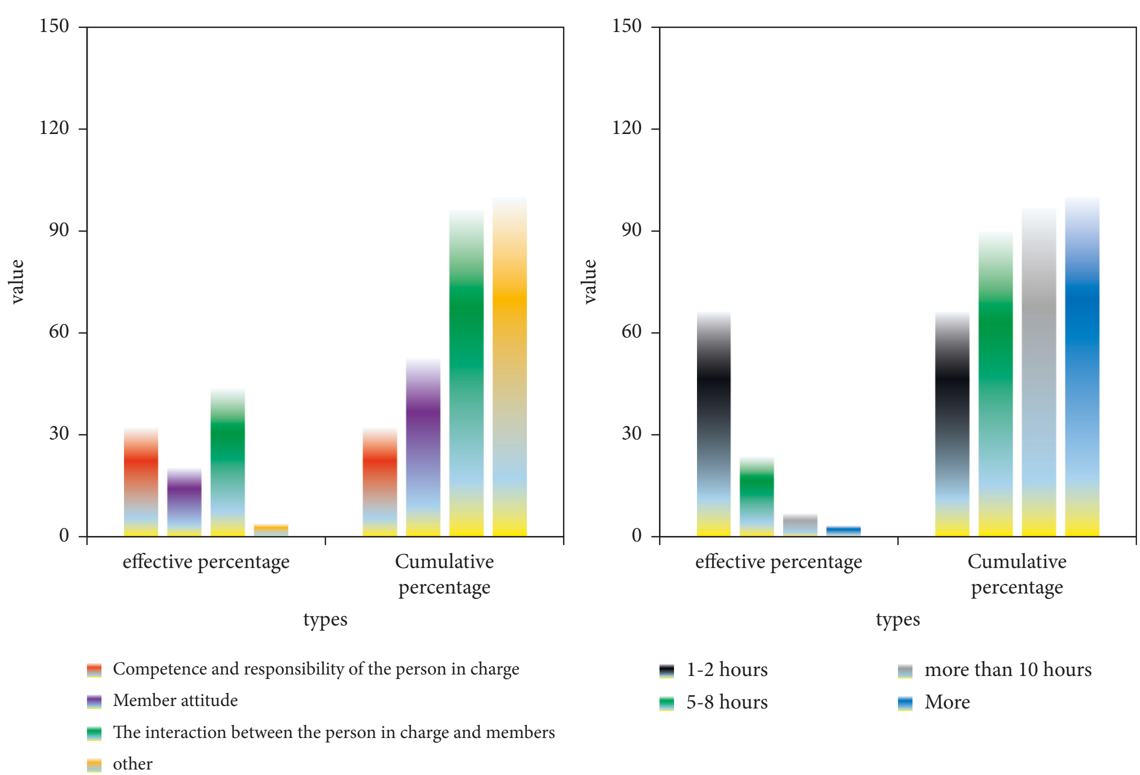

FIGURE 8: Key factors for the success of the club and the average time spent in the club activities every week.

Table 3: Main sources of student union.

	Effective percentage (%)	Cumulative percentage (%)
Society membership dues	63	63
Special funding of the school group committee	13.8	76.8
Sponsor	20.3	97
Other	3	100

Table 4: Kinds of associations people belong to.

	Effective percentage (%)	Cumulative percentage (%)
Cultural arts	39.7	39.7
Academic technology	25.9	65.6
Sports fitness	12.8	78.4
Public service	10.5	88.9
Theoretical research	5.2	94.1
Natural science	5.9	100

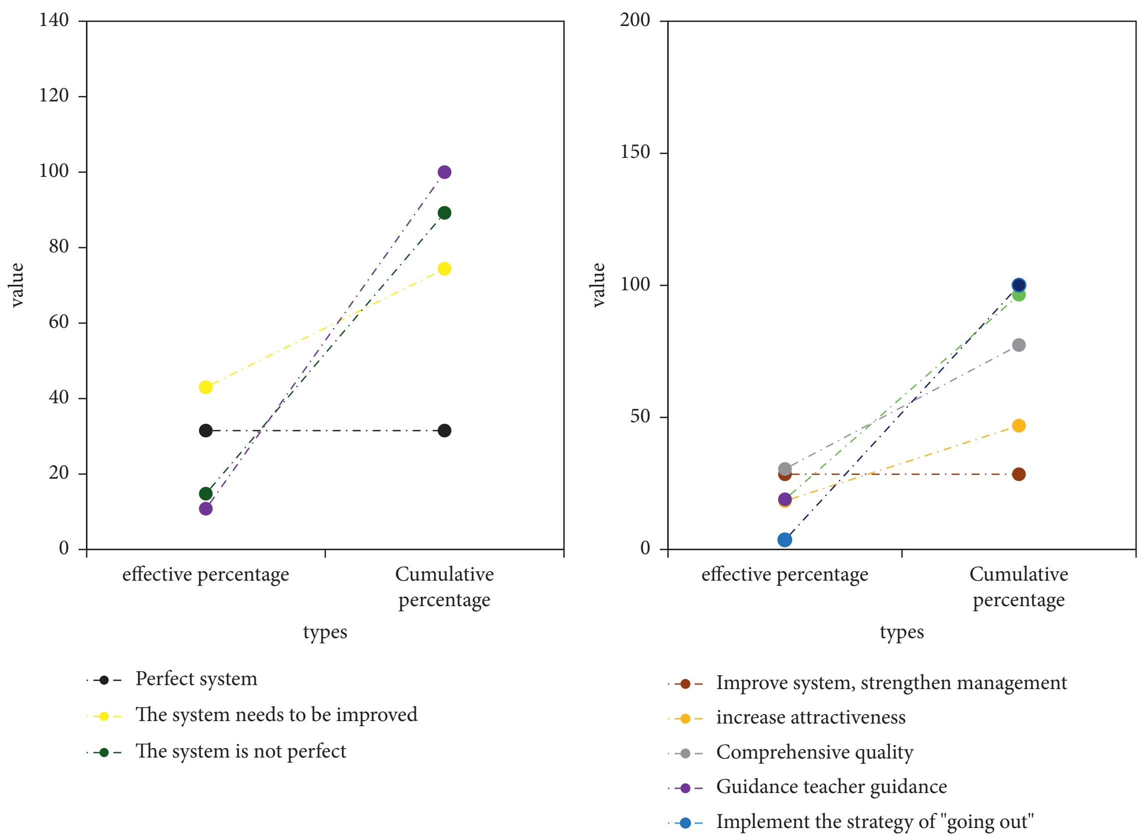

Figure 9: Internal management system of the association and key factors for the development of the Association.

body constitute the internal management environment of the student body.

In Table 3, 63% of the students' data choose "membership dues of the society," while "special support from the Youth League Committee of the school" and "community sponsorship" account for only 13.8% and 20.3%, respectively, and only about 3% of the others. It can be seen that, at present, most of the funding sources of China University Students' Association are only the membership fees paid by the members of the association, while the subsidies given inside and outside the school are relatively low. Therefore, the lack of funding sources and funding capacity is an important obstacle to the development of student associations in the direction of refinement and boutique.

From the categories of students' participation in student union in Table 4, there are many categories of college student union, but the division of the composition of student associations is unreasonable. The cumulative proportion of literature and art, academic science and technology, sports, and health and social public welfare services accounted for

88.9, becoming the main type of student union in Colleges and universities. The cumulative proportion of theoretical research and technology and natural science is less than 1/3 of that of literature and art. In today's society, the scientific and technological innovation ability of college students has attracted more and more social attention.

In the research on the internal management system of the student union, as shown in Figure 9, the number of respondents determined that "the management system has but needs to be improved" accounted for 43%, the "system is perfect" accounted for 31.5%, the "management system is not perfect" accounted for 14.8%, and the cumulative proportion with regulations accounted for 89.2%. In the statistics on the impact of student union development, 28.5% of the respondents "improved the internal mechanism and strict management." In the big data analysis and research on the standardization of behavior management, it is found that the proportion of effective restriction effect of management system on the behavior norms of association members has reached 75.5%. It can be seen that whether the management system exists or not, the strength of implementation or the strictness of norms needs to be further improved.

4. Conclusion

The purpose of this paper is to study and analyze the construction and data integration of college students' management mode under the data acquisition and monitoring system based on human-computer interaction. Based on the monitoring system, the construction of the management mode of college students is analyzed and experimentally explored. The monitoring system can be divided into centralized architecture and distributed architecture according to the hierarchical structure of monitoring objects and the local autonomy degree of monitoring nodes. In the survey of the student union management system, 43% of the participants believed that "the system exists, but needs to be improved." 31.5% of the participants believed that the system was "perfect," and 14.8% of the students believed that the "system was not perfect." In this regard, we put forward some suggestions for the management of college students by strengthening the construction of students' connotation, optimizing the functions of student management, deepening the understanding of the status and role of the student union, establishing a standardized student evaluation system, and strengthening the construction of students' internal organizations by deepening the internal and external management environment, improving the student management model, and forming a guarantee system for the management model of college students.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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