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Retraction

Retracted: Analysis of University Education Management Based on Artificial Intelligence

Security and Communication Networks

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope

(2) Discrepancies in the description of the research reported

(3) Discrepancies between the availability of data and the research described

(4) Inappropriate citations

(5) Incoherent, meaningless and/or irrelevant content included in the article

(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. Zhu, "Analysis of University Education Management Based on Artificial Intelligence," *Security and Communication Networks*, vol. 2022, Article ID 8132523, 11 pages, 2022.

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Research Article

Analysis of University Education Management Based on Artificial Intelligence

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With the rapid development of information technology, the process of informatization of education management has been accelerated. In this context, more and more education management information systems have been used in education management, providing a lot of data support for education decision-making. In addition, the development of artificial intelligence has greatly changed the way people work and live. Intelligence has emerged in various fields, bringing great convenience to people, especially the university education management. This study will integrate artificial intelligence and university classroom teaching and apply it in the field of education management. In particular, the proposed intelligent education management system mainly includes three submodules: preclass attendance, in-class state monitoring, and after-class online learning. The main function of the preclass attendance module is that half an hour before the class starts, the camera captures students' video information and sends it back to the convolutional neural network (CNN) model for face recognition processing. In class, the state detection module is mainly based on face recognition to judge the state of students. The after-class module analyzes the evaluation information of students' online learning to provide a teaching reference for the school. The system proposed in this study can improve the quality of students' classroom learning and teachers' monitoring of the quality of students' classroom.

1. Introduction

1.1. The Research Background. Influenced by the society's strong demand for higher education and driven by the trend of higher education reform, the basic characteristics of higher education in the 21st century have been increasingly clearly displayed in front of people. These characteristics can be summarized as follows: 1. higher education will develop into universal education. 2. Higher education has evolved into lifelong education. 3. Higher education is increasingly diversified. 4. Higher education units will enjoy greater autonomy. In recent years, the combination of artificial intelligence and education has gradually entered universities and educational institutions [1]. With the development of information and network technologies, information becomes ubiquitous and fills every corner of the world. Today's society is in an era of knowledge explosion and massive information. Faced with such a large amount of information, people often seem to be at a loss, and it is difficult to find out the information needed quickly and accurately [2, 3]. Various educational information management systems have accumulated a large amount of data while giving strong support to universities' educational management planning. Usually, what we can quickly recognize is the information presented on the surface of the data, while some important information hidden behind the data is difficult to obtain directly. Therefore, how to extract useful information for education decision-makers from the massive data generated by the education information management system has become a problem that education administrators must consider [4, 5].

The education management information system is based on the personal information of students and teachers. In the process of establishing the system, it is always emphasized to build a single information card of students and teachers. The main body of a school is students and teachers [6]. Instead, it is necessary to summarize the situation of students and teachers in the school so as to obtain the information of the

school more intuitively and effectively. The study of educational indicators originated in the United States in the mid and late 1920s and was first included in the study of economic indicators and social indicators, among which the social indicators of education can be said to be the embryonic form of educational indicators [7]. With the development of economy and society, many fields have begun to study indicators suitable for independent development, and education is one of the important contents. The evaluation of the function and benefit of the education system has opened a new era of analyzing the education system. At the same time, countries all over the world pay more and more attention to the quality of education. Since then, the research on education indicators has gradually developed. Education indicators provide explicable information for the education system by collecting various education-related information, which can be used for education policy explanation and decision-making.

The United States has issued "Preparing for the Future of Artificial Intelligence" and "National Artificial Intelligence Research and Development Strategic Plan," raising the importance of artificial intelligence to the height of national development strategy. China has also released the "Development Plan for a New Generation of Artificial Intelligence," emphasizing the importance of artificial intelligence, and artificial intelligence is also affecting education to have a profound change. Intelligent education robot uses artificial intelligence technology to interact with students and improve their interest in learning. These forms of intelligent education are mainly customized for students, while there are few intelligent education systems for students [8, 9]. Therefore, based on the above problems and technology, it is urgent to study an intelligent education management system that can combine the advantages of traditional education and artificial intelligence. It helps teachers to assist in the management of students, freeing teachers from the contradiction between students' status and teaching quality, providing transparent teaching quality assistance for parents, providing education assistance management for parents, students, and schools, and making greater contributions to the improvement of students' education quality [10].

1.2. Research Significance. In the actual implementation process, education managers should also learn to collect, analyze, and use data. Through comprehensive and scientific analysis and research of data, it is helpful to put forward valuable suggestions for education management. For different users, the reports provided by the educational information system are different. However, no matter what level of users, they need to understand the content and meaning of educational management indicators in these reports, and what kind of value they have in educational practice [11, 12]. For users at different levels of the system, it is necessary not only to understand the information contained in these educational statistical indicators but also to be able to be applied in the practice of educational management. According to the statistical indicators in these reports, the scientific and rational education management can be enhanced. The data collected in accordance with the educational management indicators are based on the problems that education managers care about, and the results can well reflect the relationship between various educational elements, which is convenient for education decision-makers to comprehensively and intuitively grasp the information hidden behind the educational data [13].

The "Development Plan for a New Generation of Artificial Intelligence" released in July, 2017 emphasized that we should seize the major opportunities of the development of artificial intelligence and build the first-mover advantage in the development of artificial intelligence in China, indicating that China has begun to put artificial intelligence in the core topic of scientific research. Artificial intelligence has also begun to enter various industries and many companies have begun to implement face recognition attendance, which provides a great idea for artificial intelligence-assisted education. Therefore, the combination of artificial intelligence and education, on the one hand, can help teachers to check class attendance and monitor students' status and can assist teachers to monitor students' teaching status [14]. On the other hand, it can also conduct big data analysis based on students' daily fragmented data, so that students can provide personalized learning plans to better improve their teaching quality.

Based on face recognition technology, this study establishes an educational management system. In the system, the real-time attendance and status monitoring of each class can be realized, and the daily class details of students, classes, and teachers can be reported and analyzed. The realization of the system, on the one hand, can help the school to better realize the management of students and teachers and realize the two-way control of education quality. On the other hand, it can help the school to monitor the quality of students' classes and make the quality of classes transparent, so that parents can control students' learning in real time and assist the school and parents to improve the quality of students' learning better.

2. Related Work

2.1. Research Status of Face Recognition Technology. After many years of research and development, face recognition technology has achieved quite good results [15]. In the early stage, relatively backward face recognition technology can only deal with relatively simple images, such as pictures with single background and the face in the image must be in front. The purpose of face detection is to find a high degree of similarity with the face of the region, and the region marked segmentation process. At first, the researchers did not spend a lot of time on face detection, but after the test, they found that the accuracy of each recognition was not satisfactory. Face detection is to extract the salient features of the face image, and face recognition is to extract the features of the face; the existing features are compared to determine which kind of face the feature belongs to, and the two have essential differences. [16, 17].

The geometric feature-based approach is a bottom-up face recognition paradigm. Each person has their own unique features, and each person's face has its own unique features, such as the size of the eyes, the size of the nose, and the

curvature of the eyebrows. The method based on feature recognition aims to find the above invariable features and use these features to locate the face. The recognition method based on algebraic features takes the face image as the model input matrix and performs a series of sentence operations to obtain the face features. The main advantage of this method is that the original gray distribution data of the image can be directly used for training and recognition, and the image can be effectively compressed in the low-dimensional subspace. Compared with other methods, the recognition is simpler and more effective. When deep learning is applied to face recognition, compared with other machine learning algorithms, this algorithm can extract human face features without determining feature rules in advance and finally complete the face recognition process independently. Neural network is a nonlinear modeling method. It collects massive samples for training and learning and automatically extracts useful features for relearning. Finally, the trained network structure parameters are used for face recognition [18]. However, this method also has certain limitations, since it needs a large number of sample data and the longer training time.

The application of face recognition technology in the field of education can provide more powerful solutions to some prominent problems in the current field and play a huge role in various application scenarios, such as face-brushing check-in, student identification, and examination management. The introduction of face recognition for teaching management to bring greater flexibility and reliability can effectively improve the online education environment and students' learning style. The system designed in reference [19] used the facial recognition completed noninductive attendance of students to detect the state of learning of students through facial expression recognition, which provided a new visual angle and way. In order to solve the problem of insufficient supervision of online learning effectiveness, a face perception scheme for online learning was designed [20] and implemented and applied to the effectiveness supervision system of online teaching. Based on face recognition technology, a set of examination monitoring system is designed and developed. The system effectively solves the problems of examinee identity verification, invigilation, and other aspects of the examination room and can effectively prevent the occurrence of cheating phenomenon, such as substitute examination, with strong application value [21]. In view of the existing problems of online learning, such as weak supervision and inability to perceive students' learning behaviors, an online learning behavior perception model based on face recognition technology was constructed to sense and evaluate learners' learning status [22].

2.2. Research Status of University Education Management. The traditional educational management mode adopts manual operation management, which has a large amount of text workload, low efficiency, poor comprehensive utilization of resources, long completion cycle of various statements, and easy to produce operational mistakes, which often makes the management personnel in the complex management of things and cannot achieve a good management effect. The flow of traditional educational administration mode is divided into the following four steps: the first step is to use the computer to carry on the new student registration and establish the management work of the school roll file. The second step is to use the computer to organize classes and arrange courses. The third step is to use the computer to carry on the examination management work. The fourth step is to use the computer to carry on the management work of student achievement and graduation. The traditional educational management is used in the implementation of planned enrollment and planned allocation, and the training mode of corresponding professional talents with a strong position is adopted in teaching, which is suitable for the higher education management under the planned economy system [23]. Its deficiencies become more obvious. First, strict limits on the number of years of study cannot effectively allocate the time for education, reducing the efficiency of education, to the detriment of both individuals and society. Second, the learning content is not selective, and students are not allowed to choose courses and majors that they think are necessary and interesting, which weakens students' learning enthusiasm. Third, the utilization rate of teaching resources is low. Fixed teaching content makes it difficult for emerging subjects and frontier subjects to be transformed into classroom teaching content, and the fixed teaching form is not conducive to the sharing of various teaching resources.

2.2.1. Smart Education. It can get the weak points of students or the defects that teachers fail to take into account, so as to carry out targeted personalized guidance and education management [24]. At present, the application of artificial intelligence is mainly divided into adaptive learning education, virtual assistant, expert system, business intelligence, and other aspects of the wide application. Adaptive learning education is mainly based on the individual student as the unit, according to the progress and content of the student's learning, to specify personalized learning plan and evaluation for students. The intelligent virtual assistant is mainly manifested as virtual teaching assistant and virtual training partner. The expert system mainly aims at providing students with some career planning or intelligent correction services. In the past two years, education management based on artificial intelligence has gradually emerged in various educational institutions and universities, mainly using artificial intelligence technology to improve students' classroom participation and universities' management quality.

Compared with the traditional method of extracting image features by manual design, convolutional neural network (CNN) has a strong learning ability and can learn the characteristics of training samples by itself. Therefore, it also has a strong processing ability for some complex computer vision problems. Reference [25] studied the modeling and processing method of emotional information in network teaching, trained students' emotions with neural network, and built an emotional model of emotional state on this basis. Then, the authors of reference [26] used data mining, emotion analysis, and other technologies, to establish an online learning crisis warning and intervention model to effectively

analyze the learning status and trend of learners and then assist teachers to adjust teaching content and strategies in time.

Reference [27] systematically expounded on the integration of smart education and big data, introduces the practice of smart education in representative regions of China, and shows the planning ideas and framework of big data in education. The architecture of intelligent education system in colleges and universities is studied in reference [28], and a cloud center of intelligent education, a smart campus supporting school education, and a learning-oriented smart city supporting lifelong education are proposed. Through the function of data reporting, education data at all levels can be reported and summarized and stored in a comprehensive database, providing more comprehensive and detailed education data for schools and education departments at all levels. However, on the basis of the data warehouse development decision support environment, sometimes, a data warehouse is required to meet the needs of all end users. But various types of user needs are constantly changing, which requires data stored in the data warehouse have sufficient flexibility and can satisfy all kinds of the user's query and analysis. The study [29] put forward the concept of affective computing and combines it with network teaching to improve learning efficiency. Since then, domestic and foreign researchers have been conducting research and exploration on the combination of affective computing and network learning. By studying the learning behavior, emotion, and state of learners in the network teaching system, the authors of reference [30] established a personalized network learning system. By adding emotional cognition function to the system, the system can perceive and analyze the cognitive situation and emotional state of learners in the process of online learning. Based on the above discussions, the main contributions of this study are shown as follows:

(1) Although the used models are not new, this study is the first time to use the CNN model to realize the monitoring of preclass attendance, in-class state monitoring, and after-class online learning

(2) The whole process management of college education is helpful to improve the management level of modern colleges and universities

3. The Proposed University Education Management Method

3.1. Deep CNN Model. The earliest feedforward neural network is also called multilayer perceptron (MLP), which is the simplest neural network model. Each neuron is arranged in layers. As the simplest neural network at that time, each neuron is connected to the upper layer, the output of the upper layer continues as the input of the lower layer, and there is no feedback between layers. The multilayer perceptron neural network is shown in Figure 1.

In recent years, the CNN model is often used to solve complex image recognition problems. Based on the traditional full-connection layer neural network, CNN adds the convolution layer and pooling layer to form the deep CNN model, which is shown in Figure 2.

The function of the convolution layer lies in the extraction of image features. The essence of the convolution kernel is a filter matrix, which can produce many different effects on the original image. The calculation process of convolution is as follows:

$$\mathrm{CONV}_{(ij)} = \sum_{i}^{m-1} \sum_{j}^{n-1} u_{ij} \times w + b \ (i = 1, 2 \ldots m-1; j = 1, 2 \ldots n-1), \quad (1)$$

where u_{ij} is the input image, m and n are the size of the input image, w is the size of the convolution kernel, and b is the bias constant of the convolution kernel. CONV(ij) is the characteristic graph output after convolution operation.

CNN adds an activation function layer to the network and analyzes the model better by adopting the feature mapping method of nonlinear function. Then, the mathematical expression of common activation function is introduced one by one. The mathematical expression of sigmoid function is as follows:

$$f(x) = \frac{1}{1 + e^{-x}}. \quad (2)$$

The mathematical expression of tanh function is as follows:

$$f(x) = \frac{e^{x} - e^{-x}}{e^{x} + e^{-x}}. \quad (3)$$

The mathematical expression of ReLu function is as follows:

$$f(x) = \max(0, x). \quad (4)$$

The full name of ReLU function is a rectified linear unit. The function is one of the commonly used activation functions, which is characterized by low computational complexity and no exponential operation. However, it is worth explaining that ReLU function has certain defects in the calculation process. When the data pass through the negative range of ReLU function, the output value is equal to 0. The leaky-ReLu function can solve the above problem as follows:

$$f(x) = \begin{cases} x, & x \geq 0, \\ \alpha x, & x < 0. \end{cases} \quad (5)$$

Therefore, the efficiency of the entire network operation can be improved to a certain extent. The corresponding equations of sig and tanh are as follows:

$$\begin{cases} sig(x) = \dfrac{1}{1 + \exp(-x)}, \\ \tanh(x) = \dfrac{\exp(x) - \exp(-x)}{\exp(x) + \exp(-x)}. \end{cases} \quad (6)$$

The output layer adopts softmax function to normalize, and the probability value in the corresponding category is shown in the following formula:

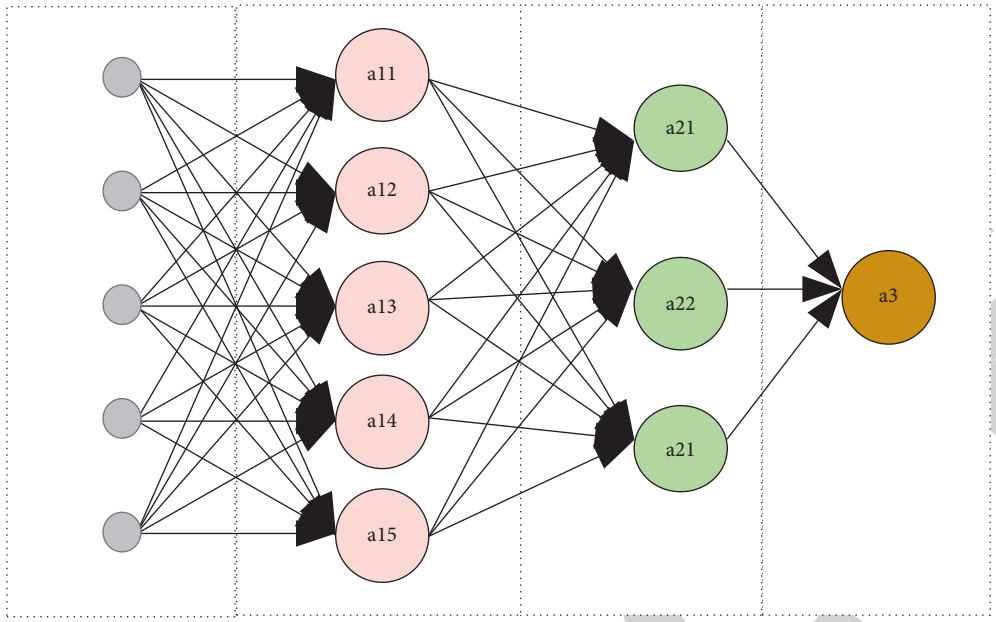

Figure 1: The typical schematic diagram of multilayer perceptron neural network.

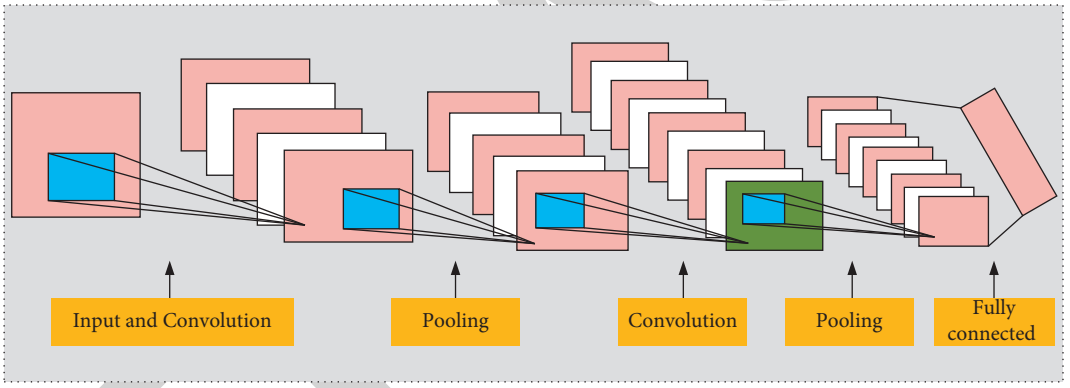

Figure 2: The typical schematic diagram of CNN.

$$h_{w,b}(x_i) = \begin{bmatrix} p(y_i = 1|x_i; w, b) \\ p(y_i = 2|x_i; w, b) \\ p(y_i = 3|x_i; w, b) \\ \cdots \\ p(y_i = n|x_i; w, b) \end{bmatrix} = \frac{1}{\sum_{j=1}^{n} e^{w_j x_i + b_j}} \begin{bmatrix} e^{w_1 x_i + b_1} \\ e^{w_2 x_i + b_2} \\ e^{w_3 x_i + b_3} \\ \cdots \\ e^{w_n x_i + b_n} \end{bmatrix}. \tag{7}$$

In classification tasks, it is a common method to use cross-entropy loss function to evaluate the gap between the predicted value and true value. The cross-entropy (CE) formula is as follows:

$$\text{loss} = -\frac{1}{m} \sum_{j=1}^{m} \sum_{i=1}^{n} y_{ji} \log\left(\hat{y}_{ji}\right). \tag{8}$$

The error calculated from the CE function needs to be calculated by back propagation, so as to realize the newer back propagation of model parameters. The original form of the gradient descent method is as follows:

$$\theta := \theta - \alpha \frac{\partial}{\partial \theta} J(\theta). \tag{9}$$

In the experiments in the following sections, this study also verifies that the use of Adam has faster convergence than SGD. The mathematical expression of a common Adam optimizer is as follows:

$$m_t = \beta_1 m_{t-1} + (1-\beta_1) g_t,$$
$$v_t = \beta_2 v_{t-1} + (1-\beta_2) g_t^2. \tag{10}$$

Therefore, the updating rule of gradient descent is as follows:

$$\theta_{t+1} = \theta_t - \frac{\alpha}{\sqrt{v_t + \epsilon}} m_t. \tag{11}$$

Based on the above discussions, the analysis of university education management based on artificial intelligence proposed in this work is shown in Figure 3. It mainly includes the CNN model-based layer, the student status monitoring layer before class, during class, and after class, and the influencing factor analysis layer of the best educational management.

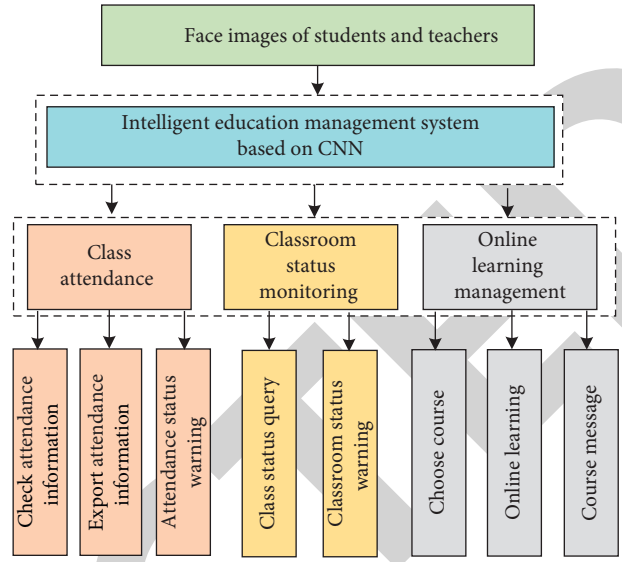

Figure 3: The overall process of the proposed method.

4. Experimental Results and Analysis

4.1. Experimental Data Introduction and Model Setup. The dataset used in the pretraining of algorithm model in the experiment is Fer2013 facial expression dataset, which has a total of 35,886 facial expression pictures, and each picture is $48 * 48$ gray-scale picture, with 7 expressions such as anger, disgust, fear, happy, sad, surprised, and neutral. In the training stage of the algorithm, the model used in the face recognition stage is selected, and the dataset in the training stage is about 54,000 faces detected in the face detection stage, which are cropped and obtained, of which the training set is about 30,000 pictures, and the verification and test set contain 12,000 pictures respectively.

In addition, the specific architecture of CNN model designed in this study is shown in Figure 4. As can be seen from the figure, the designed CNN model includes two convolution layers, two pooling layers and two full connection layers, and the RELU function is selected as the activation function.

4.2. Analysis of University Education Management by CNN. Figure 5 shows the change curves of different activation functions in the CNN model. It can be seen from the figure that under the dataset in this study, different activation functions have different characteristics, but they all have the following characteristics: differentiability: when the optimization method is based on gradient, this property is necessary. Monotone: when the activation function is monotone, the single-layer network is guaranteed to be convex. Range of output values: when the output value of the activation function is finite, the gradient-based optimization method is more stable, because the representation of features is more significantly affected by finite weights. Model training is more efficient when the output of the activation function is infinite, but in this case, a smaller learning rate is generally required.

Face detection also includes skin color detection, skin color region segmentation, and CNN algorithm feature extraction. The program flowchart of student attendance system designed in this study is shown in Figure 6. Among them, the user registration module and personnel information management module mainly collect the basic information of attendance personnel, such as names and other basic information. After collecting the face pictures of the attendance personnel, the system will push and segment the faces into the system for training and extract the face images into 128-dimensional feature vectors through the convolutional network. Then, the face picture is submitted together with the user's name and other basic information, in which the first part is submitted as a user face registration module, and the second part is submitted as a personnel information management module.

The class status monitoring module is used to monitor the class status of students during class and give timely warnings. The specific flowchart is shown in Figure 7. After the user logs in to the system, the class status monitoring button is clicked, and the system determines whether the user is the super administrator. If you are a super administrator, the class status information of all classes is displayed. If you are a common user, only the class status information is displayed. Before class, users click the class status monitoring button, and the system starts to monitor the class status. When the system determines that students' concentration is 0 or their facial expressions remain motionless for a long time in class, a status warning will be issued to the system.

The class status sequence diagram is shown in Figure 8. After the user enters the correct user name and password and successfully logs in to the system, different information will be displayed according to the permission. The user clicks to start the class. The front end sends a post request to the status monitor, and the status monitor controller receives

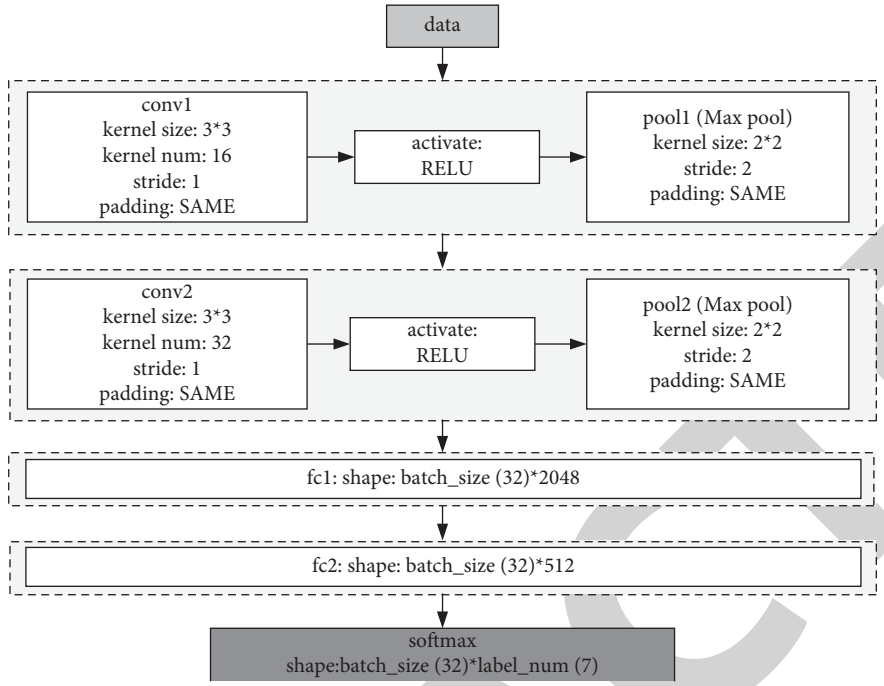

Figure 4: The settings of the CNN in this study.

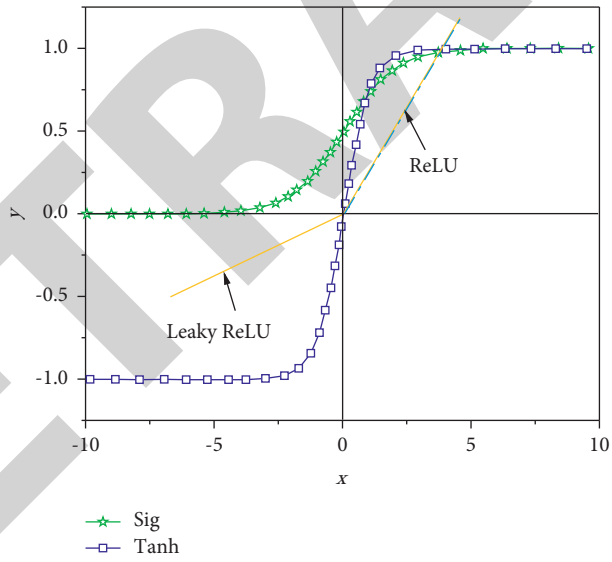

Figure 5: The curves of different activation functions of CNN.

the classic message and calls the start status monitor method to start a new thread for each class through the thread pool. The video to be checked is taken out from the address of the server where the data reside. The video here uses the written interface to transmit data from the camera to the destination address using RSTP protocol and store it in the specified format. The returned identification information is then fed into the database for updating and displaying on the interface.

In order to obtain the user's real learning state of face data, this study designed a traditional online learning module. After logging in to the system, students can select corresponding courses according to their interests and learning needs from the curriculum list on the home page. After entering the course, students can view the details of the course, select the corresponding chapter, and then study online. After learning a chapter, students can comment on the course information or leave a message, so that teachers can check students' feedback on the course in time. The flowchart of students' online learning is shown in Figure 9. In the design process of online learning module, the following classes are mainly involved: Course Detail View, Course Info View Add Comments View, Video Play View, and Study Info View, corresponding to course details, course

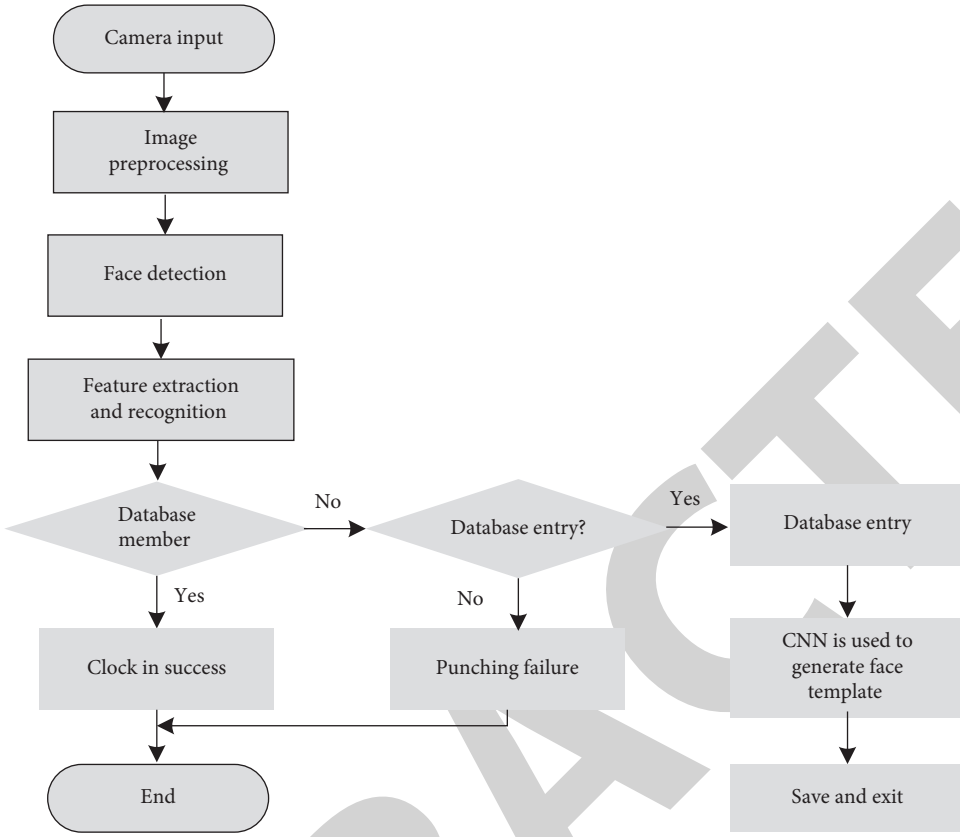

Figure 6: The flowchart of face recognition attendance system.

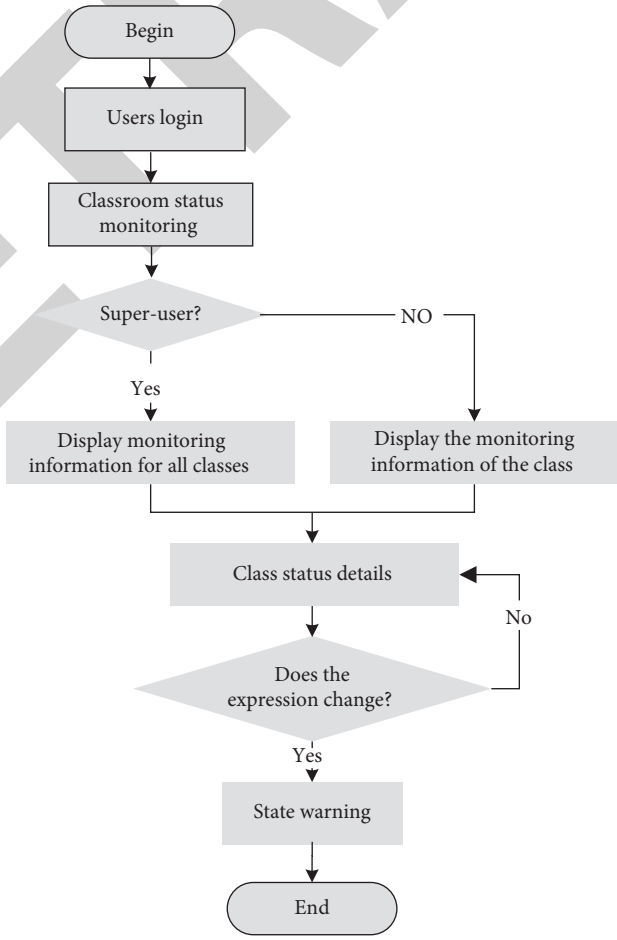

Figure 7: Flowchart of class status monitoring.

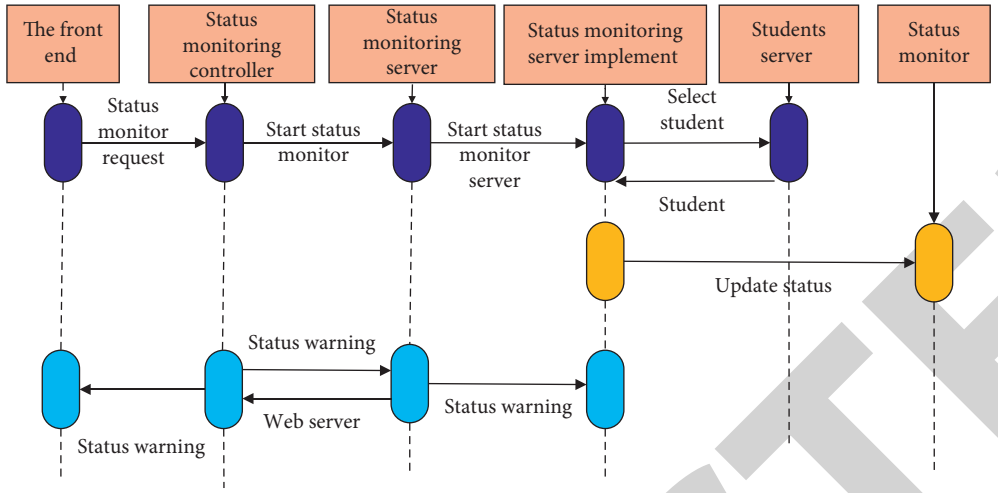

Figure 8: Class status sequence diagram.

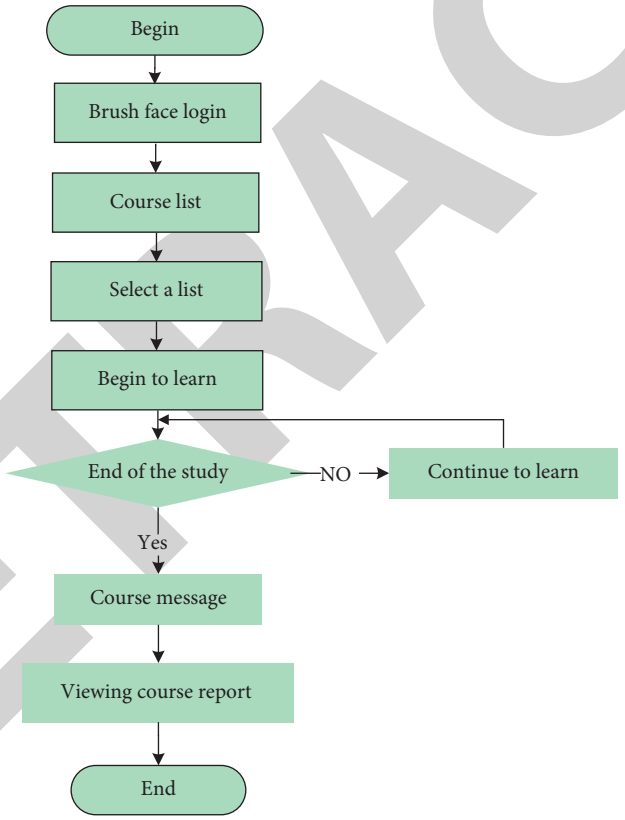

Figure 9: Flowchart of online learning.

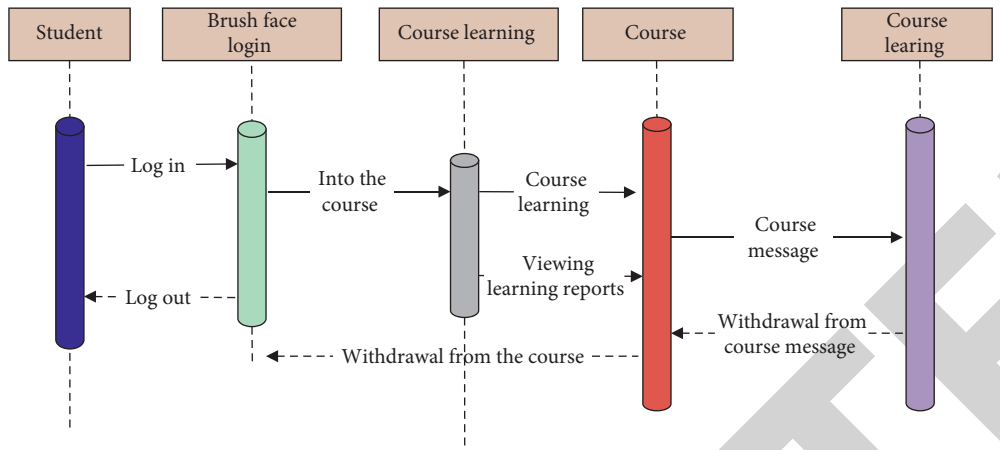

Figure 10: Online learning sequence diagrams.

information, adding comments, video playback, learning information statistics, etc. The sequence diagram of online learning is shown in Figure 10.

5. Conclusions

The system in this study uses face recognition and expression recognition to auxiliary management students; on the one hand, it can assist teachers in real-time monitoring of the state of students and give warnings, and on the other hand, it can also be targeted to improve the way of teaching for teachers reference scheme is put forward.

The system uses face recognition in the class attendance module to realize students' insensitive check-in. The CNN model built has achieved 95% accuracy in face recognition and can check in students entering the classroom within 2 s. In the class status monitoring module, face recognition is used to recognize faces and judge students' concentration. Expression recognition was used to judge the state of students' teaching to monitor the quality of teachers' teaching. Although the method in this study has achieved good results, it is still purely data driven and lacks interpretability. The focus of future research may be to integrate the characteristics of more human students into the model.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

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