The application of artificial intelligence technology can help colleges and universities effectively improve the efficiency of campus management and teaching quality. The traditional educational management concepts and models in colleges and universities can no longer meet the growing needs of students. In this paper, the application of artificial intelligence technology in intelligent education management in colleges and universities is proposed. The face recognition technology is constructed through the volume neural network model and the hog algorithm. The experimental results show that the face recognition system can meet the real-time requirements of face recognition and improve the accuracy of face recognition. In addition, in the dormitory management application experiment, the face recognition system proposed in this paper has more advantages than the traditional algorithm in recognition accuracy. The face recognition system in this paper can identify the problems existing in class attendance and provides a certain reference value for the classroom on campus.

1. Introduction

College education is an important part of national education. It is an important stage to cultivate students’ learning ability and social ability and establish a correct world outlook, outlook on life and values. With the development of China’s education and the popularization of higher education, not only the number of college students is growing, but also the scale of university campus is expanding. The problems existing in the traditional education management mode of higher education are becoming increasingly prominent [1]. The main problems of higher education management include (1) the backward concept of education management which fails to optimize and improve from the perspective of meeting the personalized growth of students and give play to the educational role of higher education management; (2) many external factors, for example, college education management should not only deal with the internal problems of the campus, but also be impacted by a large number of social environments, students’ families, students’ individuals, and the Internet; and (3) the relatively low management efficiency, for example, there is insufficient coordination of education management and poor order of education management.

With the development of information technology and science and technology, college students have put forward more and more service needs and suggestions for university management, while the traditional education management system and model of colleges and universities cannot meet the requirements of students, and the safety of school management cannot be guaranteed. At the same time, with the expansion of the scale of colleges and universities, the management tasks to be undertaken by the original number of managers are also increasing. However, the traditional management mode is inefficient and error prone, which makes managers have to carry out repetitive work and increases the cost of time and manpower [2]. In addition, the evaluation methods of students’ performance in colleges and universities are different from those in senior high schools. The final evaluation results of students are composed of classroom attendance and examination results [3]. At present, most colleges and universities record and manage students’ attendance through traditional manual methods, mainly through classroom roll call and
irregular spot check [4]. This method not only needs to occupy the classroom time and teachers’ energy, but also has a high error rate. It is unable to detect the situation of being late and leaving early, substituting for classes and absenteeism in real time. With the continuous development of the Internet technology and information technology, the information construction of university education management has developed rapidly. Building intelligent education management system and platform has become the development trend of university education management, and it is also an important research on the development of university education management [5].

Based on the payment request of college information construction, this paper puts forward the application research of artificial intelligence technology in college intelligent education audience. At present, the typical applications of artificial intelligence in the field of education mainly include intelligent tutors, intelligent partners, intelligent evaluation systems, feature recognition, and learning analysis, involving three scenes: teaching scene, learning scene, and management assessment, which basically realizes the full penetration of education. The face recognition and detection technology are constructed through convolution neural network and image gradient direction histogram feature extraction algorithm and tested in the dormitory management and classroom attendance management module of college education management system. This paper is mainly divided into three parts. The first part is the elaboration of the application and research status of artificial intelligence technology in intelligent education management in colleges and universities. The second part is the construction of face recognition model in university intelligent management system. The third part is the experimental results and corresponding analysis of face recognition model in college intelligent education management system.

2. Application of Artificial Intelligence Technology in Intelligent Education Management in Colleges and Universities

Intelligent education management in colleges and universities refers to the management mode to improve the management efficiency and teaching level of colleges and universities through the integration of college education information network application technology and college teaching information technology [6]. Intelligent education management in colleges and universities needs to use modern information technology and science and technology to realize software requirements on the basis of intelligent education management hardware equipment, such as the Internet of Things technology, big data analysis technology, and artificial intelligence technology [7].

Intelligent education is a high-end form of educational informatization, which emphasizes the openness and innovation of education, so that teaching and learning can break through the limitations of time and space. Intelligent education adheres to the people-oriented concept; makes full use of high-tech means such as big data, mobile Internet, and artificial intelligence; builds a networked, digital, and intelligent smart learning environment; meets students’ personalized learning needs; cultivates students’ comprehensive quality and innovation ability; and enables students to achieve all-round development. Artificial intelligence technology is a technology that enables computers to have the ability of analyzing and sensing and simulating corresponding responses to human thinking. It has been widely applied in many fields, such as Alipay’s face registration and train station’s face screening [8]. Artificial intelligence technology is also one of the important technologies for colleges and universities to realize the Internet of Things and intelligent education management system. Some colleges and universities have applied artificial intelligence technology to the library management system. In the past, the library identity registration was realized through the campus all-in-one card or password, and this method also obviously has some disadvantages [9]. The way of biometric verification has high requirements for biometric acquisition, and there are certain potential safety hazards, so it is not conducive to the promotion of colleges and universities [10]. The face recognition technology in artificial intelligence technology can complete identity recognition without contact and in the most natural state of the identified person, which is safe and reliable [11]. In addition, learning is still an important task for college students in college life, and at present, most colleges and universities need students to reach the standard in English before graduation. However, for many students, oral English and listening are two major difficulties in English learning [12]. Therefore, scholars have built a learning system for English listening and speaking practice based on artificial intelligence technology and judge the problems of learners’ pronunciation through speech recognition by artificial intelligence technology, so as to assist learners to make corresponding improvements [13]. Other scholars apply artificial intelligence technology to the detection of students’ classroom behavior and recognize students’ expression and body state through recognition technology, so as to judge students’ classroom behavior [14]. In addition, some scholars detect students’ running through the Internet of Things technology and artificial intelligence recognition technology, which can improve the accuracy of students’ performance and help students correct wrong running posture through action recognition [15].

In addition to college learning and education, artificial intelligence technology is also used in college safety management system and student life management system. With the construction and development of university monitoring system, some scholars have introduced video recognition technology into the monitoring system, which can identify and detect the vehicles and personnel entering and leaving the university, improve the efficiency and safety of university campus management, and reduce the possibility of potential safety hazards [16]. In addition, with the continuous improvement of university information construction, the role of dormitory management system has gradually become prominent and has become the focus of university education management research at home and abroad [17]. Foreign scholars first investigated and sorted out the needs of all aspects related to dormitory management and developed a management mechanism with dormitory as the core on this basis. The management mechanism essentially defines the main responsibilities of the campus, dormitory, and students and ensures the stable operation of the whole system [18]. Compared with developed
countries, the domestic research on dormitory management system lags behind. Not only does the dormitory management system and concept not meet the needs of university information construction, but also the technical means in the management system are relatively backward. Student dormitory management is a very important part of college student management. The level of student dormitory management reflects the level of student work in a school, which will directly affect all aspects of the school. For the current major universities, the work of student dormitory involves a lot of information. If manual registration is adopted, it will consume a lot of time and energy of administrators, and it is easy to cause information errors, information loss, and other problems. Other scholars have combined artificial intelligence technology with university network service platform, so that students can obtain corresponding service information through the network platform, such as waiting time in canteen and usage of bathroom [19].

At present, many domestic universities have applied artificial intelligence technology in education management system. Although it has improved the efficiency of university management and teaching quality, it still does not achieve the expected effect. There are three main problems. First of all, the digitization of the educational management process in colleges and universities is low. University management contains a wide range of contents, and each piece of management content contains a large number of data. Although the introduction of artificial intelligence technology can improve the data statistics and sort in various fields, the data sources of universities are scattered and have a certain fluidity, which make the statistics of some data incomplete, resulting in the low authenticity of the data managed by artificial intelligence [20]. Second, the teaching in the process of college education management has not been accurate. Artificial intelligence technology can improve the quality and level of teaching to a certain extent, but teachers do not fully grasp the learning situation and teaching effect of students. Relying too much on the evaluation of human-computer interaction will also make teachers’ evaluation of students inaccurate and incomplete. Third, the idea of people-oriented education is ignored. Artificial intelligence technology can standardize the educational management of colleges and universities and make all departments of colleges and universities act according to rules. At the same time, these standards are also a restriction on students and teachers, which are not conducive to the innovation and reform of teaching.

3. Construction of Face Recognition Model in University Intelligent Education Management System

The research of face recognition system began in the 1960s and has been improved with the development of computer technology and optical imaging technology since the 1980s. The real application stage is in the late 1990s, and it is mainly realized by the technology of the United States, Germany, and Japan. The key to the success of face recognition system lies in whether it has a cutting-edge core algorithm and makes the recognition results have practical recognition rate and recognition speed. Face recognition is one of the important technologies for the implementation of intelligent education management in colleges and universities. It can carry out face recognition in a noncontact way, which is convenient and reliable. The principle of face recognition technology is shown in Figure 1. It mainly collects face related data and extracts image features and then stores the obtained information in the database as basic data information. When the camera captures the face image in the specified area, it will digitize the image for image processing, then compare and recognize it with the existing image eigenvalues in the database, and finally get the result.

Therefore, the key link of face recognition technology is face detection and image feature extraction and comparison. The face detection algorithm used in this paper is to fuse the extracted image gradient direction histogram, namely hog, with the image features extracted by convolution neural network based on Yolo model. The fusion result is the final feature of the face.

The image gradient direction histogram feature extraction algorithm can extract the edge contour of the image in a short time and overcome the influence of illumination and color on the detection results in the process of face recognition and detection. After the image is input, it needs to be changed into a unified format file with the same pixel size, and then the horizontal gradient and vertical gradient of each pixel contained in the image are calculated accordingly and then calculated through the convolution kernel, which is $[-1, 0, 1]^T$ and $[-1, 0, 1]$. The calculation is shown in formulas

$$g_x(x, y) = h(x + 1, y) - h(x - 1, y),$$

$$g_y(x, y) = h(x, y + 1) - h(x, y).$$

The gradients of the coordinate points of the pixels in the horizontal and vertical directions are expressed as $g_x(x, y)$ and $g_y(x, y)$, respectively, and the pixel values are expressed as $h(x, y)$. According to the gradient value obtained from formulas (1) and (2), the touch and direction of the gradient corresponding to the point can be solved, as shown in formulas

$$g(x, y) = \sqrt{g_x(x, y)^2 + g_y(x, y)^2},$$

$$d(x, y) = \tan^{-1} \frac{g_y(x, y)}{g_x(x, y)}.$$ 

Through the calculated pixel gradient modulus and corresponding direction, the picture can be transformed into gradient histogram, and the gradient histogram of all units can be obtained. After that, the whole picture can be traversed arbitrarily through the sliding window. In this process, the eigenvalues contained in each block will be normalized, so as to improve the robustness of the image to shadow, illumination, and edge changes. The normalization method is shown in formula

$$v_{m,n}^{\text{normed}} = \frac{v_{m,n}}{\sum_{m=1}^{9} \sum_{n=1}^{9} (v_{m,n}^2 + \epsilon^2)}.$$
The abscissa index of the image gradient direction histogram is expressed as \( m \), the cell index contained in the sliding window block is expressed as \( n \), and the count value of the gradient direction histogram corresponding to the index is expressed as \( v_{mn} \).

The input image also needs to be processed through the convolution neural network based on the Yolo model. Each convolution in the convolution neural network based on the Yolo model will convolute, add bias, activate, and down sample the input image in the corresponding layer. The input image needs to undergo six convolution operations and four pooling operations, and then the corresponding image eigenvalues are extracted under the processing of the activation function. The convolutional neural network based on Yolo model is an improvement based on the structure of convolutional neural network, as shown in Figure 2. Compared with the traditional feature extraction and classification methods, the way of feature extraction of input image by convolutional neural network is to achieve automatic network learning through layer by layer convolution dimensionality reduction and multilayer nonlinear mapping to obtain the feature extractor and classifier required for target recognition. Therefore, after the input picture is convoluted through \( n \times m \) convolution kernels, biased and activated, the characteristic map of the corresponding layer can be obtained, the number of which is \( n \), and the activation function is shown in formulas

\[
y_j^{(i)} = f \left( \sum_{i \in M_{j(1)(u,v)}} \sum_{x_{j(i-1)}(q+u,p+v)} \omega_{j(i)(u,v)}^{(i)} x_{j(i-1)}^{(i-1)} + b_j^{(i)} \right),
\]

\[
C^{(i)} = \{(u,v) \in N^2 | 0 < u < C_x, 0 < v < C_y \}.
\]

The current number of layers is represented as \( l \), the neuron bias of the \( j \) feature graph is represented as \( b \), and the feature graph set associated with the previous layer is represented as \( M \).

The pool layer in the convolutional neural network selects the maximum value for sampling, and the number of output characteristic graphs after sampling remains unchanged, but the corresponding size will become smaller. As shown in formula (8), it is the sampling function:

\[
y_j^{(l)} = \text{down}\left( y_j^{(l-1)} \right).
\]

The nonlinear mapping capability of the network can be enhanced in the full connection layer, as shown in formula

\[
o_j^{(l)} = f \left( \sum_{i=1}^{n} x_{j(i-1)}^{(l-1)} \omega_{ji}^{(l)} + b_j^{(l)} \right).
\]

In the formula, the number of neurons in the upper layer is expressed as \( n \), the connection strength between neurons in the current layer and neurons in the upper layer is expressed as \( \omega \), the bias of neurons in the current layer is expressed as \( b \), and the activation function is expressed as \( f(\cdot) \).

Face features have great complexity and many categories, so face features are classified by softmax regression function in the network. If the number of samples is \( n \) and the number of categories is \( s \), the training set composed of \( s \) classes is expressed as \( \{ (x^{(1)}, y^{(1)}), \ldots, (x^{(s)}, y^{(s)}) \} \), in which there is sample \( x^{(r)} \in \mathbb{R}^{m+1} \), and the corresponding class mark is expressed as \( y^{(r)} \in \{ 1, 2, \ldots, m \} \). The regression function is shown in formula

\[
h_\theta(x^{(r)}) = \begin{bmatrix} \exp \left( \theta_1^T x^{(r)} \right) \\ \vdots \\ \exp \left( \theta_m^T x^{(r)} \right) \end{bmatrix} = \frac{\exp \left( \theta_1^T x^{(r)} \right)}{\sum_{k=1}^{m} \exp \left( \theta_k^T x^{(r)} \right)}.
\]

The probability that the sample belongs to category \( k \) is expressed as \( p \), and the model parameter is expressed as \( \theta \in \mathbb{R}^{m+1} \). If its expression is matrix, its cost function is shown in formula
The indicative function in the formula is expressed as $l_I$. On the basis of convolution neural network, in the neural network based on Yolo model, except that the last layer adopts linear function, the activation function of the remaining volume base layer is shown in formula $\text{Ax}(x) = \begin{cases} xx > 0, \\ 0.1 \times \text{other}. \end{cases}$ (12)

The image feature values extracted by the convolution neural network based on Yolo model will be fused with the feature images obtained by the gradient direction histogram feature extraction algorithm in the last volume base, so as to obtain the final feature image. Then the final face features will be obtained after the two-layer full connection layer processing in the neural network, but it cannot be used to realize the real face target recognition and detection, and the classifier of the recognition network needs to be further set and trained. The loss function needs to be defined before setting and training the classifier. The error of the network is divided into positioning error and classification error. Its calculation is shown in formulas

$$L_\text{position} = \sum_{i=1}^{49} \sum_{j=1}^{2} P_{ij}^\text{face} \left[ (x_i - x_j)^2 + (y_i - y_j)^2 + (w_i - w_j)^2 + (h_i - h_j)^2 \right].$$ (13)

$$L_\text{class} = \sum_{i=1}^{49} \sum_{j=1}^{2} P_{ij}^\text{face} (c_i - \hat{c}_i)^2 + \sum_{i=1}^{49} \sum_{j=1}^{2} P_{ij}^\text{noface} (c_i - \hat{c}_i)^2.$$ (14)

The positioning error is expressed as $L_\text{position}$, the classification error is expressed as $L_\text{class}$, whether a face detected in the $i$ network is expressed as $F$, the center point of the corresponding grid boundary box is expressed as $j$, the coordinate value of the point is expressed as $(x, y)$, the width and height of the boundary box of the point are expressed as $w$ and $h$, respectively, and the category of the detection target is expressed as $c_i$.

To complete the detection network defined by the loss function, we need to constantly modify and adjust the parameters of the full connection layer through the feedback information of the training results, so as to continuously improve the confidence of the recognition network, finally achieve the design goal, and output the relevant bounding box parameters of the face target. The loss function in this paper is shown in formula

$$L = \alpha_1 L_\text{position} + \sum_{i=1}^{49} \sum_{j=1}^{2} P_{ij}^\text{face} (c_i - \hat{c}_i)^2 + \alpha_2 \sum_{i=1}^{49} \sum_{j=1}^{2} P_{ij}^\text{noface} (c_i - \hat{c}_i)^2.$$ (15)

The trained network needs to carry out corresponding detection to evaluate the face target position contained in each unit with the set confidence parameters, as shown in formula

$$\text{Confidence} = P(\text{face}) \cdot \text{IOU}_\text{truth}^{\text{pred}}.$$ (16)
The probability of the existence of human face is expressed as \( P(\text{face}) \), and the coincidence degree of the predicted labeled bounding box is expressed as IOU. Its definition is shown in formula

\[
\text{IOU}_{\text{pred}}^\text{truth} = \frac{S_{\text{overlapped}}}{S_{\text{predict}} + S_{\text{truth}} - S_{\text{overlapped}}},
\]

where the area is expressed as \( S \). As shown in Figure 3, it is the structure diagram of YOLO model in convolutional neural network based on YOLO model.

4. Experimental Results of Face Recognition Model in College Intelligent Education Management System

4.1. Experimental Test Results of Recognition Module in Face Recognition System. In order for the face recognition model
to run stably and effectively in the intelligent education management system of colleges and universities, corresponding tests need to be carried out. In actual face recognition, the orientation, illumination, and expression of the face to be recognized in the detection environment are different, so these factors also need to be considered in the process of training. In the training process, the existing faces in the data set are cut uniformly, and the size of the sum is used as the standard to divide the samples into positive and negative, that is, those with a size less than 0.3 are negative samples, those with a size more than 0.65 are positive samples, and those not within this range are not used temporarily. Figure 4 shows the error comparison results obtained by fusing hog and Yolo model algorithm models.
It can be seen from the results in the figure that the face detection algorithm model adopted in this paper only propagates complex samples, which can save computing resources on the basis of maintaining a high recognition rate. In order to further test the performance of the recognition network in this paper, the algorithm in this paper is tested and compared with other face recognition algorithms through fddb data set. As shown in Figure 5, the test results are compared.

The horizontal coordinate in Figure 5 is the recognition speed, and the vertical coordinate is the recognition accuracy. It can be seen from the results in the figure that the algorithm in this paper is not the best algorithm among the four.
algorithms in terms of recognition speed or recognition accuracy, but the algorithm in this paper has the advantages that the other three algorithms do not have in terms of recognition speed and recognition accuracy. This is mainly because the fusion of Yolo model and hog fast extraction method shows good timeliness, and the final accuracy of this algorithm can reach 91.5%. Therefore, this algorithm can be applied to the environment of face recognition in the intelligent education management system of colleges and universities.

As shown in Figure 6, the results of each test example of the face recognition algorithm in the university intelligent education management system are shown. As can be seen from the figure, the main test examples include user login, accurate query, fuzzy query, data and picture upload, report generation, and query statistics. It can be seen from the test results that the test response time displayed by each example is within the expected range, which meets the expected requirements of face recognition test.

4.2. Application Test Results of Face Recognition System. In the intelligent education management system of colleges and universities, the learning management and safety management of college students are the focus. Therefore, this paper will test the application of face recognition system in two aspects: attendance system and dormitory management.

As shown in Figure 7, the face recognition test results of the dormitory environment of the face recognition algorithm in this paper and the traditional algorithm in the literature are compared. It can be seen from the figure that the fastest recognition time of this face recognition algorithm is slightly longer than that of the traditional algorithm, while the slowest recognition time is shorter than that of the traditional algorithm. Finally, in the average recognition time, the recognition time of this face recognition algorithm has a little advantage over that of the traditional face recognition algorithm, but it is not obvious. However, from the perspective of the error rate of face recognition, the recognition error rate of this face recognition algorithm is less than that of the traditional algorithm, which is reduced by 3.27%.

Overall, the face recognition algorithm in this paper has certain advantages in application testing, which can meet the requirements of real-time face recognition and improve the accuracy of face recognition.

Figure 8 shows the test results of face recognition in classroom attendance. In the classroom attendance test, twelve college students are mainly selected as the test objects of face recognition. From the results in the figure, it can be seen that the classroom attendance module based on face recognition system can identify and deal with the situations of late and early leave, substitute and absenteeism in the classroom, and can meet the expected needs of classroom attendance recognition. In the test process, it is found that the efficiency of face detection and recognition is relatively high when college students maintain correct posture and face is illuminated evenly. If the student's posture angle is too biased or the face deflection angle is large, there will be a recognition blind area, and face recognition will fail, resulting in the system judging that there is no corresponding face in the image, and the recognition result score is zero.

To sum up, the algorithm of the face recognition system in this paper has good real-time performance, can realize face recognition in the expected time, improve the efficiency of face recognition and reduce the error rate of face recognition, and can meet the needs of face recognition in different environments. In the application test of dormitory management and classroom attendance model, the application of face recognition technology can improve the efficiency of students’ education and management and achieve the purpose of effectively managing students.

5. Conclusion

With the popularization of higher education, the number of college students and the scale of university campus are expanding. With the development of higher education, the problem of campus education management is becoming more and more prominent. With the development of the Internet technology and information technology, the construction of intelligent education management system and platform has become an inevitable development trend. Therefore, this paper puts forward the application research of artificial intelligence technology in college intelligent education management and applies face recognition technology in college intelligent education management system, dormitory management system, and classroom attendance system.

The experimental results show that the convolution neural network algorithm based on Yolo model combined with hog algorithm can effectively improve the extraction of feature information of face recognition, improve the recognition efficiency, and reduce the error rate of face recognition. In addition, the face recognition algorithm in this paper has more advantages in the accuracy of face recognition than the traditional algorithm in the dormitory management experiment. It can meet the real-time performance of face recognition and improve the accuracy of face recognition. In the classroom attendance experiment, the face recognition algorithm in this paper can identify and deal with the problems such as students’ late and early departure, absenteeism, and substitute classes. However, there are also problems that cannot be recognized correctly due to students’ sitting posture and face angle. Therefore, this aspect needs further improvement and research.

Data Availability

The figures used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References

[1] W. Chunfang and G. Jin, "Analysis on the construction ways of university intelligent library under the background of artificial intelligence," China Computer & Communication (theoretical Edition), vol. 33, no. 4, pp. 141–143, 2021.

[2] N. Yanan, Y. Decheng, and Y. Zou, "Application of artificial intelligence technology in intelligent campus of colleges and universities," Journal of Heilongjiang University, vol. 12, no. 7, pp. 52-53, 2021.

[3] Z. Zhengzheng, "Theoretical logic and path prospect of the application of artificial intelligence in the field of ideological and political education in colleges and universities," Journal of Donghua University(Social Science), vol. 20, no. 4, pp. 373–379, 2020.

[4] W. Lina, "Application of artificial intelligence technology in college intelligent campus English teaching," Writers World, vol. 19, pp. 49-50, 2020.

[5] X. Xu, X. Wang, Z. Sun, and S. Wang, "Face recognition technology based on CNN, XGBoost, model fusion and its application for safety management in power system," IOP Conference Series: Earth and Environmental Science, vol. 645, no. 1, article 012054, 2021.

[6] B. Qiu, "Application analysis of face recognition technology in video investigation," Journal of Physics Conference Series, vol. 1651, no. 1, article 012132, 2020.

[7] R. Liang, "Application of artificial intelligence technology in smart campus," Research on Industrial Innovation, vol. 12, pp. 36-37, 2020.

[8] D. Salac, "Present: an android-based class attendance monitoring system using face recognition technology," International Journal of Computing Sciences Research, vol. 2, no. 3, pp. 102–115, 2020.

[9] X. Lv, M. Su, and Z. Wang, "Application of face recognition method under deep learning algorithm in embedded systems," Microprocessors and Microsystems, vol. 104034, p. 104034, 2021.

[10] L. Boussaad and A. Boucetta, "Deep-learning based descriptors in application to aging problem in face recognition - Science Direct," Journal of King Saud University-Computer and Information Sciences, vol. 34, no. 6, pp. 2975–2981, 2020.

[11] R. Ju, Y. Chen, W. Yang, M. He, Y. Pan, and Z. Wu, "Application of femtosecond laser technology in the management of subluxated lens," Nan Fang yi ke da xue xue bao= Journal of Southern Medical University, vol. 39, no. 7, pp. 843–849, 2019.

[12] J. Hernandez-Ortega, J. Galbally, J. Fiérrez, and L. Beslay, "Biometric quality: review and application to face recognition with faceqnet," 2020, https://arxiv.org/abs/2006.03298.

[13] Z. Wang, "Campus intelligence mental health searching system based on face recognition technology," International Journal of Electronic Research and Application, vol. 4, no. 4, p. 6, 2020.

[14] A. Sun, "Application of artificial intelligence in the construction of Smart Library," China Arab science and Technology Forum (Chinese and English), vol. 12, pp. 56–58, 2021.

[15] M. Wang, "Application of video recognition technology in sports stunt teaching," IOP Conference Series Materials Science and Engineering, vol. 750, no. 1, article 012123, 2020.

[16] Y. Sun, "Video recognition of government community management cases based on partial differential equation method," Advances in Mathematical Physics, vol. 2021, Article ID 5685311, 11 pages, 2021.