Research on student apartment management system based on face recognition technology

Liufang Yu, Aijun Zhou

Nanjing Normal UniversityTaizhou College ,Taizhou,225300,China

ABSTRACT: The introduction of face recognition technology into the management system of university students'apartment can greatly improve the service quality of university students'apartment management, and open the last kilometer of management education, service education and Environment Education. Taking the construction of student dormitory management system in intelligent campus as an example, this paper applies face recognition technology to the daily management of campus, establishes multi-department linkage mechanism, and realizes the intelligentization, humanization and precision of student management.

KEYWORDS: Face Recognition; apartment management system; big data; artificial intelligence

I.INTRODUCTION

With the further deepening of the Internet Information revolution, has entered the "artificial intelligence + era. ". In 2017, the State promulgated the Development Plan for a new generation of artificial intelligence, which calls for seizing major strategic opportunities for the development of artificial intelligence, building China's first-mover advantage in the development of artificial intelligence, and greatly improving the accuracy of public services, we will improve the competitiveness of public services and the quality of people's lives in an all-round way. Face recognition technology is an important application of artificial intelligence, which is a kind of biological recognition technology based on face feature information. It is necessary to introduce face recognition technology into the management system of college students'apartment. The Management System of university student's apartment based on face recognition technology is based on student's identity, which can be divided into two parts: Portrait Collection Terminal and Student's apartment management service terminal. By means of living face recognition registration terminal device, access control IC card reader, second generation ID card reader and other devices, combined with deep learning and neural network algorithms, a combined identity authentication is constructed, at last, after big data analysis, it depicts the behavior of the students and gives warning to the abnormal behavior, which provides support for the management service level of "smart apartment" , realizing the "accurate" management of the apartment. A domestic university has started to try out a face-speed door-opening system, an intelligent face recognition system that uses deep learning and neural network algorithms, and integrates various specialized technologies such as artificial intelligence, big data,access control, and the control of the gate system, etc. , more than 10,000 students are served, which has greatly improved the service quality of the management of students'apartments. In order to further explore the student apartment management system based on the face recognition technology, this paper briefly introduces the function and advantage of the face quick access door, discusses the design of the face recognition technology management system, and puts forward some thoughts and suggestions.

II. IMPLEMENTATION OF FACE RECOGNITION SYSTEM

At present, the industry application of face recognition technology is mature, the accuracy rate of face recognition is more than 99% , the recognition speed is less than 0.3 seconds, to meet the rush hour in school, rapid and accurate verification. The application of face recognition not only improves the security of verification, but also solves the problem that students forget to bring their cards or lend them to others. Therefore, face recognition is regarded as the first choice for human identification.

A）Real-time dynamic face detection
In this paper, face detection is based on the Two-stage object detection framework: STAGE1 can quickly filter the non-face region and extract the candidate window of effective face by computing the low complexity convolutional

neural network; Stage2 to increase the face input resolution and the number of convolutional neural network, further to select the candidate window classification, and through non-maximum suppression merge detection box. From Coarse to fine network structure design and multi-scale feature sharing, greatly reduce the calculation of deep learning network, real-time dynamic face detection.

B）Face recognition process

Registration stage: The user through the camera input and video input, upload face image. The system extracts the facial features and adds them to the face database. In the authentication stage, the extracted face image feature value is searched and matched with the feature template stored in the database, and a threshold is set, when the similarity exceeds this threshold, the most similar matching result is output. This process can be divided into two types: one is the comparison of 1:1 face image, the other is the recognition of 1: N face image search matching process. As shown in figure 1.
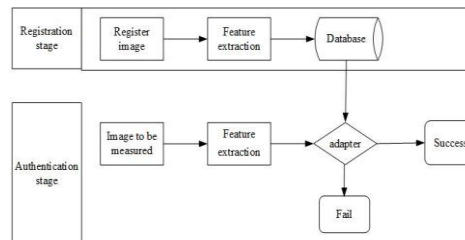

Figure 1 Face recognition process

C）Protection of face information

Face photos are very sensitive and belong to the personal privacy category. Once the data is leaked, it will cause significant security risks, so the protection of face data is particularly important. The face information in the system calls the card data, which is stored in a special database server and encrypted. The server can only be accessed by the internal network and can not communicate with the external network. The school network has a multi-layer authentication mechanism and a security management system, effectively guarantee the security of face information.

D）Emergency handling of abnormal situation

When the network is abnormal, the face recognition terminal and the Channel Gate are running offline. The face information captured in the scene is directly matched with the feature value of the face picture stored in the local face terminal, and the gate can be opened if the match is successful without affecting the normal entry and exit of people, after the network communication, automatically establish communication with the server and synchronous traffic information. Channel Gate and emergency door, and fire alarm linkage, usually closed state, fire all automatically open to meet the rapid evacuation of personnel requirements.

III.STUDENT APARTMENT MANAGEMENT SYSTEM BASED ON FACE-SPEED DOOR

The student apartment management system based on face recognition technology mainly includes four functions: Personnel Management, authority management, dormitory management, data statistics and so on. Flat Design Style System Interface, clean and simple, easy to use operation, user login at a glance, can quickly find their desired function. At the same time, the system for the characteristics of this group of college students do optimization, the following four functions are introduced.

A）Personnel Management

Personnel Management mainly includes personnel access records, add and delete personnel, strangers records and other management functions.

A.1.Personnel access records management

Access records support student name, student number, dormitory number, any time period, access direction, personnel type and other conditions. The query result shows that in addition to the above information, it also includes photos of people passing through the quick-access door and photos of people registering for easy comparison. Query results can be exported in bulk, including text, images, and other information.

A.2. Add or remove personnel

Graduation season and freshman enrollment through the Excel file can be a batch of additions and deletions. Usually guests visit, through we chat public accounts, small procedures and other online service platform to upload personal information, simplify the process, improve efficiency.

A.3. Visitors'and strangers'records

In view of the frequent student exchanges between different buildings, students parents often come to the characteristics of the system to record visitors. System design stranded warning, if there are more than half a day or 10 pm still stranded visitors, the system automatically sent text messages to the visitors mobile phone to remind. Face quick door to try to break in strangers are captured, the unauthorized personnel to record, improve management accuracy. At the same time grasp the stranger can choose to enter the white list, to make up for the original photo less, low recognition efficiency and other weaknesses.

B）Access control

The main purpose is to modify personnel access rights and access effective time, to support batch import, export, batch modification.

C）Dormitory Management

Intelligent students to live in dormitories, exchange dormitories, returned dormitories management functions, real-time change of room information and room use. Flatten the accommodation situation of the whole building and display the student's profile, personal information and real-time status (in or out of bed) through a small window when the mouse is placed on the student's name.

D）Data statistics

Statistics can be classified by college, Hostel, etc. . One-click query often late return, long-term or not return to all kinds of statistical data, in time for abnormal behavior of students early warning, for timely intervention in the analysis of psychological state of students to provide a basis. And the statistical results are visualized in the form of bar chart, trend chart, etc. .

IV. BIG DATA MINING CASE OF STUDENT BEHAVIOR IN STUDENT APARTMENT

As each student enters and leaves the student's apartment is recorded, the student's behavior in the student's apartment is digitized and informationalized. Through the analysis of the big data of students' apartment behavior, we can carry out "group portrait" and "accurate portrait" to the students' clients.

Table 1 Average access time of each college in a building

College	Average Time of early departure	Average time of late return	Average time spent studying (out)
College of Chemical Engineering	7:50:12	21:48:23	13:58:11
College of Law	8:45:12	20:12:17	11:27:05
College of physics	7:52:32	21:40:18	13:47:46
College of Telecommunications	7:35:25	21:29:54	13:54:29
College of Computer Science	7:35:02	21:39:14	14:04:12
College of Economics and management	9:15:03	20:56:01	11:40:58
College of Marxist institute	9:35:07	20:18:35	10:43:28
College of Foreign Languages	9:10:04	20:41:09	11:31:05
College of Education	9:22:08	20:44:13	11:22:05
College of the humanities	9:58:07	20:47:31	10:49:24

Based on the analysis of the data of a dormitory building with many residential colleges (tableI, the name of the college has been processed) , it can be seen that the students of science and Engineering Get up earlier and return later than the students of arts, and do not stay in the dormitory for a longer time; If a student deviates too far from the average of his fellow students at the same college, it's worth noting. The school attaches great importance to the three-day dynamic data, the system dynamic tracking three-day students without data, through this data can timely attention to sudden psychological problems of students. In case of late return, failure or failure to return more than a certain number of times within five days, the system will give early warning of students' abnormal behavior, and the counselor will immediately intervene in the analysis of students' psychological state.

V. CONCLUSION

With the growing maturity of artificial intelligence technology, face recognition technology can not only greatly improve the management level of college apartment management, but also will be more and more widely used in college student affairs management in the future, will become "three complete education" , accurate ideological and political work to improve the quality of sharp weapons. Face Recognition Technology has unique advantages in the university apartment management, but there are still some deficiencies, such as the recognition rate is affected by factors such as light, mobile phone development is not enough and so on. All these need us to further explore and improve.

REFERENCES

[1]Zuwei Wang, Huai Yao Nan, Ying Zhang. The design and implementation of university student apartment management system in the perspective of "Internet + " Taking Shenyang Normal University as an example [J]. Modern trade industry, 2019,40(08) : 187-188.

[2]Han Wei. Application of attendance system based on face recognition in student dormitory[J]. Modern information technology, 2018,2(10) : 118-119.

[3]Jingduan Zhang. Research on library access control system based on face recognition technology [J] . Modern electronics technology, 2016,39(18) : 99-103.

[4]Shuang Song. The application of face recognition technology in campus management[J]. World of communication, 2019,26(01) : 184-185.