



ANALYSIS AND APPLICATION OF SMART CAMPUS BIG DATA BASED ON FACE RECOGNITION TECHNOLOGY

Technology

Zhou Junjie

North China Electric Power University, Baoding China.

Liu Tongna*

North China Electric Power University, Baoding China.*Corresponding Author

ABSTRACT

This article focuses on the combination of smart campus and face recognition technology, uses face recognition system to collect a large number of campus data, and uses data analysis means to carry out multi-dimensional analysis of data, according to different needs to send the analysis results to each service object. Pay attention to the integration of technology and application, strengthen the cooperation and cohesion of university campus information, and realize the value of smart campus.

KEYWORDS

Face Recognition, Smart Campus, Campus Data, Data Analysis

1. INTRODUCTION

The application of new technology in smart campus, combined with face recognition and data analysis, can realize more possibilities of information technology teaching, enhance the core competitiveness of universities, and realize the important mode of deep integration of information technology with teaching, scientific research and management.

2. INTRODUCTION TO SMART CAMPUS AND FACE RECOGNITION

2.1 SMART CAMPUS

In the words of Yu Changhong (2015), "Smart campus is to promote the integration of information technology and education and teaching, improve teaching results, with the Internet of things, cloud computing, big data analysis and other new technologies as the core technology, to provide a comprehensive perception of the environment, smart, data, networking, collaborative integrated teaching, scientific research, management and life services, and can be insight and prediction of education and teaching new campus."

2.2 FACE RECOGNITION

Face recognition is a kind of biological recognition technology based on human face feature information, which has the characteristics of non-contact, non mandatory, concurrency, fast recognition and high accuracy. Face recognition system has been widely used in finance, justice, military, public security, border inspection, government, aerospace, power, factories, education, medical care and many enterprises and institutions. With the continuous maturity of technology and the improvement of social identity, face recognition technology will be applied in more fields.

3. APPLICATION AND RESEARCH OF SMART CAMPUS DATA ANALYSIS SYSTEM BASED ON FACE RECOGNITION TECHNOLOGY

WU Xiao-rong and XIE Fei (2018) have reported that "Big data reshape the human learning and education system, make learning more convenient, more personalized, customized learning possible, social science from the most barren areas into the most abundant areas of data."

The operation of smart campus is based on huge campus data, so access to campus data is its main job requirement. The characteristics of face recognition to obtain data are convenient, accurate and fast, which fits well with the characteristics of smart campus perception layer and better meets the needs of obtaining campus data.

Figure 1 is the working flow chart of the system. After real-time recognition, a large amount of identification information will be stored in the designated smart campus database. After data integration, preprocessing, transformation, classification and so on, the data in the database can be obtained. By using scientific and reasonable analysis method, the multi-dimensional analysis of the data is carried out, and the visual report generated by the analysis results is provided to different objects, which can produce corresponding intervention and influence and play the role of smart campus system.

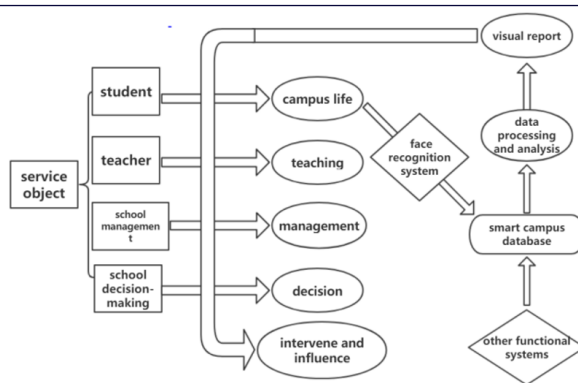


Figure 1: Workflow of Smart Campus System Based on Face Recognition Technology

In 2012, HUANG Ronghuai, ZHANG Jinbao, HU Yongbin and YANG Junfeng have noted, "Campus wisdom comes from analyzing data and making appropriate decisions based on the results of data analysis." The smart campus system can be divided into four aspects of service objects: students, teachers, school management, school decision-making. According to the different needs of each service object, the system carries on the data analysis from different dimensions. For example:

3.1 LEARNING REPORT

The face recognition system can record the students' daily study time through the recognition points such as teaching building, library, study room and so on. The data analysis system can take the week as the time unit, and draw the weekly students' learning into a chart and send it to the students. It lists the students themselves, the best data for the week, and the overall average data for students to compare. The time of self-study and the time of using learning resources can reflect the importance and investment of students' study every day.

In the traditional course achievement and ranking system, each student can not understand the learning situation of other students from the score ranking, and the face recognition system can provide information to the students from the perspective of learning time. Clear chart data can easily compare their learning situation with that of excellent students. For students with poor learning status, they can clearly realize their lack of learning status and play a warning role. For students in general, they can understand the learning state of excellent students and stimulate their learning motivation. The weekly report has the characteristics of timely and effective feedback and short intervention period, which can cultivate students' ability to obtain and use information data and improve students' initiative to solve problems.

In the report of figure 2, the system can make a prediction of the students' overall results this semester according to the students' weekly learning situation within a month, and also send the average prediction value and the optimal prediction value to the students together. It has

certain reference value for students to evaluate their learning status this month, to help students find problems, to attract attention, and to adjust their learning status in time. Through such feedback intervention, Smart Campus can achieve the goal of optimizing learning and teaching.

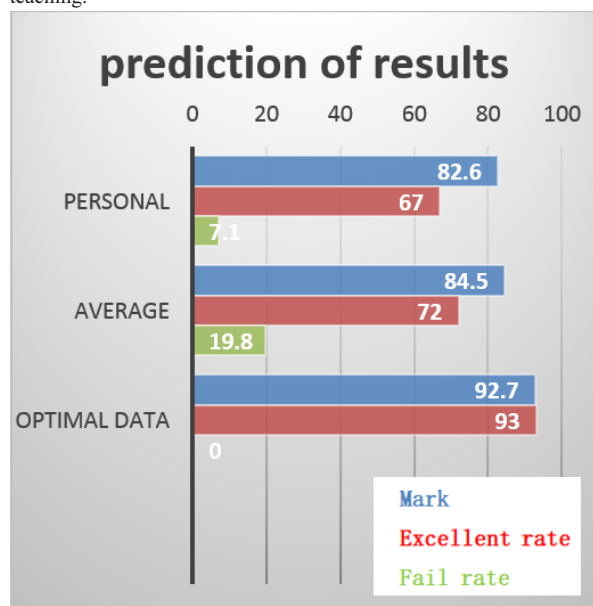


Figure 2: Monthly Student Performance Forecast

The prediction of results in this paper is based on the characteristics of face recognition information collection. The linear regression model is established by using Matlab regression analysis regress function to predict the results. Regression analysis is a statistical method to analyze data. The purpose is to understand whether there is correlation, direction and intensity between two or more variables, and to establish mathematical models to observe specific variables to predict the variables that researchers are interested in.

This paper collects some students' relevant data and analyzes them in the regress of Matlab, and obtains the linear regression results of the data. As shown in figure 3, we can see that there are a small number of outliers in the data, but most of the samples fall in the middle. For the optimization of the regression model, the outliers are removed and the new linear regression equation is obtained by re-fitting, which improves the accuracy of linear regression.

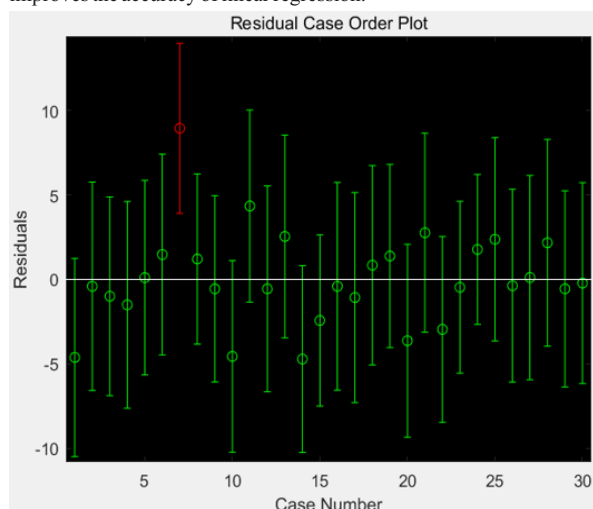


Figure 3: Sorting graph of residual cases

The regression model test is mainly analyzed by the S (stats) value of the regress function. Data S value of this group is 0.8616; 38.8966; 0.0000; 9.2688. S statistics have four values: correlation coefficient R^2 , F values, probability P, error variance corresponding to the F and error variance. As the correlation coefficient R^2 closer to 1, the

more significant the regression equation is. R absolute value of this example is 0.8616, indicating strong linear correlation; If the $p < \alpha$ (α is a predetermined significant level), it shows that there is a significant linear correlation between dependent variables and independent variables. The output of this example, $p < 0.0001$, clearly satisfied $P < \alpha = 0.05$.

3.2 INFORMATION REPORT ON SPORTS

Physical exercise is also a very important aspect of college students. The identification points in playground, gym, swimming pool, stadium and other places can record students' sports. Through the record data of each entrance and exit of track and field, the time of students entering and leaving track and field can be obtained, and then the time of students' movement can be judged by combining the identification points in the sports field.

When more students have less exercise time this week, the system will push tweets to encourage exercise, recommend appropriate sports to them, help students set up the concept of lifelong physical exercise, clarify the purpose of physical exercise and guide students to actively and scientifically participate in physical exercise. The report will also be sent to school physical education teachers and other personnel to let them understand the students' real exercise situation and organize related sports activities. When the sports participation is good, the system can push more professional knowledge articles combined with the selection of sports items in the week. At the same time, the report will be sent to the school physical education resource management teacher to help them arrange the venue reasonably according to the students' actual needs and the purchase and arrangement of the school sports resources.

3.3 REPORT ON THE USE OF SCHOOL RESOURCES

Students often encounter congestion in their daily study life, libraries, study rooms can not find seats and so on. And the face recognition points in restaurants, libraries, stadiums and other places can record the change of human flow with time, analyze the characteristics of passenger flow at different times, the peak period of use and the period of less people flow, and send them to service objects, reasonably guide them to use resources by wrong peak, save time and improve efficiency. For example, the face recognition points of restaurant import and export are used to detect the flow of people during the peak period of meals and the number of people eating and accumulative meals on this floor. Use the broken line diagram to represent the report and send the report to the whole school to help them understand the clear flow of people.

The system also recommends the appropriate time for each location to help them adjust their choice of dining place and meal time, thus effectively avoiding congestion. The report in the library, study room, stadium and other places can reflect the flow of people in different regions and realize the reasonable diversion between regions. The report will also be sent to relevant managers to help them arrange the peak staffing and resource allocation.

4. CONCLUSION

The above is mainly the service latitude content that the system can realize when the student is the main service object. For teachers, school management, school decision-making level of these three service objects, the system can also meet the different needs of service objects, using campus big data, to provide more information services, to help improve the quality of teaching and management.

Smart campus has become the development trend of educational informatization. With its deep integration with face recognition and other technologies, smart campus can better promote scientific research and feedback teaching, promote the reform of higher education in the new era, and help improve the quality of talent training.

ACKNOWLEDGMENT

This research was supported by the Fundamental Research Funds for the Central Universities 2018MS092

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