Automatic Attendance Marking System using Deep Learning Algorithm

R. Vijayarajeswari[1], Kotha Venkata Sai Rakesh[2], Sangana Sai Kishore Reddy[3]

[1,2,3] UG Scholar, Department of CSE, Mahendra Engineering College, Namakkal, Tamil Nadu,India,
vijayarajeswarir@mahedra.info, sairakeshsmart999@gmail.com, kishore33311@gmail.com

Abstract - Attendance Marking is a general thing in every educational institution like college, school. The smart and automated attendance system for marking the attendance can be implemented using various ways of biometrics. Face recognition is one of them. By using this system, the issue of fake attendance and proxies can be solved. Students face will be taken as features and will be trained. The major steps in this system are detecting the faces through camera and recognizing them. After these, the comparison of detected faces can be done by crosschecking with the database of student's faces. This smart system will be an effective way to maintain the attendance and records of students.

Keywords - face recognition; class attendance system; convolutional neural network; SVM classifier; Haar cascade.

I. INTRODUCTION

Education institutions give more importance to the attendance of the students. Generally, attendance will be taken manually. Based on the attendance, students' performance will be evaluated and considered for exam conducting like minimum attendance percentage for attending exam. To manage all these institutions, pay more attention to attendance. Generally, 5 to 10 minutes will be taken for attendance for every period in a day. So, it is time consuming and effort taking system to mark attendance.

To save the time and effort for marking attendance manually, there are so many technologies to be used like RFID technology, Face Recognition. Here Face recognition is used to mark the attendance. The reason for using Face Recognition is it is fast when compared to other technologies and does not need anything to be carried out by student.

II. SYSTEM PROCESSING FLOW

The classroom attendance system based on face recognition technology can be briefly explained through the following system flow Figure 1.

III. ALGORITHMS AND METHODS

A. Face Feature algorithm

Feature is like input in normal terms. Based on the features target will be classified. So in order to classify accurately, collection of dataset and feature extraction should be carried out carefully. With respect to features, model will behave according to features. If we train it wrong, then we must Face consequences. Here features will be extracted from the student's face. For that purpose, we are using one shot learning.

B. One shot learning

It is a type of technique used to get multiple pictures from a single video frame. In simple terms, camera will capture the face for few seconds. Then it will generate the number of photos we require. It is very useful technique because larger the data, higher the accuracy in machine learning. So in order to get more photos with less effort one shot learning is useful for that. It will record the photos in black and white format.

C. Haar-like feature

After getting the data from student it will be stored in individual folders. Each folder will have the specific student name. It is mainly used for detecting the face in video frame. When we fix our camera in workstation if camera is activated then the students in video frame should be detected. For this purpose, we are using Haar like feature. It is a popular algorithm used for object detection. Here we are using it for face detection only. It will represent the face in many ways. But we are using rectangular plotting.

In other words, we can say that a rectangle will be marked around the student face. In this way we can see how many students are in frame. And, we can label the boundary with name and probability of classifying. In this way we are using

Haar feature for boundary marking and labelling.

D. SVM CLASSIFIER

SVM means Support Vector Machine. It is an algorithm used to classify the targets based on the training. It mainly concentrates on the support vectors. Support vector means these are type of vectors where these are the deciding factors to classify the targets. so they are called as the support vectors. It will have margin plane dividing the two targets. support vectors lies close to these margin planes. In SVM classifier, we train the model with data stored in folders. While training all the photos will be trained individually. It takes some time based on the volume. It needs to be updated if there is any change in the data we provided.

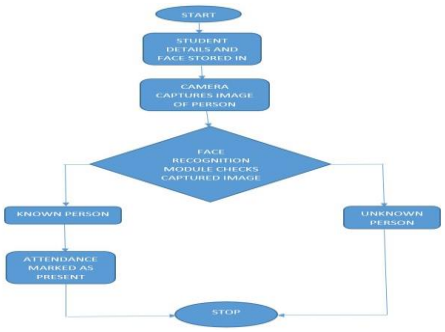

Fig. 1 System processing flow chart

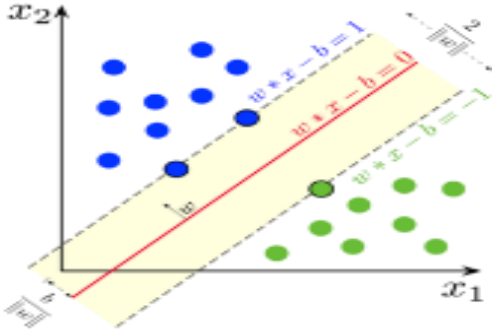

Fig. 2 SVM Support Vectors

Otherwise it will remain same for the remaining part. We can see how data will be collected in fig 3 and fig 4. Then we can see how data will be trained in fig 5. After training, the model will be knowing the student's features. So, it is easy for the model to recognize the student with his/her features already trained. Then SVM classifier comes to play by recognizing the face detected. It will cross check the face with the data trained and it will act based on the condition we give. So, it is up to user to effectively use the SVM classifier for Face Recognition. SVM classifier mainly used for classification with support vectors.

SVM is a supervised machine learning model used to predict the target based on the training. It is also used for regression analysis. It mainly works with hyper plane. Hyper plane is used to differentiate the targets and create margins among them. These are the process involved in the Support Vector Machine. Python is used for implementing the SVM Classifier. In python we can use train and test split module separate the training and testing samples.

E. MS-Excel

Here python coding is linked to MS Excel to record the result. If the student in database matches with the detected student then it will mark as present. Otherwise it will mark as unknown person. It is followed for any person. If student in class fails to come class then model will go to other condition that student is absent. Then it will be generated as a Excel sheet and class advisor or any other responsible person can see it. In this way we can manage the smart attendance system using face recognition technique.

IV. ATTENDANCE MARKING SYSTEM

Mainly it has 4 modules. They are

A. Data Collection.

In this module student's data like name, roll number and face pictures will be taken as data. Then the data will be stored in backend with individual folders of students.

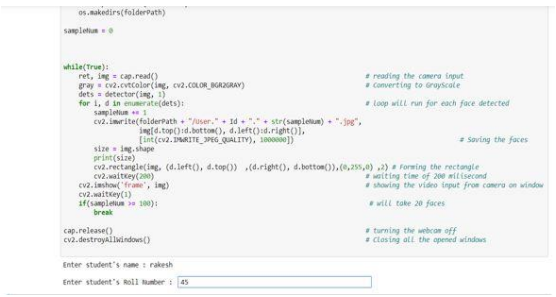

Fig. 3 Name and roll number collection

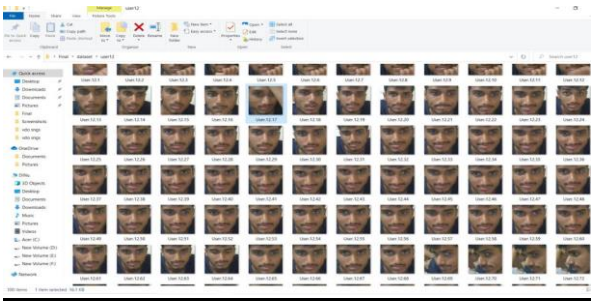

Fig. 4 Student face data collection

B. Data Training

After collecting the data from student, data will be trained with SVM classifier. Here all the generated images in data collection will be trained individually.

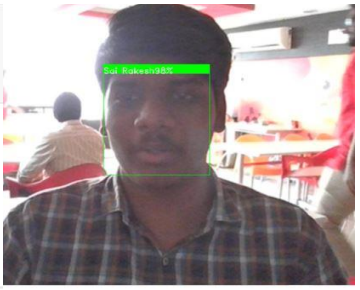

Fig. 5 Data Training

Fig. 6 Face detection and recognition

In this way we can train the data with Support Vector Machine Algorithm. Now the classifier is trained with the data loaded.

C. Face detection and Face Recognition

After Data Training, when camera placed in the class it will detect the face and compares with data in backend. If it matches then it will label face with name.

D. Attendance Marking

After recognizing the face, attendance for that person will be marked as present. Otherwise it will be marked as absent. If any student is not recognized, then it will be labelled as unknown.

If any student in the class failed to attend the class, then student's face will not be captured so that student's attendance will be marked as absent. In this way it creates a report that can be viewed by concerned authority at any time.

V. CONCLUSION

In this way smart student attendance marking system is implemented through Deep learning algorithm named SVM classifier Haar-like features. It is fast and cheap when compared to other smart attendance system. And also it is easy to update the model upto date as it is the current developing technology.

ACKNOWLEDGEMENT

Our hearty thanks to our guide R. Vijayarajeswari, Associate professor, for her constant support and guidelines offered to us during our project by encouragement towards the completion of our project.

REFERENCES

[1] Shu L I, University Y. Convolutional Neural Network-Based Video Face Detection and Recognition [J]. Computer Knowledge & Technology, 2018.
[2] Derman E, Salah A A. Continuous Real-Time Vehicle Driver Authentication Using Convolutional Neural Network Based Face Recognition [C]// IEEE International Conference on Automatic Face & Gesture Recognition. IEEE, 2018:577-584.
[3] ZHOU Feiyan, JIN Linpeng, DONG Jun. A review of convolutional neural networks[J]. Chinese Journal of Computers, 2017, 40(6): 1229-1251.
[4] Chang Liang, Deng Xiaoming, Zhou Mingquan, et al. Convolutional Neural Networks in Image Understanding[J]. Acta Automatica Sinica, 2016, 42(9):1300-1312.
[5] Yang J, Ren P, Zhang D, et al. Neural Aggregation Network for Video Face Recognition [C]// IEEE Conference on Computer Vision and Pattern Recognition. IEEE, 2017: 5216-5225.
[6] Shi Xuechao, Zhou Yatong, Chi Yue. Face gender recognition based on multi-layer feature fusion adjustable supervised function convolutional neural network[J]. Journal of Computer Applications, 2019(4).
[7] A. Jha, ""Class Room Attendance System Using Facial Recognition System."," in International journal of Mathematical science technology and management 2(3). 2007, 2007.
[8] MuthuKalyani.K, "Smart Application For AMS using Face Recognition," in CSEIJ 2013, 2013.