AUTOMATIC ATTENDANCE MARKING SYSTEM USING FACENET

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Abstract: ***The traditional attendance marking system requires manual effort of the teacher by calling the names of students and marking the attendance. It is both time consuming and prone to error. To overcome this difficulties, we propose a system that live capture the images of the students present in the class room and marking their attendance by detecting and recognizing their faces from captured image. For the purpose of face detection we are using MTCNN (Multi-Task Cascaded Convolutional Neural Network) and for the purpose of face recognition we are using FaceNet. FaceNet has an accuracy of 99.63%, which helps this system to achieve more efficiency.***

Keywords: Attendance, Face Detection, Face Recognition, MTCNN (Multi-Task Cascaded Convolutional Neural Network), FaceNet

I. INTRODUCTION

Attendance plays a crucial role in academic performance of students in schools and colleges. In recent days, the face recognition technology is rapidly gaining popularity and widely used in many different applications such as face tracking in real time, payment by using face recognition, access control, real time CCTV surveillance system, etc. Traditional attendance taking method is recording the attendance of students in sheets by calling their names. It takes a lot of time and sometimes can cause mistakes. Therefore, it is necessary to use automated attendance taking system. The proposed system in this paper is an automated system for taking the attendance of students by using face recognition technology.

Many attendance management systems have been introduced in recent years to resolve the problems faced by traditional method.. As technology growing wildly, techniques like RFID systems, fingerprint systems, Wi-Fi based systems, Bluetooth based systems, mobile and web application based systems where introduced. However, most of these systems have limitations in portability, accessibility, authenticity, accuracy, efficiency or cost. The search for an easy way to overcome the difficulties of the respective systems leads to the development of a smart attendance system based on face recognition using deep learning algorithms. Face recognition technique is the most effective technique for identification of people. Unlike other biometric and non-biometric means of attendance system, face recognition technology has its unique advantages.

The two essential parts of this system are face detection and recognition. In the beginning of the system comes the training phase, where the required dataset is collected and trained. Then comes the testing phase, where images of students in the classroom is captured for marking attendance through face recognition. This system use MTCNN (Multi-Task Cascaded Convolutional Neural Network) [1] for face detection and FaceNet [2] for face recognition. Google developed FaceNet in the year 2015, which scored upto 99.63% of accuracy. The FaceNet uses the triple loss function.

II. RELATED WORK

Face recognition is one of the most intensively studied technologies in IT field, with new approaches and encouraging results reported every year. Nowadays, it is also used in automatic attendance management system. Smart attendance system using Convolution Neural Network and Image Processing [3] was written by Senigala K. ChayaDevi, and Vamsi Agnihotram. This paper proposes an algorithm using the Convolutional Neural Network and image Processing. Implementation has three components: 1) Face scanning and detection using HAAR cascade method 2) Training the CNN-ANN model 3) Recognizes the face and update attendance. In this paper the three technologies: machine learning, image processing and IOT are merged together. Automatic Attendance System for University Student Using Face Recognition Based on Deep Learning [4] was wriiten by Tata Sutabri, Pamungkur, Ade Kurniawan, and Raymond Erz Saragih.This paper proposed a web based student attendance system which use face recognition.In this paper Convolutional Neural Network used to detect the faces in an image, to produce facial embedding deep metric learning is used and K-NN used to classify student faces. Automatic Attendance Marking using Face Recognition and SMS Alert using IoT [5] is wriiten by Dr. R. Radhika, P. Hari Prasanth, A. Karthik, K. Mohanraj, M.Navin Kumar. In this project, the camera is fixed in the classroom and this will capture the images. The faces present in the images are detected and then recognized using the database after that the attendance is marked for each students. If the attendance of a student is marked as absent then the message about the student's absence is sent to their parents through IoT.

Automated Attendance System Using Face Recognition [6] is written by Akshara Jadhav, Akshay Jadhav Tushar Ladhe, Krishna Yeolekar. In this paper the system automatically detect the students when they enter in the class room and the attendance is being marked by recognizing them. In this paper they used Violo-Jones Algorithm Face detection which used to detect human face using cacscade classifier and PCA algorithm for feature selection and for classification SVM is used. Class Room Attendance System Using Facial Recognition System [7] was written by Abhishek Jha. In this paper generation of 3D facial model takes place. This paper explains the working of face recognition system that will be established as an automated attendance system in a classroom. Convolutional Neural Networks for Class Attendance [8] was written by Zhao Pei, Haixing Shang, Yi Su, Miao Ma and Yali Peng. This paper proposes a more conveniently method of attendance statistics, which achieved through CNN.CNN is used to implement face recognition, for reducing the effect of environmental change. This paper also design a new method to collect data that gets lot of face data quickly

III. PROPOSED SYSTEM

The purpose of this work is to implement a system that can automatically mark the attendance of the students present in a classroom without the involvement of the teacher. Here we are introducing an automatic attendance marking system by face recognition using FaceNet. The ultimate objective of the system is to improve and organize the class attendance system and to decrease the number of errors occurred in the manual process and to provide attendance reports periodically

For this proposed system, initially we have to collect the required dataset from the students, which the photos of the students and store them in the database. The students must provide pictures based on the sample pictures. The sample should have ten images from different angles. These ten images of each student will be stored in the database with their name/roll no as the file name. These 10 images will be stored in a folder with their name/roll no. The operations like blurring, contrast/brightness, rotation will be applied for each of the images. From the above mentioned ten images eight images will be taken for the training purpose and two images will be taken for the testing purpose. The system can be divided into two phases-testing phase and prediction phase.

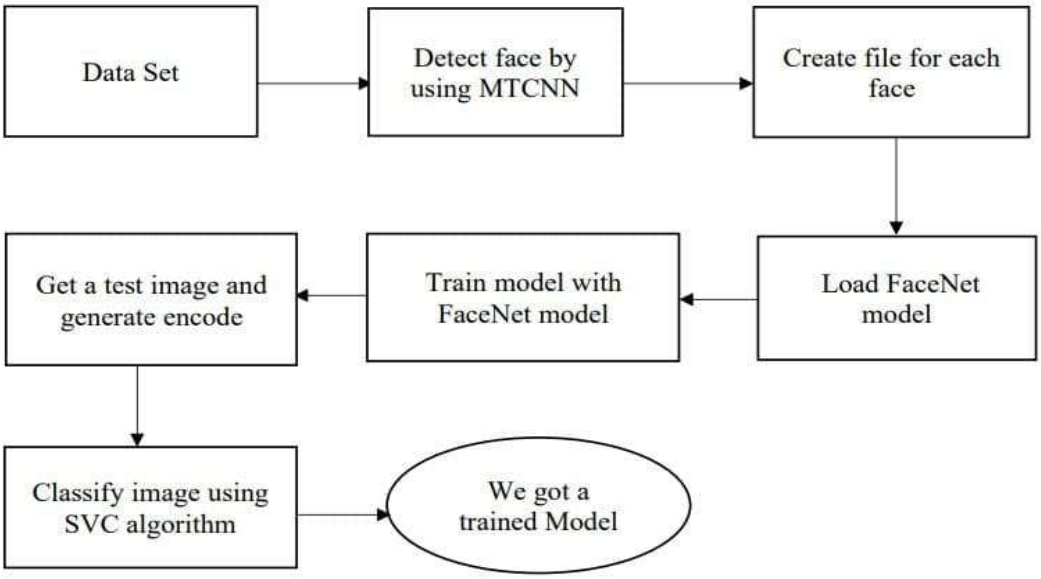

Figure 1: Steps of Testing Phase

After collecting the required dataset, we pass it for the face detection purpose. For face detection, here we are using MTCNN (Multi-Task Convolutional Neural Network). MTCNN does both face detection and face alignment and the process consists of three stages of convolutional networks that are able to recognize faces and landmark location such as eyes, nose and mouth. The MTCNN will detect the faces from the given images and extract the features from the faces and convert them into unique arrays. Then those extracted features will be stored in separate files for each students with their name as file name. Then FaceNet model should be loaded into the system and it will be trained with the extracted features of each students. Get two images from each student's dataset for testing and test those images with the FaceNet model. The FaceNet has an accuracy of about 99.63 %, which makes this system more accurate. FaceNet takes an image of the person's face as input and outputs a vector of 128 numbers which represent the most important features of a face which is called as an embedding. The FaceNet transforms the face image into 128-dimensional vectors and place it in the Euclidean space and the model thus created is trained for triplet loss to capture the similarities and differences on the image dataset provided. Finally the SVC (Support Vector Classifier) algorithm is used for the classification of each trained model.

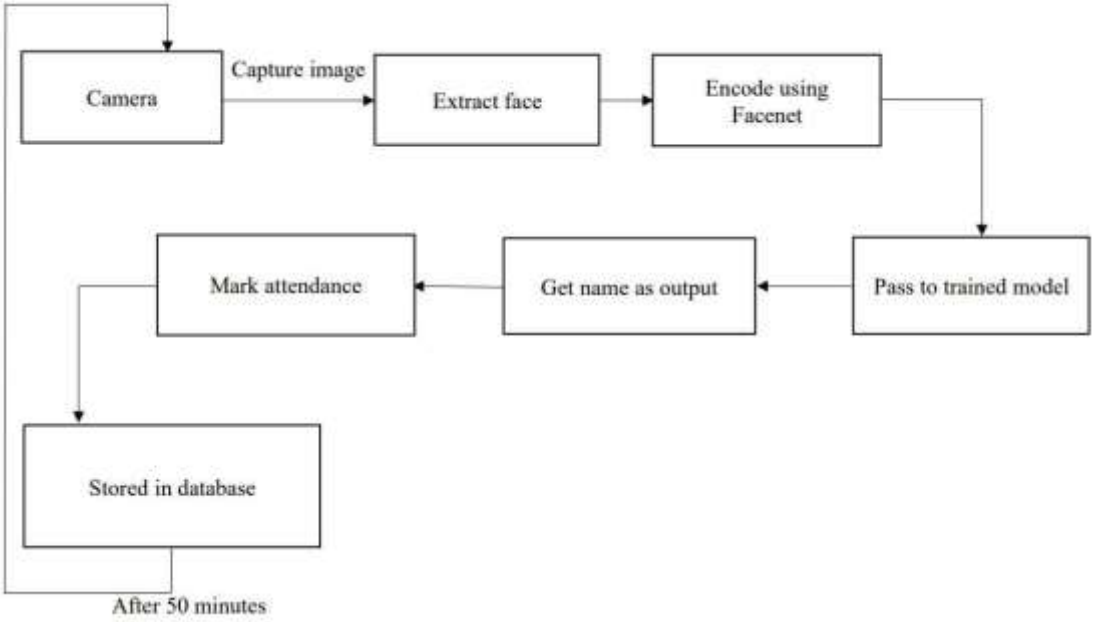

Figure 2: Steps of Prediction Phase

A camera will be placed in the classroom, which will capture an image that containing all the students that present in the classroom, in a regular interval. From the captured image, faces of each student will be extracted and then they are encoded with the FaceNet model. The result will be passed to the trained model for comparison and determining the corresponding student. Then we get the names/roll.no of the corresponding students as the output for marking attendance, which will help us to mark the attendance of the students. The recorded attendance will be stored in the database, which the teacher can later access by logging in through the website. Here a regular time interval of 50 minutes is set to continue the process for each class hours.

IV. CONCLUSION

The proposed automatic attendance marking system using FaceNet is a great model for marking the attendance of students without the intervention of teacher. This system also assist in overcoming the chances of proxies and occurrence of error in attendance marking. In recent years, a large number of systems using biometrics become popular, among them, the facial recognition turns out to be a viable option because of its high accuracy along with minimum human intervention. This system is aimed at providing a significant level of security and reducing manual errors.

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