Face Recognition Based Attendance Management System

Swathy Rani M S[1], Prof. Neelima P[2] and Dr. Mahalekshmi T[3]

Student, Final Year Master of Computer Application[1]
Assistant Professor, Master of Computer Application[2]
Principal, Sree Narayana Institute of Technology[3]
Sree Narayana Institute of Technology, Kollam, Kerala

Abstract: *Attendance is considered as an important factor for both the student as well as the teacher of an educational organization. Attendance of students in a large classroom is hard to be handled by the traditional system, as it is time consuming and has a high probability of error during the process of inputting data into the computer. This paper proposed Automated Attendance System (AAS) it is a process of automatically estimate the presence or the absence of the student in the classroom by using face recognition technology. Face recognition-based attendance system is a process of recognizing the students faces fast and precisely in images or videos for taking attendance, that are being captured through a surveillance camera, so it becomes highly reliable for the machine to understand the presence of all the students in the classroom and mark the attendance by recognizing the person. The concept to be implemented here is Deep Learning. It helps in conversion of the frames of the video into images so that the face of the student can be easily recognized for their attendance and maintains a record of those collected data.*

Keywords: Face Detection, Face Recognition, Deep Learning, Convolutional Neural Network (CNN).

I. INTRODUCTION

Attendance is one of the important aspects in the classroom. At the beginning and ending of the section, the teacher should check out the students presence in the class generally teachers take the attendance and note done in the register, but it may appear that miss someone and students any give attendance multiple times.[2]So, we use the concept of machine learning in Face Recognition Based Attendance System. In this project, we perform the face recognition and face detection algorithms, to provide the computer systems the ability of finding and recognizing human faces fast and precisely in images or videos so that the systems can used in giving attendance. The objective of this project is to develop face recognition based automated student attendance system. Our primary goal is to help the lecturers, improve and organize the process of track and manage student attendance and absenteeism. Face detection is used for many applications for the identification of human faces in digital images or video. It is defined as specific case of object-class detection; where it is used to find the locations and sizes of all objects in an image that belong to a given class. The technology is can be able to predict frontal or near-frontal faces in a photo, regardless of orientation, lighting conditions or skin color. In recent years CNN's (convolution Neural Networks) have made significant breakthrough in an image classification. Face Recognition is a form of biometric software that maps an individual's facial features mathematically and stores the data as a face print. The software consists of Deep Learning algorithms to compare a live capture or digital image to the stored face print in order to verify an individual's identity.

II. BACKGROUND

Technologies used in this project:
- **Tkinter** is the standard python interface to the Tk GUI toolkit shipped with Python. Python when combined with Tkinter provides a fast and easy way to create GUI applications. It is famous for its simplicity and graphical user interface. Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit. Tkinter is an acronym for "Tk interface". It is open-source and available under the Python License.[1]

- **Anaconda** is a free and open-source distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aims to simplify package management and deployment. The distribution includes data-science packages suitable for Windows, Linux, and macOS. It is developed and maintained by Anaconda, Inc., which was founded by Peter Wang and Travis Oliphant in 2012. Package versions in Anaconda are managed by the package management system conda. This package manager was spun out as a separate open-source package as it ended up being useful on its own and for other things than Python. There is also a small, bootstrap version of Anaconda called Miniconda, which includes only conda, Python, the packages they depend on, and a small number of other packages.

III. EXISTING SYSTEM

A) How it Actually Works

Existing system is a manual entry for the students. Manual Student Attendance Management system is a process where a teacher concerned with the particular subject need to call the students name and mark the attendance manually. Here the attendance will be carried out in the hand written registers. It will be a tedious job to maintain the record for the user. The human effort is more here. The retrieval of the information is not as easy as the records are maintained in the hand written registers.

B) Drawbacks of the Existing System

- Manual attendance may be considered as a time consuming process
- Sometimes it happens for the teacher to miss someone or students may answer multiple times on the absence of their friends.
- More manpower is required
- It is difficult to maintain a database or register in manual system.

IV. PROPOSED SYSTEM

The task of the proposed system is to capture the face of each student and to store it in the database for their attendance. The face of the student needs to be captured in such a manner that all the feature of the students' face needs to be detected, even the seating and the posture of the student need to be recognized. There is no need for the teacher to manually take attendance in the class because the system records a video and through further processing steps the face is being recognized and the attendance database is updated.
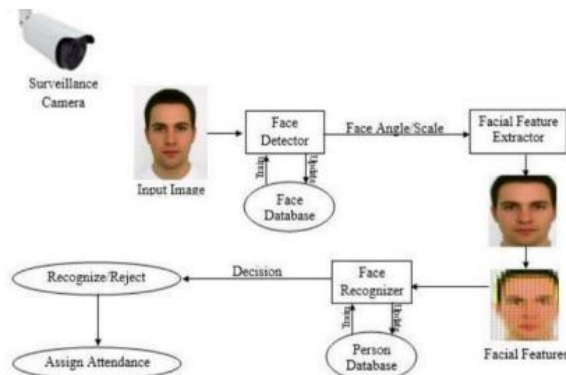
A) Description

The proposed system aims to overcome the pitfalls of the existing systems and provides features such as detection of faces, extraction of the features, detection of extracted features, and analysis of students' attendance. The system integrates techniques such as image contrasts, integral images, color features and cascading classifier for feature detection. The system provides an increased accuracy due to use of a large number of features (Shape, Color, LBP, wavelet, Auto-Correlation) of the face.

The system is tested for various use cases. We consider a specific area such as classroom attendance for the purpose of testing the accuracy of the system. The metric considered is the percentage of the recognized faces per total number of tested faces of the same person.[4] The system is tested under varying lighting conditions, various facial expressions, presence of partial faces (in densely populated classrooms) and presence or absence of beard and spectacles. An increased accuracy (nearly 100%) is obtained in most of the cases considered

B) Methodology

- Record a video to ensure that every student is appeared in the video.
- Separate a frame per minute for class attendance.

- Apply deep learning algorithm CNN for face detection module. Detect all students' faces and output coordinates.
- Apply deep learning face recognition algorithm for face recognition.
- Automatic attendance analysis module. The seats of students are fixed so do not contrast their faces' coordinate and determine the identity of each student to achieve automatic attendance.
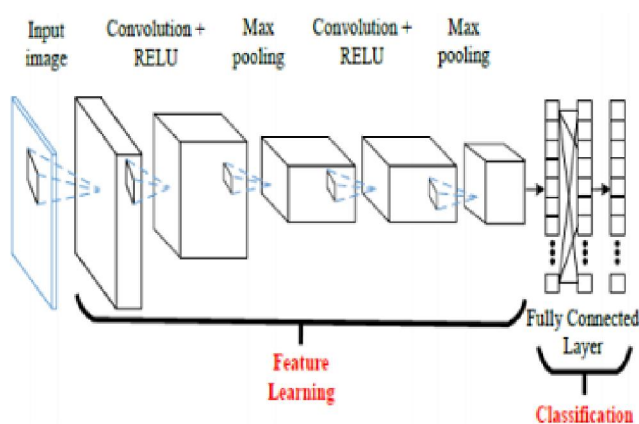

C) Advantages

- Less Time Consuming
- Less Paper work
- More flexible than existing system
- Detection of unique face image amidst the other natural components such as walls, backgrounds etc.
- Extraction of unique characteristic features of a face useful for face recognition.

D) Algorithm Used
a) CNN Algorithm

A Convolutional Neural Network is a deep neural network (DNN) widely used for the purposes of image recognition and processing and NLP. Also known as a ConvNet, a CNN has input and output layers, and multiple hidden layers, many of which are convolutional.[3]A CNN uses a system like a multilayer perception that has been designed to process the requirements faster. The CNN layer consist of an input layer, an output layer and a hidden layer that includes multiple convolution layers, pooling layers, fully connected layers, and normalization layers.[5] The removal of limitations and increase in efficiency for image processing results in a system that is far more effective, simpler to trains limited for image processing and natural language processing.

V. RESULTS AND DISCUSSIONS
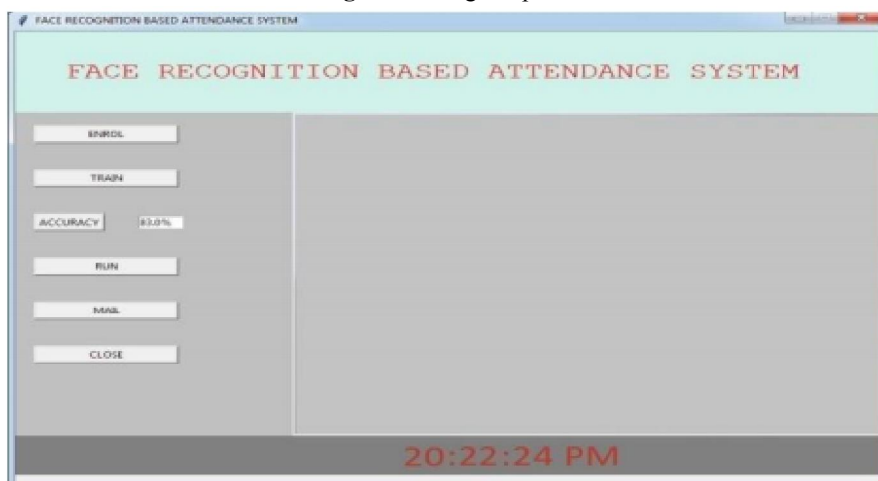

Figure 1: Image Capture

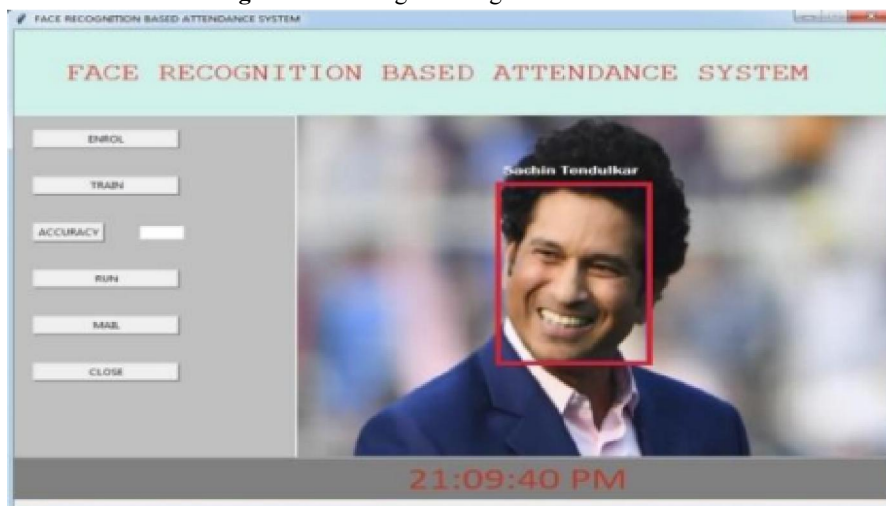**Figure 2:** Training the Image for face detection
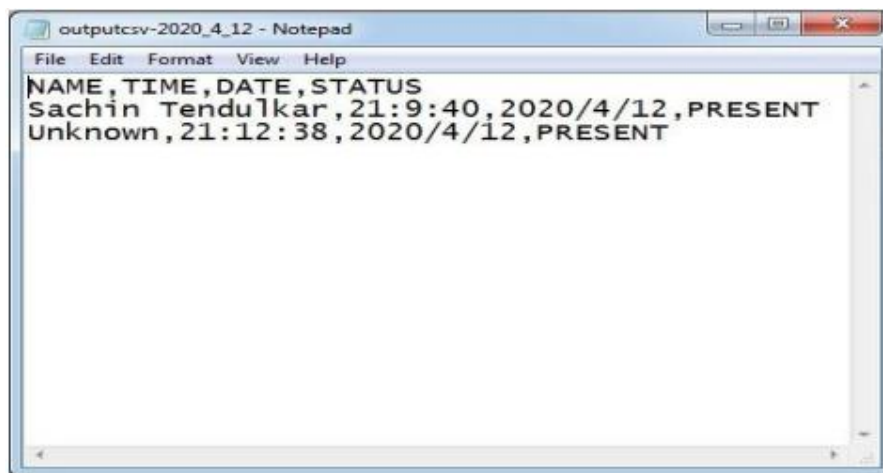

Figure 3: Recognize the face

Figure 4: Attendance Marking

VI. CONCLUSION

The main purpose of this project is to build a face recognition-based attendance monitoring system for educational institution to enhance and upgrade the current attendance system into more efficient and effective as compared to before. Face recognition provides nonintrusive way to recognize a person. The Automated Classroom Attendance System helps in increasing the accuracy and speed ultimately achieve the high-precision real-time attendance to meet the need for automatic classroom evaluation. This system helps to avoid the fail proof of attendance system and this system works as the substitute for the all existing systems i.e. Radio Frequency Identification and all other bio-metric systems. Automated Attendance Systems based on face recognition techniques thus proved to be time saving and secured. [6] This system can also be used to identify an unknown person whether he is related to the organization or not. The purpose of reducing the errors that occur in the traditional attendance taking system has been achieved by implementing this automated attendance system.

REFERENCES

[1]. Alan D. Moore, "Python GUI Programming with Tkinter" – May 2018

[2]. Kalachugari Rohini, Sivaskandha Sanagala, Ravella Venkata Rathnam, Ch.Rajakishore Babu ,"Face Recognition Based Attendance System For CMR College of Engineering and Technology", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-4S2 March, 2019

[3]. R. Girshick, "Fast R-CNN," in IEEE International Conference on Computer Vision (ICCV), 2015

[4]. T. Kanade, Computer Recognition of Human Faces. Basel and Stuttgart: Birkhauser Verlag 1997

[5]. Nandhini R, Duraimurugan N, S.P.Chokkalingam, "Face Recognition Based Attendance System", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-8, Issue-3S, February 2019

[6]. K. Wong, H. Law, and P. Tsang, "A System for Recognising Human Faces," Proc. ICASSP, pp. 1,638- 1,642, 1989.