Attendance System using Machine Learning

Ruzda Ansari, Uzma Bagwan, Ghazala Khan
Students, Department of Information Technology
M. H. Saboo Siddik college of Engineering, Mumbai, Maharashtra, India
ruzda.6118003.it@mhssce.ac.in, uzma.6118007.it@mhssce.ac.in, ghazala.6118018.it@mhssce.ac.in

Abstract: *In many of the educational institutions, managing attendance of students/candidates is tedious, as there would be large number of students in the class and keeping track of all is onerous. There are situations where student act as proxies for their friends even though they are not present. This system, which is based on face detection and recognition algorithms, spontaneously detects the student when he enters the class room and marks the attendance by recognizing him. The database is then modified or updated automatically. This reduces time and effort of manually updating the attendance. This system also provides authentication using recognition of face of the admin or teacher to unlock as there are chances of trespassing by the third party. So this rises the security of the system.*

Keywords: Attendance system.

I. INTRODUCTION

Generally, in the classroom the attendance was taken by the teachers manually at the beginning and ending of the class. The problem with this approach is that it requires some time to take and also the manual process will have chances to make mistakes in most of the cases. To overcome that problem, RFID (Radio Frequency Identification) was introduced in the past years. But those are also having the fail proof of attendance system. So, we are introducing the concept of Face Recognition Based Attendance system, the main objective the proposed system is to allot attendance to the students using face recognition-based algorithms to achieve fail proof attendance system. 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. Face Recognition is a form of biometric software that maps an individual's facial features mathematically and stores the data as a faceprint

Faces are made of thousands of fine lines and features that must be matched. The face recognition using Python is used to break the task of identifying the face into thousands of smaller, bite-sized tasks, each of which is easy to face Recognition Python is the latest technology in Machine Learning techniques. OpenCV utilizes Machine Learning algorithms to search for faces within a picture.

II. LITERATURE SURVEY

2.1 Research Paper 1

Online Attendance System using Machine Learning Algorithms Authors: Amulya R, Jahnavi S, Trupthi B V, Divya P, Kalpitha N Year of publishing: 2018.

Technology has developed by Artificial Intelligence lab, which can recognize faces with up to 97.3% accuracy, which are 2.7 less accurate than humans. Facial recognition is something weve evolved to do.

The main aim is to build a system which can mark attendance of many number of students at a time, or within a single capture to spot and mark attendance of students in a group irrespective of background.

Methodology: This was achieved by using machine learning and python. We also have authentication step which makes system only accessible for authorized users. This protects the system from trespassers operating it. And detection of face is done using haarcascade algorithm and OpenCV. The software measures a various features of face. Each code uses different nodal points and collects different measurements. This data is converted into a formula which represents unique facial signature. And that face is compared to a known faces in a database. Hence the attendance is marked into an any freeware

Impact Factor: 6.252

2.2 Research Paper 2

Attendance Monitoring using Face Recognition and Machine Learning Authors :Alankar Patil, Priya K. P, Prajwal More, Aniruddh Joshi4 , A. R. Kamble Year of publishing:2018

A system has been proposed called automated attendance management system that uses face recognition method gives solution to the faculty thereby reducing the burden in taking attendance. The system used to calculate attendance automatically by recognizing the facial dimensions. An efficient face recognition based attendance system has been developed by improving the efficiency of the system and also for the secured attendance.

Methodology: Attendance will be monitored by the face recognition algorithm by recognizing only the face of the students from the rest of the objects and then marking the students as present. The system will be pre feed with the images of all the students enrolled in the class and with the help of this pre feed data the algorithm will detect the students who are present and match the features with the already saved images of the students in the database. Keywords – Face Detection, Face Recognition, Viola-Jones, LBPH.

2.3 Research Paper 3

Face Recognition Based Attendance Management System Using Machine Learning Authors: Anju V Das, Anjana Shyju, Thomas Varghese, Nisha Mohan P M Year of publishing: 2019

The purpose of reducing the errors that occur in the traditional attendance taking system has been achieved by implementing this automated attendance system using deep learning. Face recognition system have been presented using deep learning which exhibits robustness towards recognition of the users with accuracy of 98.3% and result is converted into a PDF.

Methodology: This system uses face recognizer library for facial recognition and storing attendance. It has a camera that captures input image, an algorithm to detect a face from the input image, encode it and recognize the face and mark the attendance in a spreadsheet. The system camera of an android phone captures the image and sends it to the server where faces are recognized from the database and attendance is calculated on basis of it.

2.4 Research Paper 4

Machine Learning Based Automated Attendance System Authors: Joshan Athanesiousa Vanitha.Adithya bC. Anirudh Bhardwaj Jagat Singh Lamb A. V. Vaidehi Year of publishing: 2020

This paper proposed the this system; which keeps track of students attending a particular class with the help of a continuous stream of pictures captured from a video streaming device located inside a classroom connected to the remote server.

Methodology: The proposed method reduces the amount of time spent by the faculty on taking attendance, and leads to a reduction in chaos inside a classroom. It handles the issues in existing systems such as multi-class identification for multiple individuals in a classroom, occlusion and differing light scenarios. The methodology compares the results of the state of art algorithms, and uses the best fit architecture which provides the lowest false rate on evaluation. There is no need of user interaction in the proposed method. Experimental results show that the proposed method gives 94.66% accuracy which is better than the other existing methods.

Table 1: Comparison of the above Research Papers

Research paper1	Research paper2	Research paper 3	Research paper 4
The main aim is to build a system which can mark attendance of many number of students at a time, or within a single capture.	The main aim is to gives a solution to the faculty thereby reducing the burden in taking attendance.	The main aim is reducing the errors that occur in the traditional attendance taking system.	The main aim is to avoid the presence of proxy attendance in a manual attendance.
Methodology used is each code uses different nodal points and collects different measurements. This data is converted into a formula which represents	Methodology: Attendance will be monitored by the face recognition algorithm by recognizing only the face of the students from the rest of	Methodology used in this system is It has a camera that captures input image, an algorithm to detect a	This system uses DPAAS method.The DPAAS methodology compares the results of the state of art algorithms, and uses the

unique facial signature. And that face is compared to a known faces in a database.	the objects and then marking the students as present.	face from the input image, encode it and recognize the face and mark the attendance in a spreadsheet.	best fit architecture which provides the lowest false rate on evaluation. There is no need of user interaction in the proposed DPAAS.
The system gives 97.3% accuracy, which are 2.7 less accurate than humans.	The system gives 93.38% of accuracy.	The system provides 98.3% of accuracy and result is converted into a PDF.	DPAAS method gives 94.66% accuracy which is better than the other existing methods.
Advantage: Authentication step which makes system only accessible for authorized users. Disadvantage: 97.3% accuracy, which are 2.7 less accurate than humans.	Advantage The system will be pre feed with the images of all the students enrolled in the class and with the help of this pre feed data the algorithm will detect the students. Disadvantage: The System gives 93.38% accuracy.	Advantage: Attendance mark on excel sheet it can be downloaded anytime. Disadvantage: The system is compatible only with android phones.	Advantage: It selects best algorithm which has lowest false rate. Disadvantage: The methodology compares the results of the state of art algorithms, and uses the best fit architecture which consume time.

III. METHODOLOGY

3.1 Proposed Work

The teacher will be provided with a login ID and password. After logging in, the teacher will be directed to a dashboard. The dashboard consists of the following windows, student information, attendance information, student photos, image training, face recognition system for attendance, developer information and a chatbot.

On the student information page, the student's information is entered along with his or her image dataset. The images are saved in the student photos section. The dataset is then trained in the image training section. The attendance is taken on clicking on the facial recognition window and finally the attendance is recorded and displayed on the attendance information page.
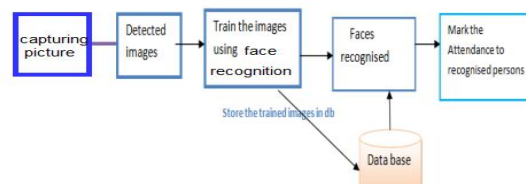

Figure 1: Block Diagram for Face Recognition and Marking Attendance

3.2 Algorithm

A. Library: OpenCV library

OpenCV is a Library which is used to carry out image processing using programming languages like python. This project utilizes OpenCV Library to make a Real-Time Face Detection using your webcam as a primary camera.

B. Face Detection: Haar Cascade

The HAAR cascade is a machine learning approach where a cascade function is trained from a lot of positive and negative images. Positive images are those images that consist of faces, and negative images are without faces. In face detection, image features are treated as numerical information extracted from the pictures that can distinguish one image from another. We apply every feature of the algorithm on all the training images. Every image is given equal weight at the starting. It founds the best threshold which will categorize the faces to positive and negative. There may be errors and misclassifications.

We select the features with a minimum error rate, which means these are the features that best classifies the face and non-face images.

C. Face Recognition: Linear Binary Pattern Histogram

LBPH (Local Binary Pattern Histogram) is a Face-Recognition algorithm it is used to recognize the face of a person. It is known for its performance and how it is able to recognize the face of a person from both front face and side face.

The LBPH algorithm typically makes use of 4 parameters:

- Radius: The distance of the circular local binary pattern from the center pixel to its circumference and usually takes a value of 1.
- Neighbors: The number of data points within a circular local binary pattern. Usually, the value of 8.
- Grid X: The number of cells in the horizontal plane, is usually a value of 8.
- Grid Y: The number of cells in the vertical plane, is usually a value of 8.

Given the above-mentioned parameters, LBPH works as follows;

A data set is created by taking images with a camera or taking images that are saved, and then provisioning a unique identifier or name of the person in the image and then adding the images to a database.

It is recommended to take many samples from a single individual. A portion of the data set is used for the training of the algorithm, while the rest is used for testing.

Using a circular neighborhood concept (which takes non-integer pixel points around a selected area), the number of appearances of LBP codes in the image is put together to form a histogram.

The classification is then carried out through the calculation of the basic similarities of the histograms under comparison.

This histogram contains a description of an individual at three different levels: at a pixel-level, labels are combined in a small area to create a regional level, the regional histograms in combination build a general description of the person.
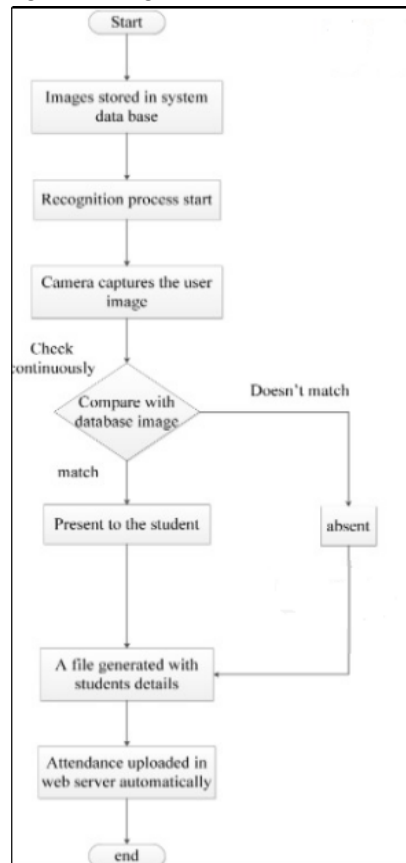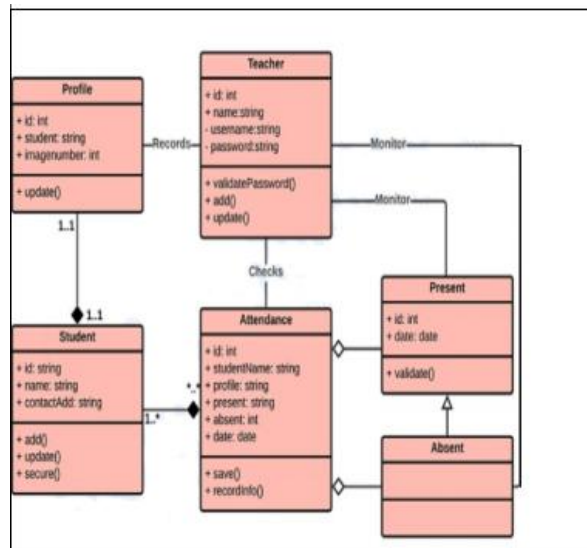

Figure 2: Work Flow
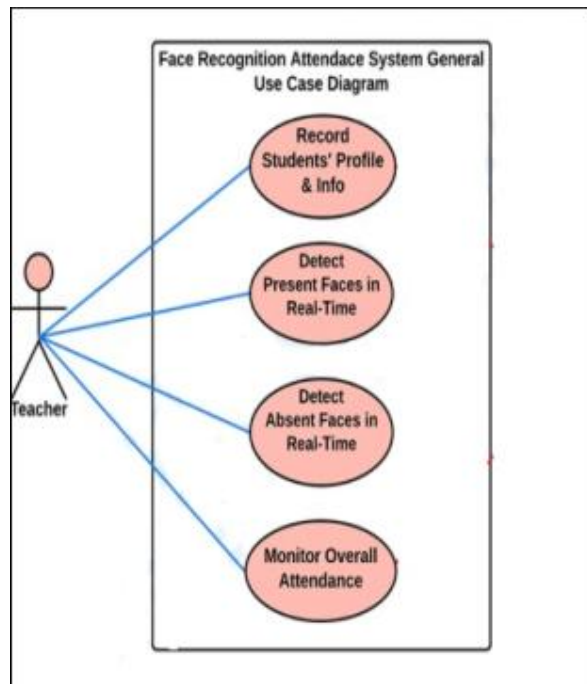
Fig. 3: Class Diagram

Fig. 4: Use Case Diagram

IV. CONCLUSION

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. It saves the time and energy in the aspect of taking attendance. Automated Attendance Systems based on face recognition techniques thus proved to be time saving and secured. This system can also be used to identify an unknown person whether he is related to the organization or not.

ACKNOWLEDGEMENT

REFERENCES

[1]. Amulya. R , Jahnavi. S, Trupthi. B .V , Divya. P, Kalpitha N, Online Attendance System using Machine Learning Algorithms, 2018

[2]. Alankar Patil, Priya K. P, Prajwal More, Aniruddh Joshi#4 , A. R. Kamble, Attendance Monitoring using Face Recognition and Machine Learning, 2018

[3]. Anju V Das, Anjana Shyju, Thomas Varghese, Nisha Mohan P, MFace Recognition Based Attendance Management System Using Machine Learning,2019

[4]. Joshan Athanesiousa Vanitha.Adithya bC. Anirudh Bhardwaj Jagat Singh LambA.V.Vaidehi,Machine Learning Based Automated Attendance System, 2020