Degree – Bachelor of Technology

in ECE

Submitted to -

LOVELY PROFESSIONAL UNIVERSITY.

PHAGWARA, PUNJAB

TOPIC :-

Facial Authentication and

Attendance marking system

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Abstract: ------Face recognition is a widely used authentication technique for various uses like Attendance marking, Human computer interaction, Security access, E-learning, online proctoring etc. Here we use face recognition for marking attendance for large groups of people together in a classroom. Compared to other traditional attendance marking methods face recognition will provide better accuracy and prevents proxy attendance, but it is a complex and time consuming process when it applied to a group of people simultaneously. In this proposed system we are focusing on reducing the complexity of the group face recognition process by finding a suitable scenario which will improve the accuracy and reduce the time complexity. The human face attendance system is developing based on the current image recognition technology in order to detect the faces of the students in a classroom and mark attendance of the person if he or she is matched with the facial data in the given facial database. This HFR (human face recognition) system will independently mark the attendance of the students in a classroom without disturbing the teacher, so that the teacher can enhance their teaching role in different ways. The time can be saved by using the proposed system. The idea is developed by using an open CV.

Keywords— Human face recognition, face capture, Eigen values

I.INTRODUCTION

In today's world authentication plays an important role in many things like security etc. Now a days, facial recognition plays an important role in authentication. From the last few years, need for facial recognition has improved drastically Face recognition is now a days of high demand for both commercial as well as security purposes.

The image recognition framework is categorized into 2 kinds, feature based framework and image-based framework. In the primary framework, features are extracted from the eye, nose, mouth, and so on which are then combined mathematically to decide the connection between these features. While in the subsequent framework the image pixels are subjected to algorithms like Principal Component Analysis, wavelet change, and so on which is then utilized for image characterization.

Common techniques that aim to replace the said effort are to install RFID and fingerprint-based systems, which automate the process but simultaneously come with their own challenges namely,

- High installation costs
- Creation of disturbance during the lecture
- Waste of time • Chances of proxy
- Keeping a track of students who spend extra time outside the classroom
- No continuous surveillance etc.

Hence, making use of the recent developments in complex deep learning structures, and computer vision techniques, open cv, visual studio an improved system has been proposed that strongly addresses the aforementioned problems. Hence the proposed architecture presents the following advantages:

- Replacement of the professor's manual efforts

• Elimination of incorrect marking of students through proxy

• Omitting the need for a professor to track the students' presence in the classroom with the use of a constant monitoring system.

'Proxy': Refers to a student posing as someone else who is absent for the lecture, to grant them attendance.

[P.T.O]

II.LITERATURE SURVEY

They have given an idea of managing the attendance using finger print. In this system, a movable fingerprint device will be passed among the students and they will place their fingers on this device. So due to this, there will be a chance of procurator. This makes a disturbance in the classroom. It reduces the concentration ability of both teacher and student. It takes a lot of time in order to take attendance. A number of works related to Radio Frequency Identification (RFID) based attendance Systems exist in the literature.

The other work related to HFR is by Arulogun et al. Here, radio frequency Identity (RFID) is used. In this the students should carry the tags if they forgot to carry the tag they may lose attendance for the whole day and they can enter into the class easily by doing procurator.

There was a face recognition algorithm proposed by Lukas et al.,Here face recognition system but was implemented by taking more than one image of a same person which takes more space to store.

In the idea given by K. Okokpujie et al., GSM notifications are used to share data to user this makes more expensive user require GSM sim to receive result to use. Modified version of finger print verification is proposed by Saraswat et al., and Shoewu et al.

Regarding the attendance system a QR code based attendance was implemented but in this the procurator was proposed. Dey et al., gave an idea of speech niometric . They have related speech based biometric attendance and has developed in this system if a student is suffering from

any vocal cord problems. This will not recognize the voice so there will be no proper attendance.

Advantages, disadvantages, and major concerns of Face Recognition based Attendance

Advantages of Face recognition based attendance system

AI in Face recognition system provides its users with a simple, user-friendly, and easily manageable platform to maintain records of face templates. Here are a few advantages offered by this system that make things all the more convenient for the clients.

1. Automated system

Artificial intelligence-based attendance is an automated system, which makes it a lot easier to track employees' time. There is no need to keep an eye on employees during all their hours on the premises. This technology can accurately and quickly deliver the information about the attendance, absence, and overtime of every employee.

2. Time and cost-saving

This system can be beneficial in saving lots of time and money for companies. Since the face recognition system keeps automatic track of employees' working hours and access to various areas on the premises, companies won't have to employ an additional workforce to do this job.

The automated system also helps in preventing human error and keeps track of accurate hours.

3. Better security

Contactless biometric attendance face recognition system not only allows you to keep track of your employees' accurate working hours, but it also helps in improving and tightening existing security measures. Other than employees, you can also add the details of visitors that come to your premises from time to time. Any person who could not be found in the system will be denied access. A face recognition system can also provide evidence in case any untoward or illegal event happens and authorities come to investigate.

4. Touchless feature

The face recognition system does not need the person to touch any surface. For instance, in the current pandemic of COVID-19, it is important not to touch any surface which has not been sanitized before, as it might contain the virus and those who are touching it, might get infected by it. Using a **Touchless biometric attendance** face recognition system, employees won't have to touch any surface and they can enter and exit the premises in significantly less time. It will minimize the spread of the virus and also save a lot of time for employees.

5. Easy to install

It is easy to install facial recognition on **artificial intelligence-based attendance systems**. Companies can easily incorporate this software in your existing system and most of the applications can work seamlessly with it. The face recognition feature offers a hands-free procedure and also helps in maintaining hygiene and accuracy.

Disadvantages of Face recognition based attendance system

1. Breach of privacy

Using Face Recognition system enables the government authorities to sabotage the privacy rights of other people, especially in countries where privacy rights are not of great importance. Authorities can use the technology as they want and use it to spy on others. They can collect the data without people knowing about it and use it as they wish without the consent of the people involved.

Similarly, the police department can also use this technology to track criminals. But at the same time, they can use the same technology to track anyone at any place and at any time. They can detect the person from CCTV footage, smartphones, videos, social media posts, and other activities online. Indeed, it can be difficult to say if any data privacy can be maintained in the wake of the facial recognition system.

2. Biased performance

There is the possibility that facial recognition systems might not be able to identify women or people of color. Although many think it is just a misconception, some reports have emerged complaining about the same thing happening. This might occur as the problem after the first implementations, where the dataset is not very large and contains information with limited characteristics.

3. No so reliable

As per a study conducted by the Massachusetts Institute of Technology (MIT), facial recognition systems have done a lot of misidentifications. Some factors could lead the system in the wrong way, such as poor light, wrong camera angle, bad image or video quality, and more.

Major concerns with Face recognition based attendance system

1. No proper federal regulations

Face recognition is seeing a dramatic rise in demand. The market for this technology is growing exponentially. Based on a research report, the facial recognition industry could grow up to $7.0 billion by 2024 in the USA, mainly for surveillance and marketing purposes. However, lack of proper federal regulations is one of the major concerns for the citizens. They are worried about their privacy rights, lack of complete accuracy, and biased or misinformed results.

2. Misidentification

Many agencies and departments in law enforcement have begun to use a face recognition system to track criminals and perform other searches. However, since people are already concerned about the lack of complete accuracy in the results provided by this system, it can lead to misidentification. Authorities might convict the wrong person, which can be very damaging for that individual's reputation in society and could have harmful repercussions in the long run.

3. Violation of UN Human Rights

A human rights principle recognized by the UN is that surveillance should only be done when it is necessary and proportionate. It means that surveillance should only be done in case of serious crime rather than allowing others to interfere unwarrantedly in other liberty and fundamental rights. A **Face recognition based attendance system** allows the users to monitor others' activity at any time and any place. As a result, people are right to mistrust this technology and the intentions of those who are using it under the disguise of a nation's security.

4. Bad effect on citizens' participation in public events

Citizens' mistrust in this technology and the authorities' intention behind using it can lead to a lack of active attendance and participation in public

events such as political campaigns and protests. This can seriously put a hurdle on people's right to freedom, expression, and association.

5. Can be used to target others, more vulnerable sections of the structure

Facial recognition technology can be put to good use for people's security, monitoring, and tracking lawbreakers, recording employees' attendance and working hours, and a lot more. On the other hand, it can also be used to target certain sections of society in an attempt to bring them down. For instance, the usage of facial recognition software by agencies such as the US Immigration and Customs Enforcement (ICE) has been under heavy criticism. The agency has been severely censured for how it deals with the migrants.

III.RESEARCH METHODOLOGY

The functionality of this system requires various existing techniques which can be used with some modifications. The initial step to design and develop such a system needed R&D on face recognition system. For understanding the face detection dynamics the most important thing was to understand the functioning of the algorithms. The algorithm that we used to understand the basics of this system is the Eigen's face algorithm which helps to divide the face into smaller parts and helps at the time of authentication because it is easy to match small parts rather than a complete face. Through the implementation of the algorithm we were then able to track the faces of the student. Tracking can be done in three different ways:

1. Head Tracking
2. Facial feature Tracking
3. Complete Tracking

Through these types of tracking, we were able to get the exact structure of the face that is required for accurate outcome. Hand gestures and body movement also plays an important role in our system. We had various approaches for face recognition:

1. Approach based on multi-image
2. Approach based on single-image
3. Hybrid approach

We used the single-image based approach because approach can be used at various places while the multi-image approach can only be used in an advance lecture attendance system. For developing a system which depends on face recognition, we also need a database of some people and for that SQL queries are required.

The steps in saving the information to database and the recognition steps. The different phases involved in the process are

- Pre-process Image

The system will capture a single image of every individual's faces. This image will be converted into gray scale and stored in the database along with the student name and Roll number.

- Face detection

As soon as a student enters the class and shown his/ her face in front of the camera, the camera will place a frame over the face and convert the face into gray scale and submits to the next phase.

- Feature Extraction

The binary value of the previous phase will be used for feature extraction. Fisher face method is used for extracting the feature.

- Face Recognition

The face recognition is done by comparing the values obtained to the values stored in the database. In the event that the qualities are a match, at that point the face is perceived and the name related with that face is shown. The eigenfaces and fisher faces a holistic approach to face recognition. These algorithms take high-dimensional image space, the high-dimension is bad, so low-dimensional subspace is used.

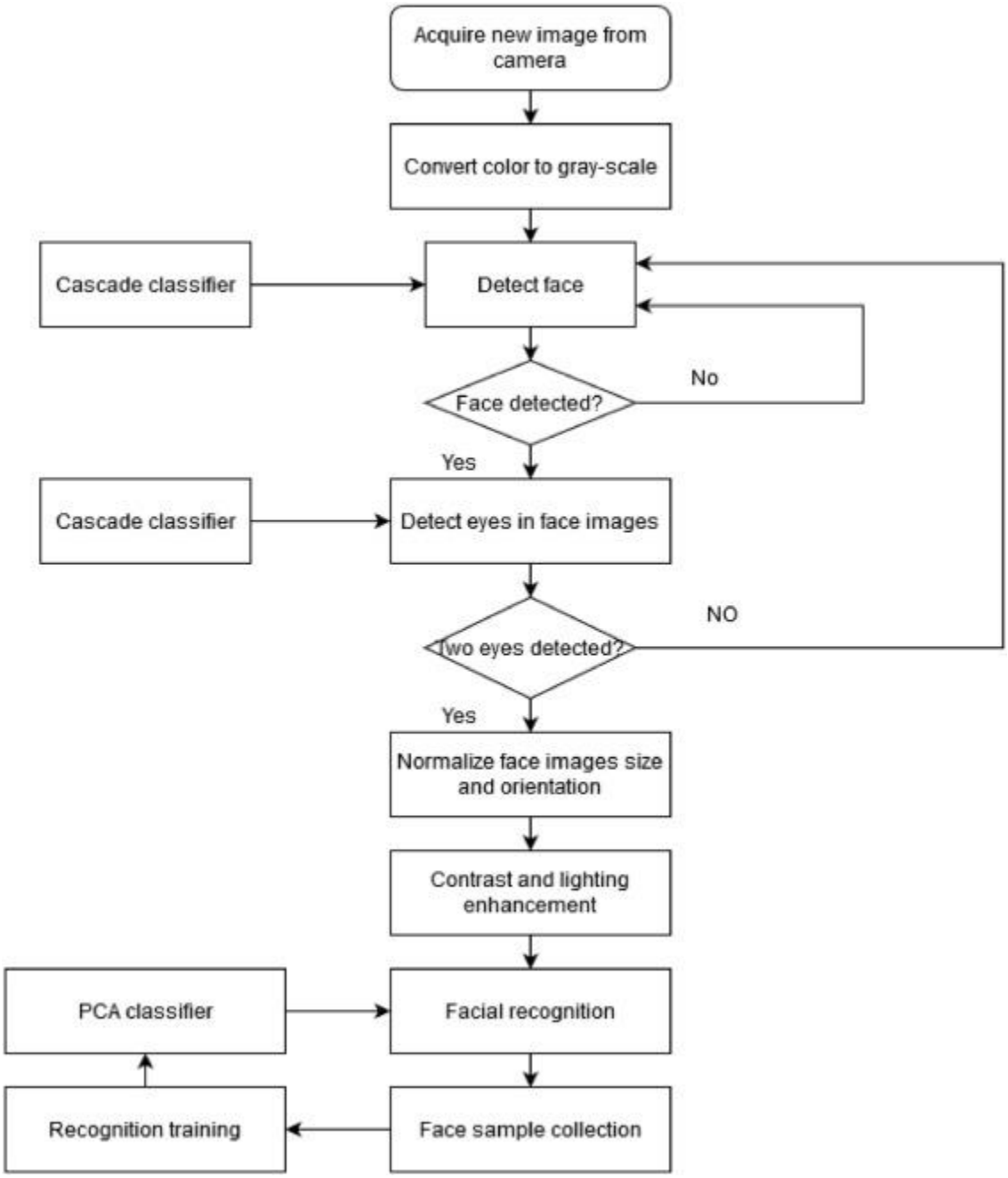

Fig.1: flow chart of face recognition

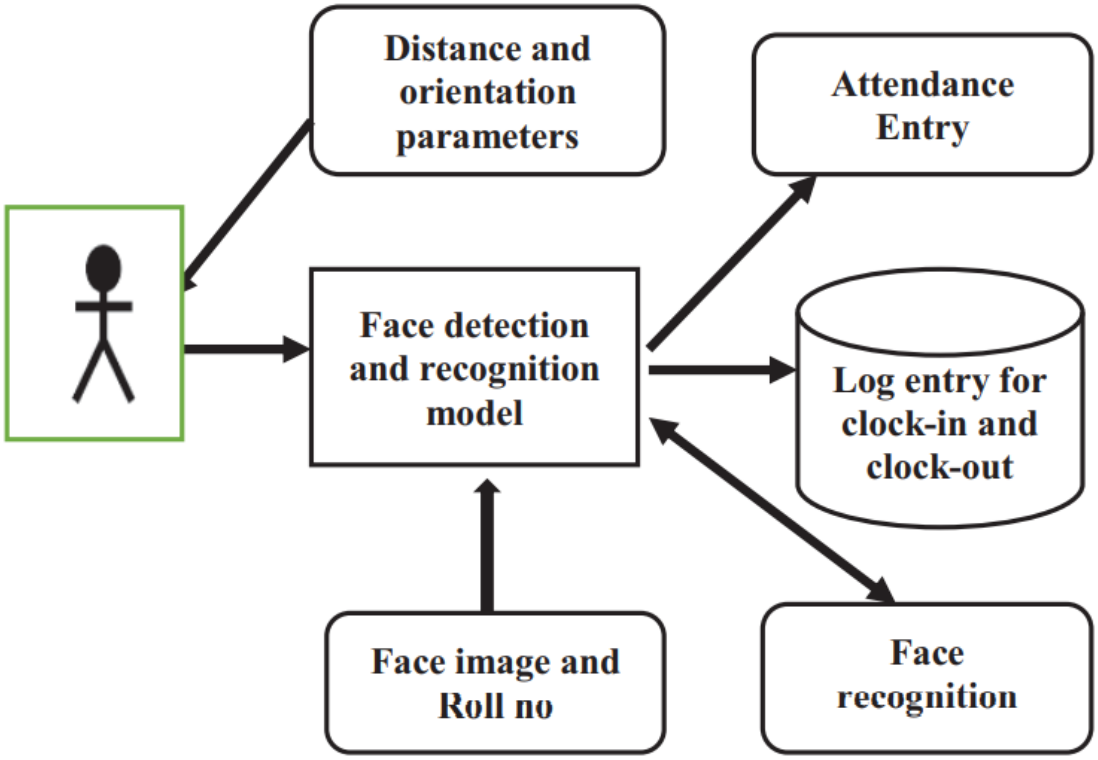

Fig.2 Model of Face detection

IV.LEARNING OUTCOMES

The OpenCV helps in recognizing the frontal face of the person and also creates XML documents for several areas such as the parts of the body. Deep learning evolved lately in the process of the recognition systems. Hence deep learning along with the face recognition together work as the deep metric learning systems.

The objective of face recognition is, from the incoming image, to find a series of data of the same face in a set of training images in a database. The great difficulty is ensuring that this process is carried out in real-

time, something that is not available to all biometric face recognition software providers.

V.CONCLUSION/FEATURE SCOPE

When we test the model in a classroom with a number of students this clearly shows the group attendance saves time and it helps the system to improve itself by handling more challenging scenarios like occlusion, low resolution faces. Currently student faces the camera while entering the class. It can be improved to fully automatic by using PTZ (pan, tilt and zoom) cameras. Also the face recognition model Resnet can be improved by training with more challenging face images in low light and resolution, which will improve the system accuracy.

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