Attendance System Based on Face Recognition

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Abstract- The Growing Interest of computer vision within the past decade. From a preferred computer vision is an area of research , it has been found that a complex problem of computer vision is rise above by face detection and recognition and it provide us one of the better and successful analysis the image of applications and unable to understand the algorithm. Because of the essential nature of the problem, In area of research computer science and computer vision make use of neuro-scientific and psychological studies. It mainly use for the purpose of processing the computer image that advances in nature and help us to understand the research that provide awareness that how our brain work and vice versa. Many developer have various purpose of making different applications for the users that can be access on different platforms which mainly work to analysis carefully the facial features of the person. This application based on computer vision which is an open source named as Intel's , OpenCV and framework.

I.   INTRODUCTION

The aim of this project is to have the easier interaction between the human and machine which will be used for the purpose of user authentication through face detection and recognition.By using the the web came of the machine the person will be detected and recognize and identify the person with its proper name;a custom screen which has the capability to detect the person who identified face look will be authenticated.The objectives is to provide the variety processor for detection algorithms that can be access on different platforms.The algorithms we used in that we analysis that around 95% of recognition rate is successful and about 3% are fail in detection.

I.1 Problem Definition:

From the last many years,the large area of research id computer vision,it has been found that a complex problem of computer vision is rise above by face detection and recognition and for image analysis it provide us one of the better and successful applications and unable to understand the algorithm.Because of the essential nature of the problem,In area of research computer science and computer vision make use of neuro-scientific and psychological studies.It mainly use for the purpose of processing the computer image that advances in nature and help us to understand the research that provide awareness that how our brain work.

The main problem of the face recognition is understand by :there will be either a picture or the videos is recorded that will verify and detect the faces of one or more person at a time and then store them in a specific database. Face recognition generally have two stages:

Face Detection when we search for a photo to detect a face,so for easier recognition the image is first cropped and then face will be extracted.Face recognition is process in which different faces are processed and detected and then stored those faces in a proper database,in order to identify that person. Since 2002, it is observed that there is a open-source framework of Intel's called as Opencv mainly used easy and better performance of face detection.These framework are use to detect the face with accuracy of 80-90% by the help of In-Build Detector of the person looking towards the camera.Usually it is hard to detect a face from different angles.Sometimes its happen due to improper brightness and occurance of shadow it become difficult to detect the face,or sometime the image can also be blue, etc.

Face recognition: It has been found that face detection is much more better than face recognition, that has accuracy of around 30-70% normally.It was observed that research is a strong field of face recognition from 1990s,but still there is need of improved method which can be used for user authentication.

As we all know that every year new and advance technology's are been developed rapidly. There is the method which is called Eigenface that is the simplest method which is use to recognize a face accurately, but there are different kinds of (much more complicated) methods and multiple methods of combine form are used which are more complicated but provide little more accurate.

OpenCV was launched by Gary Bradsk during 1999 which is consider as Intel and the purpose was to make a research on computer vision which is based on applications of communication in the world and, As the demand of Intel increase,it give rise to the application which make the computer more powerful.Intel's provide library of computer-vision which are open-source which is mainly used for programming to simplify computer-vision. It is also improved by using advanced feature - face detection, face tracking, face recognition,by using various kind of filters, and methods of artificial-intelligence (AI) of different forms.Including that, it provides various type of basic algorithms and APIs of computer-vision.

There are various advantage of OpenCV, it provide framework for different platform; it also supports Windows, Linux, and Mac OS X. OpenCV has so many abilities that can be found at first site in different forms.In order to have a good result by the use of Opencv one should have a better understanding of different kinds of methods used Fortunately, we only need to know some selected form of it work.OpenCV's have various functions that is use to recognition the facial expressions of different modules.

1.2. Proposed Solution

When we consider and concent the image quality,There are more than enough parameter that effect the system's performance. In order to standardize the images it become necessary to make use of various type of pre-defined image processing so that you support a system of recognize a face.There are various type of algorithm which are use for face detection and they are sensitive in nature and trained light in condition in such a manner in which condition is given that you have to recognize a person in a dark room, it is difficult to recognize them in a lighted room, etc.therefore we say that the algorithms use for face recognition are sensitive in nature.

There is a problem that is called as "lumination dependent", and there are various type of issues related to this, such as one should put the face in a fixed direction in front of the camera, (such as pixel coordinates of the eyes should be same), by making fixed size, different angle, hair and makeup, feelings (smiling, angry, etc), lights direction(to the left or above, etc).so therefore it is required to make a proper use of pre-defined filters for good image for face recognition.One should consider few more things like remove the pixels around the face which aren't needed, in the form of rectangle which lie inside the rectangular box which will be use to only show the face region, not will not show hair and other image background.

OpenCV make a use of variety of face detector which is called a Haar Cascade classifier. It will first capture an image,that will be brought from any file or can come from video and the face recognizer will examines each and every image path and then classify it weather it is "Face" or "Not Face."
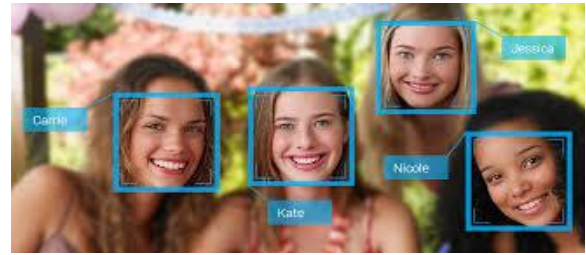

Fig. 1: Samples of the FER-2013 emotion dataset [4].

II.   SYSTEM OVERVIEW

Our experiment is to make simple attendance monitoring system for any institution. For this we require a system that can match faces and mark presence for right person. We are incorporating these features in our system using face detection and recognition technique. face detection system works on the presence, ,location, scale and also on orientation of faces if any face is present in either image or video. it is designed to fulfill the objective of detecting the presence of faces regardless of some of complex attributes such as gender, age, facial hair and many more. next one is face recognition which is desgined to match the unknown face amongst various known faces. it is desgined to know if face matches or not .the working principal behind this is comparison and predicting potential matching while leaving some complex attributes.

III.   RELATED WORK

With the help of face detection we are going to determine where the face is, its coordinates and location or in other words we can say that it distinguish faces from non faces objects. recognition is done just to have a identity of any person whose face is shown in an picture.for this we need to maintain database of known faces.if we talk about face recognition algorithm, eigenfaces is algorithm which uses PCA technique. this technique helps us to reduce the dimensions and to get better result .The basic of PCA approaches mainly carry two stages namely classification and training. if we talk about training phase, here face images are mapped on eigenspaces. In classification phase, on same eigenspaces the input face is projected and hence classified by an appropriate method.let us see some earlier work done for monitoring attendance and what were consequenses:

3.1 Fingerprint Based recognition system: In this system, we have to configure a hardware device with the students fingerprint i.e. portable fingerprint device .this system works in following manner. either before lecture or during the lecture the students have to record fingerprint on the configured hardware device so the attaendance for the day is recorded. only disadvantage is that if it also recors attendance during day time then it may cause distraction.

3.2   Radio Frequency Identification Based recognition system: for RFID based attendance monitoring system, students have their identity card which has Radio frequency in them, then each student will put their RFID card in front of card reader to record their

presence in Institution. This system is capable of recording attendance to saved databases. the limitation is that fraud access may occur because it may happen that student carry someone else's card to show that they are present while they are absent.

3.3 Face Based Recognition System: This technology we are going to use in our system. for using this technology we requires a high resolution digital camera for recording attendance.The student face will be detects and recognizes,then the image of students face get store in database will be recognized by the machine after comparison.attendance is marked only when only then and calculation is also done and if it is unable to mark students attendance then the database will store the image as new one.

IV. THE PROPOSED FRAMEWORK

The main purpose of this system is to capture the face of every student in order mark the attendance of student which will be stored in database. The captured picture show be maintain in such a way that student every feature can be recognized,it should bother the posture of the body while detecting the student.In this system teacher need not to mark the attendance of every student manually,here automatically a video will play that will recognize the student by performing the further processes to detect and store that in database

4.1 Software Implementation :

when we talk about the software implementation first we need to take the input for the processing purpose and that will be taken with the help of webcam,in which a video will capture the input and processing will be done on that input by using the python library Opencv that will analysis video.If any person is detected in the video then Opencv will process and create a sketch by the detected face coordinates.The generated sketch will be compared with the captured images which are stored in frame.The process of detection of face is explained in following steps:

a) Basically here we are using classifier for the analysis purpose,firstly we will activate the webcam and capture the use image.
b) The capture image will be stored in frame and displayed.image will be stored for temporary memory in certain location
c) An external window is also created to display the captured frame and make use of RGB color codes.
d) We can perform the read and write operation on the stored image.
e) To take the input,video capturing will be used which will make use of opencv for further processing of the input..
f) Make use of Haar Cascades for face detection,by using cascades classifier which analysis the face by multiple scales.

g) For image processing,the things we need to perform are detect the face,cropping the image,Resize the image,Normalize the image,and save it.

Capturing Video with Opencv :

OpenCV work well by using the video that will capture the image of persn and work to further to recognize them :
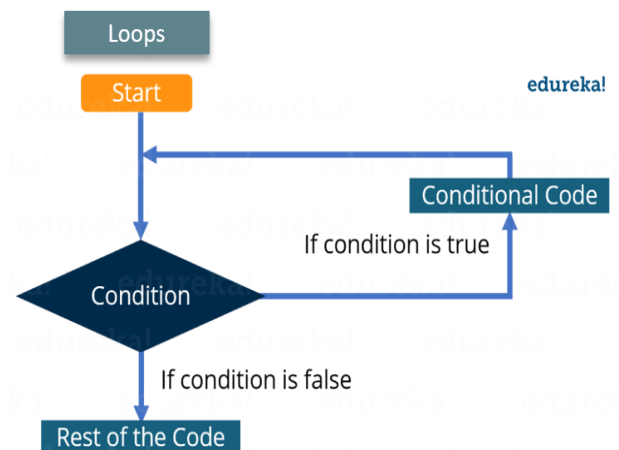
Fig,2 Flow Chart

Capturing Video:

In this method we make use of a library that is OpenCV in which usually a method is needed named as Video Capture that generate the objects for Video Capture.This type of method make use of machine camera In which there are different parameters used in program that will decided whether to use external camera or machine camera.   And at last, to release a camera we need to use a method called released method that work within milliseconds or will mention time limit.

4.2 Preparing the data:

CSV is the simplest platform-independent approach . However, we have to contain the entire files of CSV in a specific format to follow which is given below in sequence.

4.3 Eigen faces:

The representation of image carry some problem that the images we have given are always in high dimensionality. Two-dimensional grayscale can be represented as pXq as an image m=pXq- the image of pixels 100x100 whose vector space dimensional,is of order 10,000 with different range of image space. The thing that arises:every dimensional we have are same importance.It will take,if any kind of decision is needed to distinguishing features in data of images we have, so what we are looking for are the most distinguishing attributes which determines how one image is different from other.. The Principal Component Analysis (PCA) that we study in Artificial Intelligence was launched by Karl Pearson (1901) and Harold Hotelling (1933) to reduce a large number of attributes

available to us into set of small number of attributes because these are crucial and without them it is not even possible to distinguish. Reduced attributes will always be subset of large subset. Smaller number of attributes are easy to handle. The basic idea behind it is that dataset which is high dimensional is described by variables which almost very similar i.e. (attributes have not distinguishing features) and that's why various type of information is exchanged by using account which are dimension of meaningful. Principle components is a method which is called as PCA,which is mainly used to detect the data of variance difference.

4.4 Algorithm Used:

1. We will calculate the mean μ

$$\mu = \frac{1}{n} \sum_{i=1}^{n} x_i$$

2. After mean we will calculate the Covariance Matrix *S*

$$S = \frac{1}{n} \sum_{i=1}^{n} (x_i - \mu)(x_i - \mu)^{T}$$

3. With the help of covariance matrix eigenvalues λ_i and eigenvectors v_i of S are calculated.

$$Sv_i = \lambda_i v_i, i = 1, 2, \ldots, n$$

4.We will arrange eigen values in order of ascending eigenvalue is arranged in descending order in terms of eigenvectors. I t is found that k principal components which were calculated are the eigenvectors which is used to find the k largest eigenvalues. The observed vectors of PCA are:

$$5. y = W^{T}(x - \mu)$$

Value given by

$$W = (v_1, v_2, \ldots, v_k)$$

The function of eigenfaces that will recognition the face through following ways:

- The all samples which are trained to project the PCA data.
- Image query will be projected as a PCA data.
- The neighbor which is nearest between the two of above namely,image query projected and the image training projected.

V. COMPARATIVE ANALYSIS

As we studied for this research paper we have seen that over the years there were so many methods which were used to implement facial recognition models but after introduction to Artificial Intelligence it has made our life even more easier. Using Deep Learning which is part of

AI, if we have the sufficient amount of data we can build facial recognition system very easily. We make use of the OpenCV in order to build a simple Face Recognition application. For this These algorithms of computer vision can help us in identification of the face, in identification of data, in classification of performance of man displayed in PC, also record the camera action,and consider the image extracted,it normally work to extract the 3D image as an object and from it collect the face features and also try to resolve the image by cropping its sides and use those features for the identification purpose by examining the movement of eyes and expression of face and store everything which is examined in the database and if there it found the same image it will detect it and give a notification of it.so here,we have every kind of observed case to study.

Advantages of this technique in Attendance Monitoring System

- One of the major advantages is safety and security.
- It offers a quick, automatic, and very easy verification experience to users.
- Whatever changes is being made were there not requirement for any specific hardware,the thing is that simple mobile or webcam is enough.
- Facial recognition is found to be quite convenient, as simple as we take a selfie.

Affordability: Opposite to fingerprint scanner, identification of face is needed ,with no other hardware is required to get activated on phone. If we compare this with even a various software use for face recognition on which different company of mobile use to invest a lot. So cost wise it is much cheaper then what it serves.

Remote verification: Remote verification means you don't have to do anything you have to just stand in front of camera in the same way as it is in the identification of face expression by using mobile,computer which unable us for remote identification.Which is the main advantage of this technology which is required more for any attendance monitoring system. It means you only need to show your faces by standing towards the camera and automatically your device will get unlock by scanning you and you don't need to anything.

Security: Whenever we discuss about this technology we find that there is different discussion raised that the devices which is based on face recognition of feature have security issue with them which is compatible with this technology. But if we research in detail we will find that the acceptability rate of fingerprint is less than the face identification.It has been observed naturally that not every person has hands for the fingerprint scanning but they do have face features for identification.but when we talk about the easy use then face identification is easier one.

5.Result: The main objective of our project is to provide affordable and compatible attendance monitoring system

using facial identification and recognition. If we talk about privacy or security concern then for attendance monitoring system in any institute this level of security is enough. This will also save power, paper and plastic. There is the need of student image in order to mark its attendance in the database otherwise that will be consider as absent. This technology is definitely going to help us in many ways since, our Id cards will get replaced and it will reduce amount of pages required to make that. This will reduce tree cutting and promote digitalization and in turn will help in protecting environment slowly. Since attendance monitoring system is involved in almost every organization
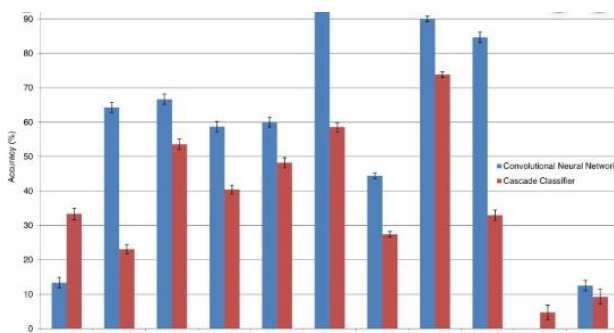
5.1 EXPERIMENTATION AND GRAPHICAL REPRESENTATION

(a)

(b)

(3)
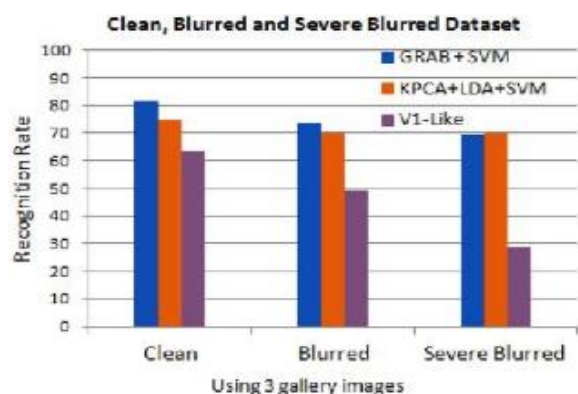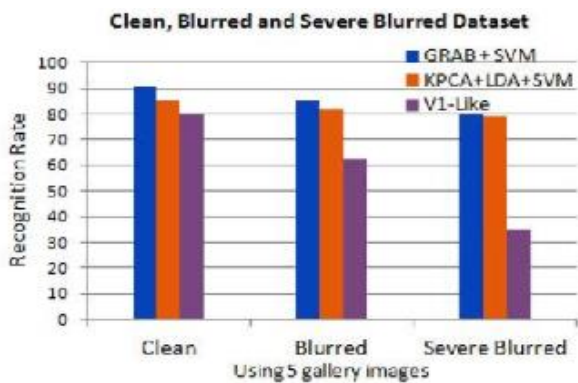
Fig3. Performance for comparison face detection

7. CONCLUSION AND FUTURE WORK:

There may be any lighting condition, similarly any type of seating arrangements and environments in various types of classes. These all conditions are checked and have shown accuracy at an optimal level. Some of additional cases might be like various facial expressions, beard, spectacles, long scarf, various types of hair style , we have tasted all these conditions to obtain high level of accuracy and efficiency. Thus we can conclude that we need not to work manually over the resources and we will have a speedy, flexible and secure system has developed

Future Work: A more detailed research is needed in this type of upcoming technology. Because we all know that coming decades will be of more enhance technology which is easy to use as well as saves other resources , cause less pollution and collect more information at the same time. In this case facial recognition and identification is most appropriate technology**.**

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