Face Recognition based Smart Attendance System

Authors:-Meena Adhane,Rutuja Bansude,Radha Jadhav,Vaidehi Kapadnis

Project Guide:- Prof Dipa Deshmukh

Dept. of Computer Engineering
Sinhgad Academy of Engineering, Kondhwa (Bk)

Abstract — Now a days face detection and authentication is very useful and has very wide applications .So in every field like Security-companies are using facial recognition to secure their premises.Access Control- facial recognition can be used in the home to grant access to certain IoT devices in addition to entry into the home itself.Authentication- Unlock phones.Find missing persons.Identify people in social media –Social media sites such as Facebook use the technology to identify and tag people in photos etc. There are different types of attendance systems like Biometric-based, Radiofrequency card based, face recognition based and old paper-based attendance system. From all of them a Face recognition based attendance system is more secure and time-saving ,much effective .The algorithms Haar cascade and LBPH are also more effective to capture the face .the process include first face detection and then preprocessing that images,after that feature extraction,extracting features which are more relevant and important ,and exclude the unimportant feature which results in fast processing.then the last process is the classification,where the images capture at that moment is get compared with the database trained model. We used Haar cascade for face detection as because it's robustness and LBPH algorithm for face recognition. It is robust against grayscale images which are form from the actual images. Scenarios such as face recognition rate, false-positive rate for that and false-positive rate with and without using a threshold in detecting unknown persons are considered to evaluate our system. We got face recognition rate of students is 70 and its false-positive rate is 30%. Face Recognition of unknown persons is nearly 62% for both with and without applying threshold value. Its false-positive rate is 15% and 31% with and without applying threshold respectively.

Keywords:- haar cascade, Preprocessing, Feature Extraction.

1.INTRODUCTION

A picture of users face is captured from a photo or video. Then the facial recognition software reads the geometry of the users face. This includes the distance between the eyes and the distance from forehead to chin. One system usually identifies 68 such factors. Then it identifies some key facial landmarks to distinguishing users face.

This creates a users facial signature. The software then compares this facial signature with known faces available in the database.

The first step for any automatic face recognition system. First step in many Human Computer Interaction systems.

1.Expression Recognition

2.Cognitive State/Emotional State Recognition.

It makes use the most usual human identifier , face and unique facial characteristics. Emergence has been fuelled due to wide range of law and commercial enforcement.

2.MOTIVATION

- For time saving as manual method of taking attendance consumes more time.
- Secure and authentication in the attendance process.
- Nees of a authentication in many field like It secctor,banking,airpot etc.

3.LITERATURE SURVEY

Kohonen Ref[1]. is one of the early pioneers of the most famous face recognition system, which employed a simple neural net using network of Eigenfaces by approximating eigenvectors through face images autocorrelation matrix. Although, the method was not very successful to be practically implemented in a real-life environment due to associated high demand for normalization and positioning when run in a large database with many types of face conditions.

In harnessing and improving the work of Kohonen, Kirby and Sirovich in 1990 as in , directly calculated the Eigenfaces using algebraic manipulation with fewer than 100 faces to implement facial recognition, which was further improved by Turk and Pentland in 1991 as in Ref[1].by determining the exact location and scales of faces and also the use of coding residual error originated from Eigenfaces, but in a minimally constrained environment.

Better and more novel approaches than Kohonen approach for facial recognition using; Principal Component Analysis (PCA), Fisherfaces and the traditional Local Binary Patterns (LBP) were proposed, particularly the LBP, because it has a simple theory with computational simplicity, invariant with respect to any monotonic transformation of gray scale, has powerful rotation-invariant analysis with a uniform pattern and discriminates excellently between different various kinds of texture ,but It is known that the LBP is not as robust as the viola-jones and other algorithms for face detection as highlighted because of issues such as noise, illumination variation, background, pose, scale and occlusion etc.

Al Imran, Hafizur Rahman, American American International University-Bangladesh 9 PUBLICATIO,ref[2] real time face detection and identify the face ,it used Violo johns algorithm.and uses appearance based approach. For the recognization of face they worked with Eigen Faces which algorithm named as PCA .for training they have used 5 images of each person for traning a dataset and manipulated the Eigen values to match the known individual. Eigenfaces are used in many applications for human face recognition. Eigen faces assume different appearance. Eigen faces use effective methos for face detection and recognition. variation of data is being capture by this method and data set of face images which is latter used to convert and match images or

individual personsfor recognization PCA technique is very effective .

MUHAMMAD ZEESHAN KHAN1 , SAAD HAROUS 2 , SALEET UL HASSAN1 , MUHAMMAD USMAN GHANI KHAN1 , RAZI IQBAL,ref[3], The model proposed in this paper consists of 2 parts, one is forsuggested regions for detected faces and the second part is used for to identify detected faces from the datasets. whether trained. Area recommendation network (RPN) is used for face detection, RPN analyzes the image using sliding window. Basically, the deeply integrated neural network architecture is developed byto recognize 2622 distinct entities,is structured to solve the N-way classification problem. CNN applies to each training frame Ix, x = 1. . . .X, the score is calculated using yx = wπ(Ix) BɛRn until the last fully connected layer has N linear predictors wɛRn × D, BɛRn each for an identity . The scores are thencompared to the ground truth label against each layer toto calculate the loss value. After training, the classifierwas discarded and the score vectors were used to verify the face using Euclidean distance.

 K. Sunil Manohar Reddy, International Journal of Advanced Research in Science, Engineering ,ref[4]the approach used in this paper for face recognition and detection is LBPH i.e local binary pattern and histogram,It It is one the effective technique that captures different images of the human with considering the challenges like light intensities,shadows ,aging,wrinkles on face . image and then converting into the 3X3 pixels . we choose the redius pixel as a threshold .If the neighbouring pixels are greater than the threshold of that matrix then set the value to 1 if it less than the threshold then we set the value as 0.Now the values of neighbouring pixels in line gives us the binary

number we can convert that binary number into the decimal number and replace the value with the median pixel value in matrix.So now we can extract histogram from that each grid Each histogram now represent the facial image in the database,and for classification/recognization two histogram are being checked
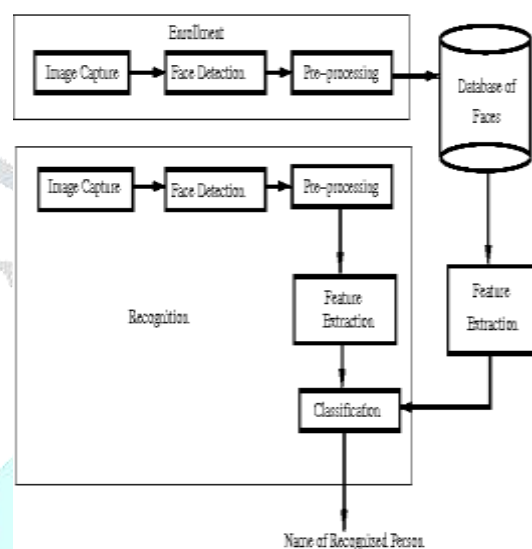
4. SYSTEM ARCHITECTURE

Fig. 1 System Architecture

5.METHODOLOGY

Two steps in this face recognition based attendance system .

Preprocessing and face detection :

We take a image and then convert into grayscale image .for this image detection we have use the haar cascade algorithm .where this algorithm helps us to identify the line and the intensities in the the image.basically it is use for detection of face features like edge line ,four rectangle .we have taken 40 images per person for training purpoase .

Face recognization:

Face recognization:

For face recognization we've used the LBPH formula .This formula is employed to seek out the characteristics of face. initial we've use to capture the image so changing into the 3X3 pixels . we elect the redius component as a threshold .If the near pixels area unit bigger than the edge of that matrix then set the worth to one if it but the edge then we tend to set the worth as zero.Now worth|the worth}s of near components in line the binary variety we will convert that binary variety into the decimal variety and replace the worth with the median pixel value in matrix.So currently we will extract histogram from that every grid every histogram currently represent the facial image within the info .while at the time of face recognization it follows constant steps as on top of and draws the new histogram for that image and at the time of classification it gets compare with the histogram present within the databases with the assistance of euclidian distance..If the histogram gets matched with the info image then it offers output as present showing the distinctive id of that person on top of his/her face .

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Pnel-pRrcepsne smulgfane HatecDonectPre processing
ace Detection

6.ALGORITHM

Haar Cascade Algorithm:-

Positive and negative images are being captured by haar cascade feature .
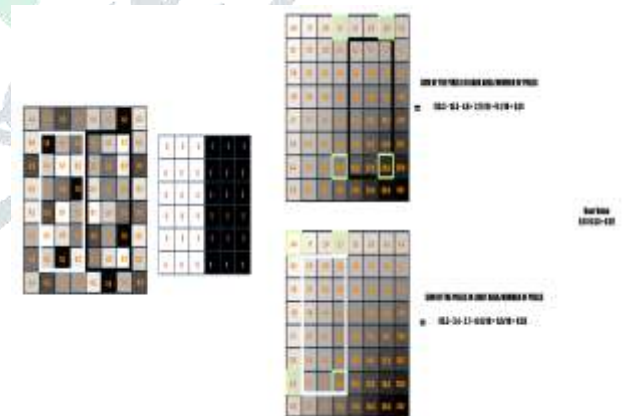
Positive Images: These photos contain the images that our classifier is supposed to recognize.

Negative Images: Images of everything else that isn't the object we are looking for.

It is an object detection algorithm used to identify faces in an image or a real time video .The algorithm uses edge or line detection.If the average of negative images minus average of positive images is 1.then we can say there is line detected .In this way the features of face detected using this haar feature.

Contains different feature to evalute are as follows:

1.two rectangle feature

2.three rectangle feature
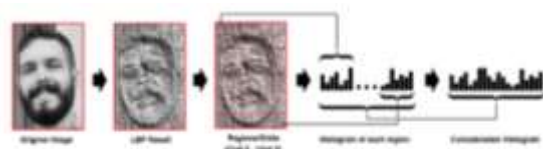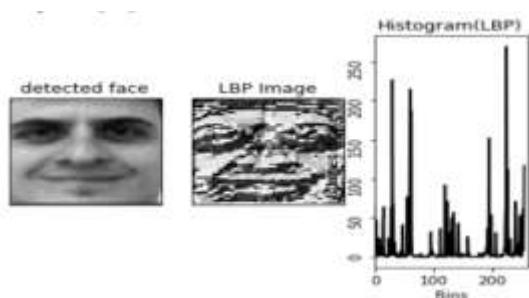
3.four rectangle feature

LBPH:

we have used the LBPH algorithm This algorithm is used to find the characteristics of face. First we have use to capture the image and then converting into the 3X3 pixels . Face recognization:For face recognization we've used the LBPH formula .This formula is employed to seek out the characteristics

of face. initial we've use to capture the image so changing into the 3X3 pixels . we elect the radius component as a threshold .If the near pixels area unit bigger than the edge of that matrix then set the worth to one if it but the edge then we tend to set the worth as zero.Now worth|the worth}s of near components in line . the binary variety we will convert that binary variety into the decimal variety and replace the worth with the median pixel value in matrix.So currently we will extract histogram from that every grid every histogram currently represent the facial image within the info .while at the time of face recognization it follows constant steps as on top of and draws the new histogram for that image and at the time of classification it gets compare with the histogram present within the databases with the assistance of euclidian distance..If the histogram gets matched with the info image then it offers output as present showing the distinctive id of that person on top of his/her face .

LBPH Uses 4 Parameters:

- **Radius**It
- **Neighbours**
- **Grid X**
- **GridY**

7.MATHEMATICAL MODEL

- Let S be the Whole system S= {I,P,O}
- I-input
- P-procedure
- O-output
- Input(I)
- I={ Face Attendance dataset}
- Where,
- Dataset->
- Students face capture
- Procedure (P),
- P={I, Using I System perform operations and calculate the prediction }
- Output(O)-O={detect the face and mark attendance to the Excel sheet}

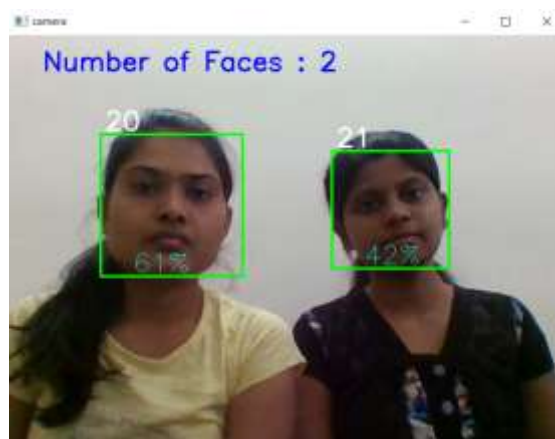## 9.ACKNOWLEDGEMENT

9.CONCLUSION

This project on Face recognition had given us an opportunity to study about many popular methods used in the field of face recognition.

We also came to know that combining two or more techniques can improve the accuracy of system greatly.

In this project we have developed a face recognition system for feature extraction and matching using classifiers.

10.RESULT

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