

AUTOMATED ATTENDANCE SYSTEM BASED ON FACE RECOGNITION

Submitted in partial fulfillment of the requirements
for the award of
Bachelor of Engineering degree in Computer Science and Engineering

by

RAVURI NEETHU CHOUDARY (37110632)
POTLA LAKSHMI PRASASNA (37110577)



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING**

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade “A” by NAAC

**JEPPIAAR NAGAR, RAJIV GANDHI SALAI,
CHENNAI - 600 119**

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Accredited with "A" grade by NAAC

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600119

www.sathyabama.ac.in



DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Ravuri Neethu Choudary (37110632)** and **Potla Lakshmi Prasanna (37110577)** who carried out the project entitled **"Automated Attendance System Based on Face Recognition"** under my supervision from November 2020 to April 2021.

Internal Guide

Dr. S. Jancy MCA., M.Tech., Ph.D.

Head of the Department

Dr. S. Vigneshwari M.E., Ph.D.,

Dr. L. Lakshmanan M.E., Ph.D.

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

I **Potla Lakshmi Prasanna** hereby declare that the Project Report entitled **“Automated Attendance System based on Face Recognition”** done by me under the guidance of **Dr. S. Jancy MCA., M.Tech., Ph.D.** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in 2017-2021.

DATE:

PLACE:

SIGNATURE OF THE CANDIDATE

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ABSTRACT

The management of educational establishments are concerned about the regular attendance of students. As, attendance has become a key factor while evaluating a student, their overall academic performance alone doesn't quite cut it now. Traditionally, we are used to taking attendance either by calling out student's admission numbers or taking their signatures in a log book. They both were more time expending and troublesome. Subsequently, there is a necessity of PC based understudy participation in the executives' framework which will help the workforce for keeping up participation records consequently. In this undertaking, we have actualized the computerized participation framework utilizing **OPEN CV** package in **Python**. We have anticipated our plans to execute "Automated Attendance System Based on Facial Recognition", in which it assimilates huge applications. The application incorporates face distinguishing proof, which spares time and dispenses with odds of intermediary participation in view of the face approval. Thus, this framework can be actualized in a field where participation assumes a significant job.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	EXPANSION
CNN	Convolutional Neutral Network
ILSVRC	ImageNet Large Scale Visual Review Challenge
SIANN	Space Invariant Counterfeit Neural Systems
VGG	Visual Geometry Group
SVM	Supervised Machine Learning
LDA	Linear Discriminant Analysis

CHAPTER-1

INTRODUCTION

The main objective of this project is to develop face recognition based automated student Attendance system. In order to achieve better performance, the test images and training images of this proposed approach are limited to frontal and upright facial images that consist of a single face only. The test images and training images have to be captured by using the same device to ensure no quality difference. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

Problem Statement:

Traditional student attendance marking technique is often facing a lot of trouble. The face recognition student attendance system emphasizes its simplicity by eliminating classical student attendance marking technique such as calling student names or checking respective identification cards. There are not only disturbing the teaching process but also causes distraction for students during exam sessions. Apart from calling names, attendance sheet is passed around the classroom during the lecture sessions. The lecture class especially the class with a large number of students might find it difficult to have the attendance sheet being passed around the class. Thus, face recognition student attendance system is proposed in order to replace the manual signing of the presence of students which are burdensome and causes students get distracted in order to sign for their attendance. Furthermore, the face recognition based automated student attendance system able to overcome the problem of fraudulent approach and lecturers does not have to count the number of students several times to ensure the presence of the students.

Hence, there is a need to develop a real time operating student attendance system which means the identification process must be done within defined time constraints to prevent omission. The extracted features from facial images which represent the identity of the students have to be consistent towards a change in background, illumination, pose and expression. High accuracy and fast computation time will be the evaluation points of the performance.

Aims and Objectives:

The objective of this project is to develop face recognition based automated student attendance system. Expected achievements in order to fulfill the objectives are:

- To detect the face segment from the video frame.
- To extract the useful features from the face detected.
- To classify the features in order to recognize the face detected.
- To record the attendance of the identified student.

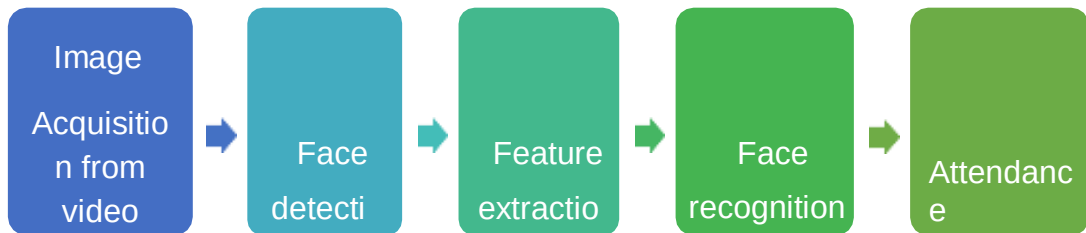


Figure 1.1 Block Diagram of the General Framework

CHAPTER-2

LITERATURE SURVEY

Difference between face detection and face recognition are often misunderstood. Face detection is to determine only the face segment or face region from image, whereas face recognition is to identify the owner of the facial image. S.Aanjanadevi et al. (2017) and Wei-Lun Chao (2007) presented a few factors which cause face detection and face recognition to encounter difficulties. These factors consist of background, illumination, pose, expression, occlusion, rotation, scaling and translation. The definition of each factor is tabulated in Table 2.2.

Table 2.1 Factors Causing Face Detection Difficulties (S.Aanjanadevi et al., 2017)

Background	Variation of background and environment around people in the image which affect the efficiency of face recognition.
Illumination	Illumination is the variation caused by various lighting environments which degrade the facial feature detection.
Pose	Pose variation means different angle of the acquired the facial image which cause distortion to recognition process, especially for Eigen face and Fisher face recognition method.
Expression	Different facial expressions are used to express feelings and emotions. The expression variation causes spatial relation change and the facial-feature shape change.

Occlusion	Occlusion means part of the human face is unobserved. This will diminish the performance of face recognition algorithms due to deficiency information.
-----------	--

There are a few face detection methods that the previous researchers have worked on. However, most of them used frontal upright facial images which consist of only one face. The face region is fully exposed without obstacles and free from the spectacles.

Varsha Gupta and Dipesh Sharma (2014) studied Local Binary Pattern (LBP), Adaboost algorithm, local successive mean quantization transform (SMQT) Features, sparse network of winnows (SNOW) Classifier Method and Neural Network-based face detection methods in addition to Viola-Jones algorithm. They concluded that Viola-Jones algorithm has the highest speed and highest accuracy among all the methods. Other methods for instance Local Binary Pattern and SMQT Features have simple computation and able to deal with illumination problem, their overall performance is weaker than Viola- Jones algorithm for face detection. The advantages and disadvantages of the methods is studied and tabulated in Table 2.2.

Table 2.2 Advantages & Disadvantages of Face Detection Methods
(Varsha Gupta and Dipesh Sharma, 2014)

Face detection method	Advantages	Disadvantages
Viola jones algorithm	1. High detection speed 2. High accuracy.	1. Long training time. 2. Limited head pose. 3. Not able to detect dark faces.

Local Binary pattern	1. Simple computation. 2. High tolerance against the monotonic Illumination changes.	1. Only used for binary and Grey images. 2. Overall performance is Inaccurate compared to Viola-Jones algorithm.
AdaBoost algorithm (part of Viola Jones algorithm)	Need not to have any prior knowledge about face structure.	The result highly depends on the training data and affected by weak classifiers.
SMQT Features and SNOW Classifier Method	1. Capable to deal with Lighting problem in object detection. 2. Efficient in Computation.	The region contain very similar to grey value regions will be misidentified as face.
Neural-Network	High accuracy only if large size of image were trained.	1. Detection process is Slow and computation is complex. 2. Overall performance is Weaker than Viola-Jones algorithm.

Pre-Processing

Subhi Singh et al. (2015) suggested cropping of detected face and color image was converted to grayscale for pre-processing. They also proposed affine transform to be applied to align the facial image based on coordinates in middle of the eyes and scaling of image to be performed. Arun Katara et al (2017), Akshara Jadhav et.al (2017), Shireesha

Chintalapati, and M.V. Raghunath (2013), all of the 3 papers have proposed histogram equalization to be applied to facial image, and scaling of images was performed for pre-processing.

Pre-processing enhances the performance of the system. It plays an essential role to improve the accuracy of face recognition. Scaling is one of the important pre-processing steps to manipulate the size of the image. Scaling down of an image increases the processing speed by reducing the system computations since the number of pixels are reduced. The size and pixels of the image carry spatial information. Gonzalez, R. C. and Woods (2008) mentioned spatial information is a measure of the smallest discernible detail in an image. Hence, spatial information has to be manipulated carefully to avoid distortion of images to prevent checkerboard effect. The size should be same for all the images for normalization and standardization purposes. Subhi Singh et al (2015) proposed PCA (Principal Component Analysis) to extract features from facial images, same length and width of image is preferred, thus images were scaled to 120×120 pixels.



Figure 2.1 Facial Images Were Converted To Grayscale, Histogram Equalization Was Applied and Images Were Resized to 100x100

Feature Extraction

The feature is a set of data that represents the information in an image. Extraction of facial feature is most essential for face recognition. However, selection of features could be an arduous task. Feature extraction algorithm has to be consistent and stable over a variety of changes in order to give high accuracy result.

There are a few feature extraction methods for face recognition. In the paper of Bhuvaneshwari et al. (2017), Abhishek Singh and Saurabh Kumar (2012) and Liton Chandra Paul and Abdulla Al Suman (2012), they proposed PCA for the face recognition. D. Nithya (2015) also used PCA in face recognition based student attendance system. PCA is famous with its robust and high speed computation. Basically, PCA retains data variation and remove unnecessary existing correlations among the original features. PCA is basically a dimension reduction algorithm. It compresses each facial image which is represented by the matrix into single column vector. Furthermore, PCA removes average value from image to centralize the image data. The Principle Component of distribution of facial images is known as Eigen faces. Every single facial image from training set contributes to Eigen faces. As a result, Eigen face encodes best variation among known facial images. Training images and test images are then projected onto Eigen face space to obtain projected training images and projected test image respectively. Euclidean distance is computed by comparing the distance between projected training images and projected test image to perform the recognition. PCA feature extraction process includes all trained facial images. Hence, the extracted feature contains correlation between facial images in the training set and the result of recognition of PCA highly depends on training set image.

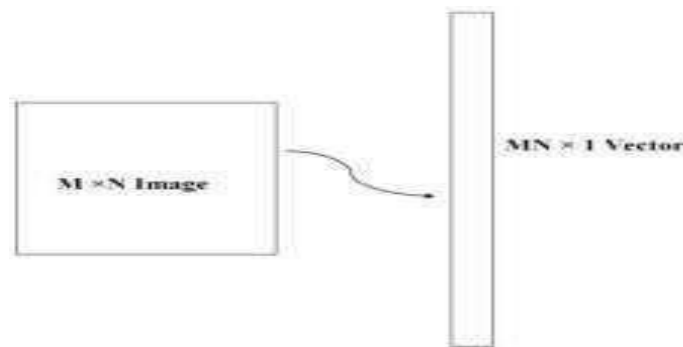


Figure 2.2 PCA Dimension Detection

Deep Face Recognition

The target of this paper is face affirmation – from either a lone photograph or from a great deal of faces followed in a video. Continuous progress here has been a direct result of two factors:

1. All the way learning for the endeavor using a convolutional neural network (CNN),
2. The availability of incredibly gigantic scale getting ready datasets.

Convolutional Neural Networks (CNNs) have overpowered the PC vision arrange, basically improving the top tier in various applications. One of the most noteworthy components for the achievement of such strategies is the availability of colossal measures of getting ready data. The ImageNet Large Scale Visual Recognition Challenge (ILSVRC) was instrumental in giving this data to the general picture portrayal task. All the more as of late, analysts have made datasets available for division, scene portrayal and picture division. In the domain of face affirmation, in any case, colossal scale open datasets have been missing and, all things considered, as a result of this factor, most of the continuous advances in the system stay restricted to Internet goliaths, for instance, Facebook and Google, etc.

For example, the most recent face affirmation system by Google was readied using 200 million pictures and 8,000,000 remarkable characters. The size of this dataset is directly around three arrangements of degree greater than any unreservedly available face dataset. Clearly, building a dataset this gigantic is past the capacities of most worldwide research social occasions, particularly in the academic network. In this work we have made two duties: first, we have arranged a strategy that can gather a colossal scale dataset, with little imprint noise, while constraining the proportion of manual clarification included. One of the key musings was to use increasingly delicate classifiers to rank the data acquainted with the annotators. This procedure has been made for faces, yet is unmistakably sensible for other article classes similarly as fine grained assignments. The ensuing duty was to show that a significant CNN, without any embellishments anyway with reasonable getting ready, can achieve results equivalent to the bleeding edge. Again, this is an end that may be applicable to various assignments.

CHAPTER-3

THEORITICAL ANALYSIS

CNN:

In Deep learning, a convolutional neural system (CNN, or ConvNet) is a class of profound neural systems, most generally applied to examining visual symbolism. They are otherwise called move invariant or space invariant counterfeit neural systems (SIANN), in view of their mutual load's design and interpretation invariance attributes. They have applications in picture and video acknowledgment, recommender frameworks, picture characterization, restorative picture investigation, and regular language processing[3].

A convolutional neural framework contains data and a yield layer, similarly as various hid layers. The disguised layers of a CNN generally involve a movement of convolutional layers that convolve with an expansion or another spot thing. The commencement limit is customarily a RELU layer and is appropriately trailed by additional convolutions, for instance, pooling layers, totally related layers, and institutionalization layers insinuated as covered layers considering the way that their data sources and yields are hidden by the activation limit and last convolution. The last convolution, consequently, every now and again incorporates back spread to even more correctly weight the completed result. [4].

CNNs utilize generally little pre-preparing contrasted with other picture arrangement calculations. This implies the system learns the channels that in conventional calculations were hand-built. A convolutional neural system comprises of an information and a yield layer, just as numerous concealed layers. The concealed layers of a CNN commonly comprise of a progression of convolutional layers that convolve with an increase or other spot item. The initiation capacity is ordinarily a RELU layer, and is accordingly trailed by extra convolutions, for example, pooling layers, completely associated layers and standardization layers, alluded to as shrouded layers in light of the fact that their information sources and yields are conceal by the actuation capacity and last convolution. The last convolution, thus, frequently includes back spread so as to all the more precisely weight the finished result.

VGG:

As mentioned above, there are several pre-trained models for CNN and one of the most popular and widely used in face recognition is the VGGF model — developed by Oxford Visual Geometry Group . There are a few pre-prepared models for CNN and one of the most well known and generally utilized in face acknowledgment is the VGGF model — created by Oxford Visual Geometry Group [5]. The model was set up on a colossal dataset containing 2.6M face pictures of more than 2.6 K individuals. The building of VGGF includes 38 layers, starting from the data layer up to the yield layer. The data should be a concealing picture with a size of 224 by 224, and as the pre-taking care of step, a typical is routinely figured from the information picture. At the point when all is said in done, the VGGF contains thirteen convolutional layers, each layer having a remarkable course of action of crossbreed parameters. Each social event of convolutional layers contains 5 max-pooling layers and there are in like manner 15 remedied straight units (ReLU). After these layers, there are three totally related layers, specifically, the FC6, FC7, and FC8. The underlying two have 4096 channels, while FC8 which has 2622 channels are used to organize the 2622 characters. The last layer is the classifier which is a softmax layer to bunch an image to which the individual face class has a spot. We show the structure of this further in Fig. 3.2.

Implementation steps:

1. Here We have taken every individual's unbiased face, smiley face, furious face, tragic face, and shock face. In this way, there will be five kinds of datasets, they are nonpartisan, grin, miserable, irate and amazed.
2. At that point we will have every individual's five diverse outward appearances.
3. Each picture of each dataset will experience the preprocessing techniques.
4. At that point we have to take each picture's component vector utilizing VGG-model.
Fig3.1
5. Presently the nonpartisan picture of one individual is included to the component vectors every outward appearance dataset. Along these lines, we get 5 diverse element vectors which are connected to one element vector.

6. Presently we will have a solitary component vector that will be given to PCA and LDA.
7. At that point the names and the preparation set must be given to the SVM with three distinct pieces one is linea, the subsequent one is poly and the third is rbf.
8. So here SVM is utilized for order.
9. Finally the yield will be the individual perceived precisely.
10. We need to give any individual's picture with sort of outward appearance so the model that was manufactured ought to remember it precisely.

3.3.1 **Algorithm 1:** Feature extraction from the face dataset

```

Input: Training set M, with m classes
nj = number of images in a given class
for i=1 to mdo
    for j=1 to nj do
        im → read an image;
        im → resize(image);
        im → normalize(image);
        imfeatures → ExtractFeatures(CNNs(im));
    end
end
end

```

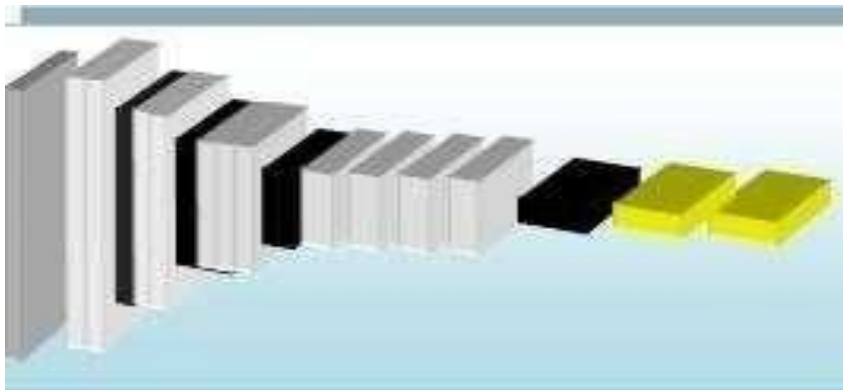


Fig.3.1.VGG

Confusion Matrix:

Confusion Matrix is the estimation of the adequacy and execution of our calculation. It is a table with a blend of genuine perceptions and anticipated perceptions and it is helpful for estimating Accuracy, Precision, Recall, and F1score. We utilized four execution estimates like True Positive (TP), True Negative (TN), False Positive (FP) and False Negative (FN). Genuine Positive implies you have foreseen positive and it is genuine True Negative methods you have foreseen negative and it is valid. Bogus Positive implies you have foreseen positive and it is bogus. Bogus Negative implies you have foreseen negative and it is bogus. Precision, as a rule, tells about how routinely is our calculation or model is right and it is the extent of accurately evaluated perceptions to all-out perceptions.

$$\text{Accuracy} = (\text{TP} + \text{TN}) / (\text{TP} + \text{FP} + \text{FN} + \text{T})$$

Precision tells about when the algorithm estimates positive, how frequently it is right. It is the proportion of effectively anticipated perceptions of the total anticipated positive perceptions.

$$\text{Precision} = (\text{TP}) / (\text{TP} + \text{F})$$

The recall is also called as a sensitivity which ascertains what number of the Actual positives our algorithm or model catch through marking it as True Positive.

$$\text{Recall} = \text{TP} / (\text{TP} + \text{F})$$

F1 score considers both precision and recall. It is the harmonic mean of precision and recall.

$$\text{F1 score} = 2 * (\text{Recall} * \text{Precision}) / (\text{Recall} + \text{Precision})$$

	<i>Class 1 Predicted</i>	<i>Class 2 Predicted</i>
Class 1 Actual	TP	FN
Class 2 Actual	FP	TN

Fig.3.2.Confusion Matrix

SVM:

SVM is a supervised machine learning algorithm which can be used for both binary classification and multi classification problems. The SVM centers around distinguishing the edges by means of hyperplanes to isolate the information into classes. Boosting the edge lessens the upper bound on the normal speculation blunder by making the biggest conceivable separation between the isolating hyperplanes.

Unmistakably the SVM is outfitted to take care of double grouping issues. In the entirety of our trials, we utilize the direct SVM to take care of the multi-classes arrangement issue dependent on One-versus One (OVO) approach. This is otherwise called pairwise classification. As for the kind of SVM (among straight and non-direct portion), here we have picked the straight SVM for the reasons as clarified here. Before running the primary examinations, we ran some preliminary trials to test the precision of acknowledgment results between direct SVM and non-straight SVM (with spiral premise work pieces) to test their exactness and proficiency. We found, as a rule, the straight SVM functions admirably when little pieces of the face are utilized as tests. For example, in one preliminary trial including faces from 60 subjects, we found that for the correct cheek, the straight SVM created an acknowledgment pace of 24.44% while the piece SVM with outspread premise works just delivered a pace of 2.77%. Likewise, as a rule, the straight SVM is computationally increasingly effective in all the preliminary investigations we ran. In this manner, we presumed that the portion SVM with its negligible increases (just in bigger pieces of the face, for example, half or 3/4 face) doesn't loan generally speaking extra points of interest. Consequently, we utilized the straight SVM all through the remainder of the trials.

LDA:

Linear Discriminant Analysis (LDA) is most regularly utilized as dimensionality decrease method in the pre-preparing step for design arrangement and AI applications. The objective is to extend a dataset onto a lower-dimensional space with great class-detachability all together abstain from overfitting ("revile of dimensionality") and furthermore decrease computational costs.

Discriminant Analysis works by making at least one straight blends of indicators, making another dormant variable for each capacity. These functions are called discriminant functions. The quantity of capacities conceivable is either $N_g - 1$ where N_g = number of gatherings, or p (the quantity of indicators), whichever is littler. The primary function made boosts the contrasts between bunches on that function. The subsequent capacity augments contrasts on that function, yet additionally should not be related with the past function. This proceeds with ensuing capacities with the prerequisite that the new function not be associated with any of the past functions.

PCA:

Principal Component Analysis (PCA) is an unsupervised linear transformation technique that is broadly utilized crosswise over various fields, most noticeably for highlight extraction and dimensionality decrease. Other well known uses of PCA incorporate exploratory information examinations and de-noising of sign in securities exchange exchanging, and the investigation of genome information and quality articulation levels in the field of bioinformatics.

PCA encourages us to recognize designs in information dependent on the relationship between's highlights. Basically, PCA means to discover the bearings of most extreme fluctuation in high-dimensional information and activities it onto another subspace with equivalent or less measurements than the first one.

Difference between PCA and LDA:

Both PCA and LDA are linear transformation techniques. However, PCA is an unsupervised while LDA is a supervised dimensionality reduction technique.

PCA has no worry with the class names. In basic words, PCA abridges the list of capabilities without depending on the yield. PCA attempts to discover the headings of the greatest difference in the dataset. In a huge list of capabilities, there are numerous highlights that are only copy of different highlights or have a high connection with different highlights. Such highlights are fundamentally excess and can be disregarded. The job of PCA is to discover such profoundly corresponded or copy highlights and to think of

another list of capabilities where there is least connection between's the highlights or as it were list of capabilities with most extreme change between the highlights. Since the difference between the highlights doesn't rely on the yield, in this way PCA doesn't consider the yield names.

Dissimilar to PCA, LDA attempts to diminish measurements of the list of capabilities while holding the data that segregates yield classes. LDA attempts to discover a choice limit around each group of a class. It at that point extends the information focuses to new measurements such that the bunches are as discrete from one another as could reasonably be expected and the individual components inside a group are as near the centroid of the bunch as could be allowed. The new measurements are positioned based on their capacity to amplify the separation between the bunches and limit the separation between the information focuses inside a group and their centroids. These new measurements structure the linear discriminants of the list of capabilities.

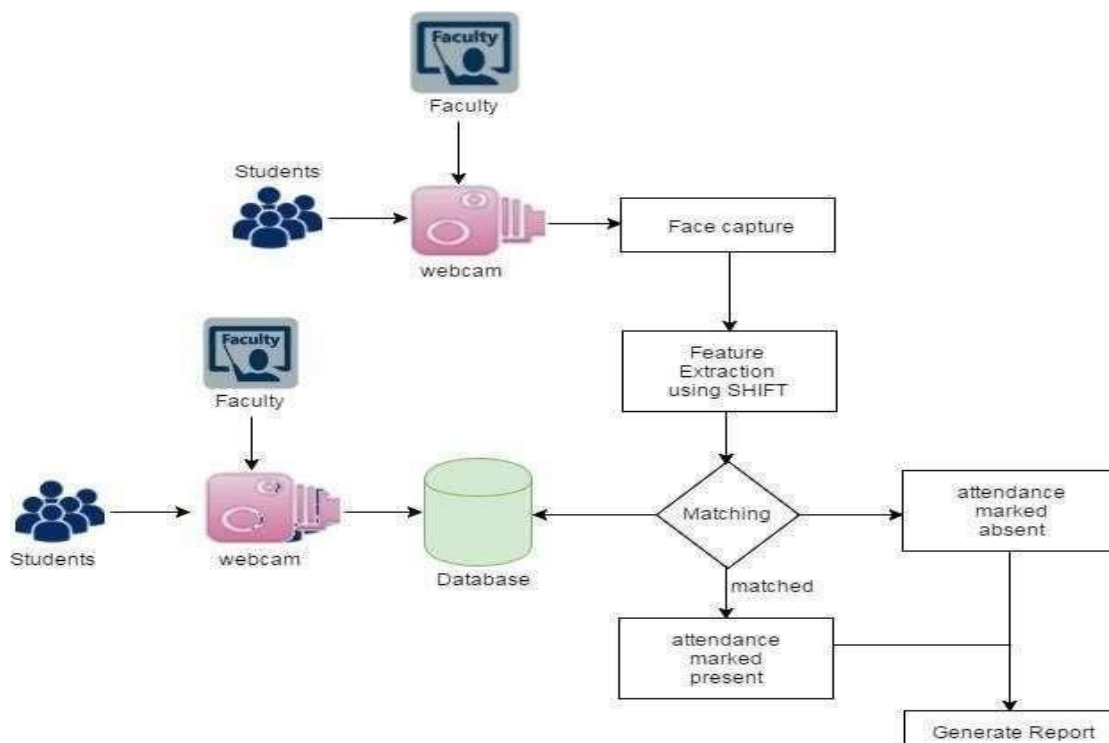


Fig.3.3.Training

Here we are training two different face expression variant feature sets into VGG model then adding the feature vectors to train them through SVM and classify them by giving a label.

TESTING:

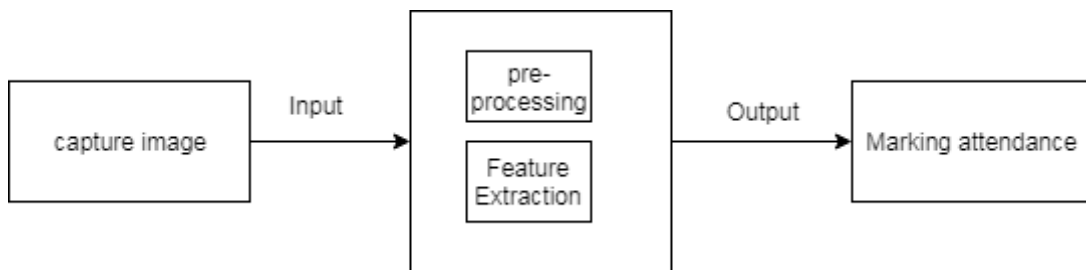


Fig.3.4. Testing

Here we are testing the algorithm using some expression variant face images to classify the faces in the input images. So, we are here having this objective by adding the vectors will improve our algorithm in classifying the faces.

CHAPTER-4

CONCLUSION AND DISCUSSION

This project shows the results of the different faces present in the class. Using Haar-cascades for face detection worked extremely well even when studentss wore spectacles. Real time video speed was satisfactory as well devoid of noticeable frame lag. Considering all factors, LBPH combined with Haar- cascades can be implemented as a cost effective face recognition platform. An example is a system to identify the owner of the different automobiles when they are being theft.It is used as security purpose to unlock personal data.

CHAPTER-5

EXPERIMENTAL INVESTIGATIONS

5.1. SOURCE CODE:

```
##### IMPORTING
#####

import tkinter as tk

from tkinter import ttk

from tkinter import messagebox as mess

import tkinter.simpledialog as tsd

from cv2 import cv2,os

import csv

import numpy as np

from PIL import Image

import pandas as pd

import datetime

import time


##### FUNCTIONS
#####


def assure_path_exists(path):

    dir = os.path.dirname(path)

    if not os.path.exists(dir):

        os.makedirs(dir)
```

```
#####
```

```
def tick():  
    time_string = time.strftime('%H:%M:%S')  
    clock.config(text=time_string)  
    clock.after(200,tick)
```

```
#####
```

```
def contact():  
    mess._show(title='Contact us', message="Please contact us on : 'saiprudhvireddy69@gmail.com' ")
```

```
#####
```

```
def check_haarcascade():  
    exists = os.path.isfile("haarcascade_frontalface_default.xml")  
    if exists:  
        pass  
    else:  
        mess._show(title='Some file missing', message='Please contact us for help')  
        window.destroy()
```

```
#####
```

```

def save_pass():

    assure_path_exists("TrainingImageLabel/")

    exists1 = os.path.isfile("TrainingImageLabel\psd.txt")

    if exists1:

        tf = open("TrainingImageLabel\psd.txt", "r")

        key = tf.read()

    else:

        master.destroy()

        new_pas = tsd.askstring('Old Password not found', 'Please enter a new password below', show='*')

        if new_pas == None:

            mess._show(title='No Password Entered', message='Password not set!! Please try again')

        else:

            tf = open("TrainingImageLabel\psd.txt", "w")

            tf.write(new_pas)

            mess._show(title='Password Registered', message='New password was registered successfully!!')

            return

    op = (old.get())

    newp= (new.get())

    nnewp = (nnew.get())

    if (op == key):

        if(newp == nnewp):

            txf = open("TrainingImageLabel\psd.txt", "w")

            txf.write(newp)

        else:

            mess._show(title='Error', message='Confirm new password again!!!')

```

```

        return

    else:

        mess._show(title='Wrong Password', message='Please enter correct old password.')

        return

    mess._show(title='Password Changed', message='Password changed successfully!!')

    master.destroy()

```

```

#####

```

```

def change_pass():

    global master

    master = tk.Tk()

    master.geometry("400x160")

    master.resizable(False,False)

    master.title("Change Password")

    master.configure(background="white")

    lbl4 = tk.Label(master,text='    Enter Old Password',bg='white',font=('times', 12, ' bold '))

    lbl4.place(x=10,y=10)

    global old

    old=tk.Entry(master,width=25 ,fg="black",relief='solid',font=('times', 12, ' bold '),show='*')

    old.place(x=180,y=10)

    lbl5 = tk.Label(master, text=' Enter New Password', bg='white', font=('times', 12, ' bold '))

    lbl5.place(x=10, y=45)

    global new

    new = tk.Entry(master, width=25, fg="black",relief='solid', font=('times', 12, ' bold '),show='*')

```

```

new.place(x=180, y=45)

lbl6 = tk.Label(master, text='Confirm New Password', bg='white', font=('times', 12, ' bold '))

lbl6.place(x=10, y=80)

global nnew

nnew = tk.Entry(master, width=25, fg="black", relief='solid',font=('times', 12, ' bold '),show='*')

nnew.place(x=180, y=80)

cancel=tk.Button(master,text="Cancel", command=master.destroy ,fg="black" ,bg="red"
,height=1,width=25 , activebackground = "white" ,font=('times', 10, ' bold '))

cancel.place(x=200, y=120)

save1 = tk.Button(master, text="Save", command=save_pass, fg="black", bg="#3ece48", height =
1,width=25, activebackground="white", font=('times', 10, ' bold '))

save1.place(x=10, y=120)

master.mainloop()

```

```

#####
#

```

```

def psw():

    assure_path_exists("TrainingImageLabel/")

    exists1 = os.path.isfile("TrainingImageLabel\psd.txt")

    if exists1:

        tf = open("TrainingImageLabel\psd.txt", "r")

        key = tf.read()

    else:

        new_pas = tsd.askstring('Old Password not found', 'Please enter a new password below', show='*')

        if new_pas == None:

            mess._show(title='No Password Entered', message='Password not set!! Please try again')

```

```

else:

    tf = open("TrainingImageLabel\psd.txt", "w")

    tf.write(new_pas)

    mess._show(title='Password Registered', message='New password was registered successfully!!')

    return

password = tsd.askstring('Password', 'Enter Password', show=*)

if (password == key):

    TrainImages()

elif (password == None):

    pass

else:

    mess._show(title='Wrong Password', message='You have entered wrong password')

#####
##

def clear():

    txt.delete(0, 'end')

    res = "1)Take Images >>> 2)Save Profile"

    message1.configure(text=res)

def clear2():

    txt2.delete(0, 'end')

    res = "1)Take Images >>> 2)Save Profile"

    message1.configure(text=res)

```

```
#####  
###
```

```
def TakeImages():  
    check_haarcascadefile()  
  
    columns = ['SERIAL NO.', ', ', 'ID', ', ', 'NAME']  
  
    assure_path_exists("StudentDetails/")  
    assure_path_exists("TrainingImage/")  
  
    serial = 0  
  
    exists = os.path.isfile("StudentDetails\StudentDetails.csv")  
  
    if exists:  
        with open("StudentDetails\StudentDetails.csv", 'r') as csvFile1:  
            reader1 = csv.reader(csvFile1)  
  
            for l in reader1:  
                serial = serial + 1  
  
        serial = (serial // 2)  
  
        csvFile1.close()  
    else:  
        with open("StudentDetails\StudentDetails.csv", 'a+') as csvFile1:  
            writer = csv.writer(csvFile1)  
  
            writer.writerow(columns)  
  
            serial = 1  
  
        csvFile1.close()  
  
    Id = (txt.get())  
  
    name = (txt2.get())
```

```

if ((name.isalpha()) or (' ' in name)):

    cam = cv2.VideoCapture(0)

    harcascadePath = "haarcascade_frontalface_default.xml"

    detector = cv2.CascadeClassifier(harcascadePath)

    sampleNum = 0

    while (True):

        ret, img = cam.read()

        gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

        faces = detector.detectMultiScale(gray, 1.3, 5)

        for (x, y, w, h) in faces:

            cv2.rectangle(img, (x, y), (x + w, y + h), (255, 0, 0), 2)

            # incrementing sample number

            sampleNum = sampleNum + 1

            # saving the captured face in the dataset folder TrainingImage

            cv2.imwrite("TrainingImage\ " + name + "." + str(serial) + "." + Id + '.' + str(sampleNum) + ".jpg",

                        gray[y:y + h, x:x + w])

            # display the frame

            cv2.imshow('Taking Images', img)

            # wait for 100 milliseconds

            if cv2.waitKey(100) & 0xFF == ord('q'):

                break

            # break if the sample number is morethan 100

            elif sampleNum > 100:

                break

    cam.release()

```

```

cv2.destroyAllWindows()

res = "Images Taken for ID : " + Id

row = [serial, ", Id, ", name]

with open('StudentDetails\StudentDetails.csv', 'a+') as csvFile:

    writer = csv.writer(csvFile)

    writer.writerow(row)

csvFile.close()

message1.configure(text=res)

else:

    if (name.isalpha() == False):

        res = "Enter Correct name"

        message.configure(text=res)

#####

#####

def TrainImages():

    check_haarcascadefile()

    assure_path_exists("TrainingImageLabel/")

    recognizer = cv2.face_LBPHFaceRecognizer.create()

    harcascadePath = "haarcascade_frontalface_default.xml"

    detector = cv2.CascadeClassifier(harcascadePath)

    faces, ID = getImagesAndLabels("TrainingImage")

    try:

        recognizer.train(faces, np.array(ID))

    except:

```

```

mess._show(title='No Registrations', message='Please Register someone first!!!')

return

recognizer.save("TrainingImageLabel\Trainer.yml")

res = "Profile Saved Successfully"

message1.configure(text=res)

message.configure(text='Total Registrations till now : ' + str(ID[0]))

#####
#####3

def getImagesAndLabels(path):

    # get the path of all the files in the folder

    imagePaths = [os.path.join(path, f) for f in os.listdir(path)]

    # create empty face list

    faces = []

    # create empty ID list

    Ids = []

    # now looping through all the image paths and loading the Ids and the images

    for imagePath in imagePaths:

        # loading the image and converting it to gray scale

        pillImage = Image.open(imagePath).convert('L')

        # Now we are converting the PIL image into numpy array

        imageNp = np.array(pillImage, 'uint8')

        # getting the Id from the image

        ID = int(os.path.split(imagePath)[-1].split(".")[1])

        # extract the face from the training imagesample

```

```

    faces.append(imageNp)

    lds.append(ID)

return faces, lds

```

```

#####
#####

```

```

def TrackImages():

    check_haarcascadeFile()

    assure_path_exists("Attendance/")

    assure_path_exists("StudentDetails/")

    for k in tv.get_children():

        tv.delete(k)

    msg = "

    i = 0

    j = 0

    recognizer = cv2.face.LBPHFaceRecognizer_create() # cv2.createLBPHFaceRecognizer()

    exists3 = os.path.isfile("TrainingImageLabel\Trainer.yml")

    if exists3:

        recognizer.read("TrainingImageLabel\Trainer.yml")

    else:

        mess._show(title='Data Missing', message='Please click on Save Profile to reset data!!')

    return

    harcascadePath = "haarcascade_frontalface_default.xml"

    faceCascade = cv2.CascadeClassifier(harcascadePath);

```

```

cam = cv2.VideoCapture(0)

font = cv2.FONT_HERSHEY_SIMPLEX

col_names = ['Id', '', 'Name', '', 'Date', '', 'Time']

exists1 = os.path.isfile("StudentDetails\\StudentDetails.csv")

if exists1:

    df = pd.read_csv("StudentDetails\\StudentDetails.csv")

else:

    mess._show(title='Details Missing', message='Students details are missing, please check!')

    cam.release()

    cv2.destroyAllWindows()

    window.destroy()

while True:

    ret, im = cam.read()

    gray = cv2.cvtColor(im, cv2.COLOR_BGR2GRAY)

    faces = faceCascade.detectMultiScale(gray, 1.2, 5)

    for (x, y, w, h) in faces:

        cv2.rectangle(im, (x, y), (x + w, y + h), (225, 0, 0), 2)

        serial, conf = recognizer.predict(gray[y:y + h, x:x + w])

        if (conf < 50):

            ts = time.time()

            date = datetime.datetime.fromtimestamp(ts).strftime('%d-%m-%Y')

            timeStamp = datetime.datetime.fromtimestamp(ts).strftime('%H:%M:%S')

            aa = df.loc[df['SERIAL NO.'] == serial]['NAME'].values

            ID = df.loc[df['SERIAL NO.'] == serial]['ID'].values

            ID = str(ID)

```

```

ID = ID[1:-1]

bb = str(aa)

bb = bb[2:-2]

attendance = [str(ID), ", ", bb, ", ", str(date), ", ", str(timeStamp)]

else:

    Id = 'Unknown'

    bb = str(Id)

    cv2.putText(im, str(bb), (x, y + h), font, 1, (255, 255, 255), 2)

cv2.imshow('Taking Attendance', im)

if (cv2.waitKey(1) == ord('q')):

    break

ts = time.time()

date = datetime.datetime.fromtimestamp(ts).strftime('%d-%m-%Y')

exists = os.path.isfile("Attendance\Attendance_" + date + ".csv")

if exists:

    with open("Attendance\Attendance_" + date + ".csv", 'a+') as csvFile1:

        writer = csv.writer(csvFile1)

        writer.writerow(attendance)

    csvFile1.close()

else:

    with open("Attendance\Attendance_" + date + ".csv", 'a+') as csvFile1:

        writer = csv.writer(csvFile1)

        writer.writerow(col_names)

        writer.writerow(attendance)

```

```

csvFile1.close()

with open("Attendance\Attendance_" + date + ".csv", 'r') as csvFile1:

    reader1 = csv.reader(csvFile1)

    for lines in reader1:

        i = i + 1

        if (i > 1):

            if (i % 2 != 0):

                iidd = str(lines[0]) + ' '

                tv.insert("", 0, text=iidd, values=(str(lines[2]), str(lines[4]), str(lines[6])))

csvFile1.close()

cam.release()

cv2.destroyAllWindows()

##### USED STUFFS
#####

global key

key = "

ts = time.time()

date = datetime.datetime.fromtimestamp(ts).strftime('%d-%m-%Y')

day,month,year=date.split("-")

mont={'01':'January',

      '02':'February',

      '03':'March',

```

```
'04': 'April',  
'05': 'May',  
'06': 'June',  
'07': 'July',  
'08': 'August',  
'09': 'September',  
'10': 'October',  
'11': 'November',  
'12': 'December'  
}
```

```
##### GUI FRONT-END  
#####
```

```
window = tk.Tk()  
  
window.geometry("1280x720")  
  
window.resizable(True, False)  
  
window.title("Attendance System")  
  
window.configure(background='#262523')  
  
  
frame1 = tk.Frame(window, bg="#00aeef")  
  
frame1.place(relx=0.11, rely=0.17, relwidth=0.39, relheight=0.80)  
  
  
frame2 = tk.Frame(window, bg="#00aeef")  
  
frame2.place(relx=0.51, rely=0.17, relwidth=0.38, relheight=0.80)
```

```
message3 = tk.Label(window, text="Face Recognition Based Attendance System",
fg="white",bg="#262523",width=55,height=1,font=('times', 29, ' bold '))
```

```
message3.place(x=10, y=10)
```

```
frame3 = tk.Frame(window, bg="#c4c6ce")
```

```
frame3.place(relx=0.52, rely=0.09, relwidth=0.09, relheight=0.07)
```

```
frame4 = tk.Frame(window, bg="#c4c6ce")
```

```
frame4.place(relx=0.36, rely=0.09, relwidth=0.16, relheight=0.07)
```

```
datef = tk.Label(frame4, text = day+"-"+mont[month]+"-"+year+" | ", fg="orange",bg="#262523",width=55,
,height=1,font=('times', 22, ' bold '))
```

```
datef.pack(fill='both',expand=1)
```

```
clock = tk.Label(frame3,fg="orange",bg="#262523",width=55,height=1,font=('times', 22, ' bold '))
```

```
clock.pack(fill='both',expand=1)
```

```
tick()
```

```
head2 = tk.Label(frame2, text="                For New Registrations                ",
fg="black",bg="#3e4e48",font=('times', 17, ' bold '))
```

```
head2.grid(row=0,column=0)
```

```
head1 = tk.Label(frame1, text="                For Already Registered                ",
fg="black",bg="#3e4e48",font=('times', 17, ' bold '))
```

```
head1.place(x=0,y=0)
```

```
lbl = tk.Label(frame2, text="Enter ID",width=20,height=1,fg="black",bg="#00aeef",font=('times', 17, '
bold '))
```

```
lbl.place(x=80, y=55)
```

```
txt= tk.Entry(frame2,width=32 ,fg="black",font=('times', 15, ' bold '))
```

```
txt.place(x=30, y=88)
```

```
lbl2 = tk.Label(frame2, text="Enter Name",width=20 ,fg="black" ,bg="#00aeff" ,font=('times', 17, ' bold '))
```

```
lbl2.place(x=80, y=140)
```

```
txt2 = tk.Entry(frame2,width=32 ,fg="black",font=('times', 15, ' bold '))
```

```
txt2.place(x=30, y=173)
```

```
message1 = tk.Label(frame2, text="1)Take Images >>> 2)Save Profile" ,bg="#00aeff" ,fg="black"  
 ,width=39 ,height=1, activebackground = "yellow" ,font=('times', 15, ' bold '))
```

```
message1.place(x=7, y=230)
```

```
message = tk.Label(frame2, text="" ,bg="#00aeff" ,fg="black" ,width=39,height=1, activebackground =  
 "yellow" ,font=('times', 16, ' bold '))
```

```
message.place(x=7, y=450)
```

```
lbl3 = tk.Label(frame1, text="Attendance",width=20 ,fg="black" ,bg="#00aeff" ,height=1 ,font=('times', 17,  
 ' bold '))
```

```
lbl3.place(x=100, y=115)
```

```
res=0
```

```
exists = os.path.isfile("StudentDetails\StudentDetails.csv")
```

```
if exists:
```

```
    with open("StudentDetails\StudentDetails.csv", 'r') as csvFile1:
```

```

        reader1 = csv.reader(csvFile1)

        for l in reader1:

            res = res + 1

        res = (res // 2) - 1

        csvFile1.close()

    else:

        res = 0

    message.configure(text='Total Registrations till now : '+str(res))

##### MENUBAR #####

menubar = tk.Menu(window,relief='ridge')

filemenu = tk.Menu(menubar,tearoff=0)

filemenu.add_command(label='Change Password', command = change_pass)

filemenu.add_command(label='Contact Us', command = contact)

filemenu.add_command(label='Exit',command = window.destroy)

menubar.add_cascade(label='Help',font=('times', 29, ' bold '),menu=filemenu)

##### TREEVIEW ATTENDANCE TABLE #####

tv= ttk.Treeview(frame1,height =13,columns = ('name','date','time'))

tv.column('#0',width=82)

tv.column('name',width=130)

tv.column('date',width=133)

tv.column('time',width=133)

```

```
tv.grid(row=2,column=0,padx=(0,0),pady=(150,0),columnspan=4)
```

```
tv.heading('#0',text ='ID')
```

```
tv.heading('name',text ='NAME')
```

```
tv.heading('date',text ='DATE')
```

```
tv.heading('time',text ='TIME')
```

```
##### SCROLLBAR #####
```

```
scroll=ttk.Scrollbar(frame1,orient='vertical',command=tv.yview)
```

```
scroll.grid(row=2,column=4,padx=(0,100),pady=(150,0),sticky='ns')
```

```
tv.configure(yscrollcommand=scroll.set)
```

```
##### BUTTONS #####
```

```
clearButton = tk.Button(frame2, text="Clear", command=clear ,fg="black" ,bg="#ea2a2a" ,width=11  
,activebackground = "white" ,font=('times', 11, ' bold '))
```

```
clearButton.place(x=335, y=86)
```

```
clearButton2 = tk.Button(frame2, text="Clear", command=clear2 ,fg="black" ,bg="#ea2a2a" ,width=11 ,  
activebackground = "white" ,font=('times', 11, ' bold '))
```

```
clearButton2.place(x=335, y=172)
```

```
takeImg = tk.Button(frame2, text="Take Images", command=TakeImages ,fg="white" ,bg="blue"  
,width=34 ,height=1, activebackground = "white" ,font=('times', 15, ' bold '))
```

```
takeImg.place(x=30, y=300)
```

```
trainImg = tk.Button(frame2, text="Save Profile", command=psw ,fg="white" ,bg="blue" ,width=34  
,height=1, activebackground = "white" ,font=('times', 15, ' bold '))
```

```
trainImg.place(x=30, y=380)
```

```
trackImg = tk.Button(frame1, text="Take Attendance", command=TrackImages ,fg="black" ,bg="yellow"  
,width=35 ,height=1, activebackground = "white" ,font=('times', 15, ' bold '))
```

```
trackImg.place(x=30,y=50)
```

```
quitWindow = tk.Button(frame1, text="Quit", command=window.destroy ,fg="black" ,bg="red" ,width=35  
,height=1, activebackground = "white" ,font=('times', 15, ' bold '))
```

```
quitWindow.place(x=30, y=450)
```

```
##### END #####
```

CHAPTER-6

EXPERIMENTAL FIGURES

MODEL SUMMARY:

Face Recognition Based Attendance System
-February-2021 22:01:55

For Already Registered

Take Attendance

Attendance

ID	NAME	DATE	TIME
----	------	------	------

Quit

For New Registrations

Enter ID

Clear

Enter Name

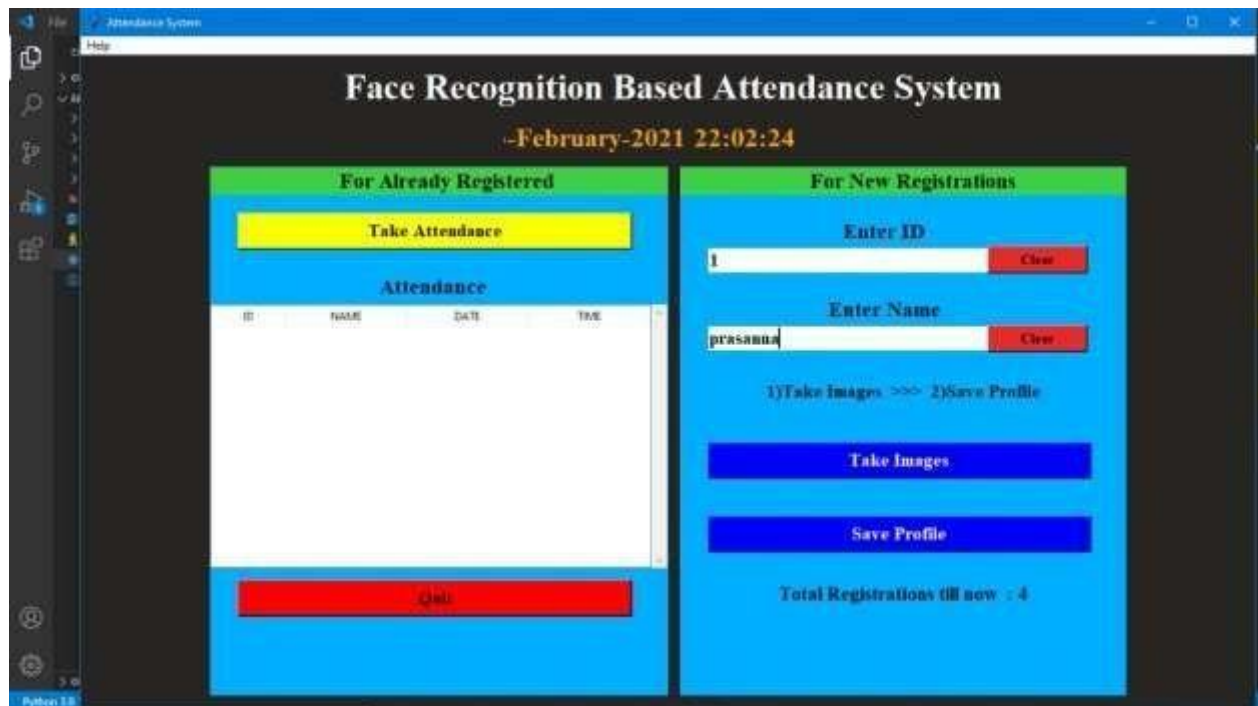
Clear

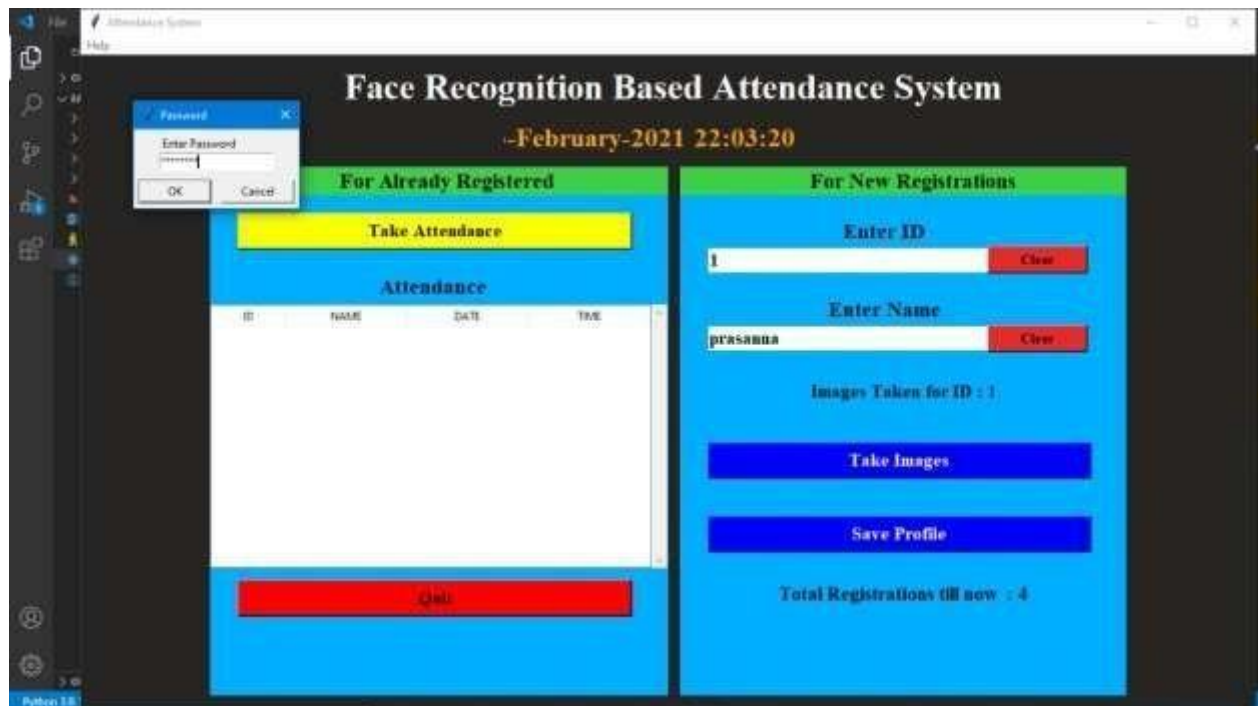
1)Take Images >>> 2)Save Profile

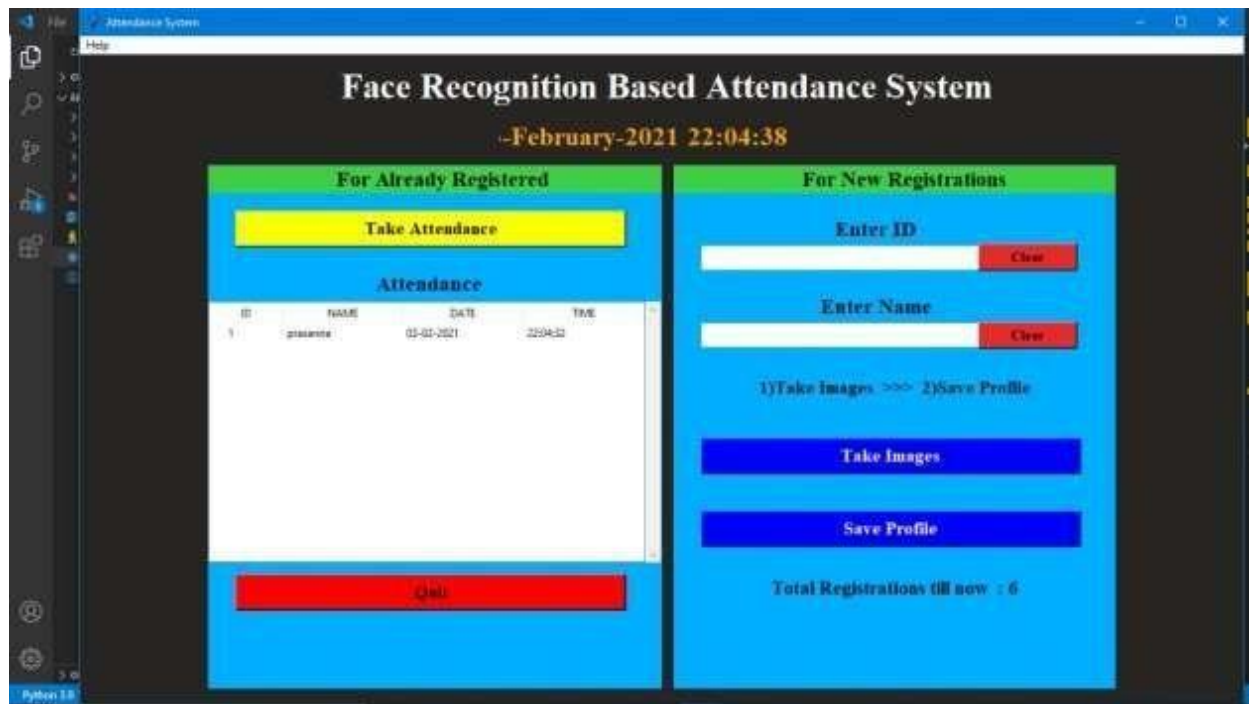
Take Images

Save Profile

Total Registrations till now : 4







LIMITATIONS

1. Image quality affects how well facial-recognition algorithms work. **The image quality of scanning video is quite low compared with that of a digital camera.** Even high-definition video is, at best, 1080p (progressive scan); usually, it is 720p. These values are equivalent to about 2MP and 0.9MP, respectively, while an inexpensive digital camera attains 15MP. The difference is quite noticeable.
2. When a face-detection algorithm finds a face in an image or in a still from a video capture, the relative size of that face compared with the enrolled image size **affects how well the face will be recognized.** An already small image size, coupled with a target distant from the camera, means that the detected face is only 100 to 200 pixels on a side. Further, having to scan an image for varying face sizes is a processor-intensive activity. Most algorithms allow specification of a face-size range to help eliminate false positives on detection and speed up image processing.
3. **The relative angle of the target's face influences the recognition score profoundly.** When a face is enrolled in the recognition software, usually multiple angles are used (profile, frontal and 45-degree are common). Anything less than a frontal view affects the algorithm's capability to generate a template for the face. The more direct the image (both enrolled and probe image) and the higher its resolution, the higher the score of any resulting matches.
4. Even though high-definition video is quite low in resolution when compared with digital camera images, it still occupies significant amounts of disk space. so usually only a fraction (10 percent to 25 percent) is actually run through a recognition system. Processing every frame of project is an enormous evolution. To minimize total processing time, agencies can use clusters of computers. However, adding computers involves considerable data transfer over a network, which can be bound by input-output restrictions, further limiting processing speed. Ironically, humans are vastly superior to technology when it comes to facial recognition. But humans can only look for a few individuals at a time when watching a source video. A computer can compare many individuals against a database of thousands.

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theekapun@gmail.com tokai@fuis.fuis.fukui-u.ac.jp, hase@fuis.fuis.fukui

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AUTOMATED ATTENDANCE SYSTEM BASED ON FACIAL RECOGNITION

Ravuri Neethu Choudary¹, Potla Lakshmi Prasanna², Dr.S.Jancy³

¹ B.E. Computer science and Engineering, Sathyabama Institute of Science and Technology, Chennai, India

² B.E. Computer science and Engineering, Sathyabama Institute of Science and Technology, Chennai, India

³ Assistant Professor, Department of Computer Science and Engineering, SIST, Chennai, India

ABSTRACT---*The management of educational establishments are concerned about the regular attendance in school. As, attendance-report has become a key factor while evaluating a student, their overall academic performance alone doesn't quite cut it now. Traditionally, we are used to taking attendance either by calling out student's admission numbers or taking their signatures in a log book. They both were more time expecting and troublemaking. Subsequently, there is a necessity of PC based understudy participation in the executives' framework which will help the workforce for keeping up participation records. In this undertaking, we have actualized the computerized participation framework utilizing OPEN CV package in Python. We have anticipated our plans to execute "Automated Attendance System Based on Facial Recognition", in which it incorporates huge applications. The application incorporates profile distinguishing proof, which spares time and dispenses with odds of intermediary participation in view of the facial approval. Thus, this framework can be actualized in a field where participation assumes a significant job. Although this project has many iterations in the past, we made it more effective by using PCA algorithm and Haar Cascade classifier, this helps us train the images of a student even when they are faced lateral to the web camera.*

Keywords: Face Recognition, Python, Tkinter, Imaging Library, Haar Cascade.

INTRODUCTION

The technology aims in making a tremendous knowledge oriented technical creations now a days. Deep Learning is one among the interesting domains that enables the machine to train itself by providing some datasets as input and provides an appropriate output during testing by applying different identical learning algorithm. These days taking-attendance is considered as an important factor for both the student as well as the teacher of an educational institutes and organizations. With the improvement of the deep learning technology the machine automatically identifies the attendees of the students and maintains a report of those collected data. In general, the student's assistance of the user can be maintained in two different forms namely, Manual Attendance System (MAS), Automated Attendance System (AAS).

Manual Student Attendance-taking system is a process where a teacher concerned with the respective subject teacher need to call the students name and mark the attendance by hand. Manual report may be taken as a time consuming process or sometimes it happens for the teacher to miss someone's name or pupil may answer the appearance on the absence of their others.

So, the problem arises when we think about the traditional process of taking presence in the classroom. To solve all these issues we go with AAS. Automated Attendance System (AAS) is a process to automatically automate the presence or absence

of the student in the classroom by using Face Recognition Technology. The student is sleeping or awake during the conference and it can also be implemented in the exam sessions to ensure the student's presence. Student's presence can be determined by capturing their faces on a high definition monitor video streaming service, so it becomes highly reliable for the machine to understand the presence of all the student in the classroom. The two common Human Facial Recognition techniques are, Feature-based approach, Brightness-based approach. The Feature-based approach also known as local expression recognition system, used in pointing the key features of the face like eyes, ears, nose, mouth, edges, etc., and the brightness-based approach also termed as the global profile identification system, used in recognizing all the parts of the image.

LITERATURE SURVEY

A Counterpart Approach to Attendance and Feedback System using Machine Learning Techniques: In this document, the idea of two technologies has been implemented, the system of assistance and Feedback of two technologies, with an automatic learning approach. This process automatically detects the pupil's performance and maintains the student's records like attendance and their feedback on the subjects like Science, Maths, etc. Therefore the presence of the student can be made available by recognizing the face. On recognizing, the attendance details and subject details about the marks of the student is obtained as feedback.

Automated Attendance Detection System Using Face Recognition: Automated Attendance Detection pattern using Facial expressions Identification proposes that the structure is based on facial detection and acknowledgement algorithms, which is used to automatically detect the student face when the student enters the class and the system is capable to mark the attendance by recognizing them. Viola Jones Algorithm had been used for face identification which used to detect human

features using most significant approach Cascade classifier and PCA algorithms for feature selection and SVM for classification. When compared to traditional attendance taking, this system saves the time and also helps to monitor the students.

Students Attendance Systems Using Iris Detection: In

this proposed system the students are required to stand in front of the camera to detect and recognize the iris, for the system to dial the attendance for the student. Some algorithms like Grey

Facial Recognition-based Lecture Attendance System:

This paper process states that the system takes the attendance automatically identifications obtained by continuous monitoring. Continuous monitoring helps in estimating and improving the performance of the attendance. To get the report of attention for the day, positions and facial images of the student's present in the classroom are captured. Through continuous observation and recording the structure estimates exact seating position and the location of each student for attendance marking. The entire work is focused on the method to obtain the different weights of each focused seat according to its definite location. The effectiveness of the picture is also being taken into consideration to enable the faster identification of the image.

Fingerprint Based recognition systems: In this existing fingerprint-based attendance system, a portable fingerprint device must be configured with the student's fingerprint above. Later either during conference hours or before, the student needs to record the fingerprint on the configured device to ensure their attendance for the day. The problem with this approach is that during the lecture time it may divert the attention of the students.

RFID (Radio Frequency Identification) Based recognition systems: In the RFID-based existing system, the student needs to hold a Radio Frequency Identity Card with them wherever they go and place the ID on the card reader to record their presence for that particular day. The system is capable of to connect to RS32 and record the attendance to the recorded database. There are possibilities for theunauthorised access also. Some of the pupil may make use ofother student's ID to ensure their presence when the particular student is absent or they even try to mislead it sometimes.

3.3 Iris Based Recognition Systems: In this system, the user needs to stand in front of a camera, so that the camera will scan the eyes of the person. The scanned iris (eyes) is matched with data of child stored in the database and the appearance on their presence needs be updated. This reduces the paper and pen work of the faculty member of the institute. This also reduces the chances of proxies in the class, and helps in *Capt* maintaining the person records crystal clear. It is a wireless networking technique that solves the problem of fraudulent attendance and the trouble of laying the corresponding symmetric network.

3.4 Facial Based Recognition Systems:

The facial recognition technology can be used in recording the attendance through a high-resolution digital surveillance camera that identifies and recognizes the appearance of the students and the machine compares the recognized face with students' face pictures which are stored in the database previously. Once the face of the student is matched with the stored image, then the attendance is marked in respective created attendance database for further calculation. If the captured image doesn't match with the students' head in the database then the latest image is stored as a new image onto the database as updated image. In this process, there are possibilities for the camera not to capture the forms properly or it may miss some of the students from capturing due to the light significance.

The major duty of the proposed system is to capture the face of each member and to store it in the database for their attendance. The face of the student is to be captured in such a way 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 including face mask. There is no need for the teacher to take attendance in the class manually because the system records a video and through further processing steps the face is being recognized and the attendance database will be updated.

The main working principle of the project is that, the video captured data is converted into image and further converted into binary data and to detect and recognize it. Further the recognized photograph of the person is provided with report, or else the process marks the database as absent.

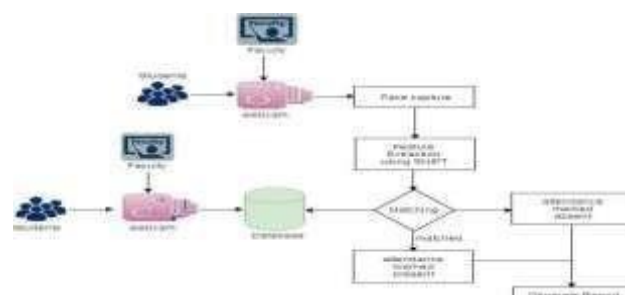


Figure 1.1

The Camera is fixed at a particular distance inside a classroom to capture videos of the frontal images of the entire students of the class in one complete go.

Separate as frames from the video:

The captured video needs to be converted into frames per second for easier detection and consideration of the students' face to generate the reporting database.



Figure 1.2

Face Detection:

Face Detection is the process where the image, given as an input is searched to find any face in the classroom, after finding the face the image processing cleans up the facial posture for easier recognition of the already present data. PCA algorithm can be implemented to detect the profile.



Figure 1.3

Face Recognition:

After the completion of detecting and processing the face, it is compared to the faces present in the students' database to update the attendance of the students.



Figure 1.4

Post-Processing:

The post-processing mechanism involves the process of updating the names of the student into an excel sheet. The excel sheet can be maintained on a weekly basis or monthly basis to record the students' appearance. This presence record can be sent to parents or guardians of students to report the performance of the person in the class.

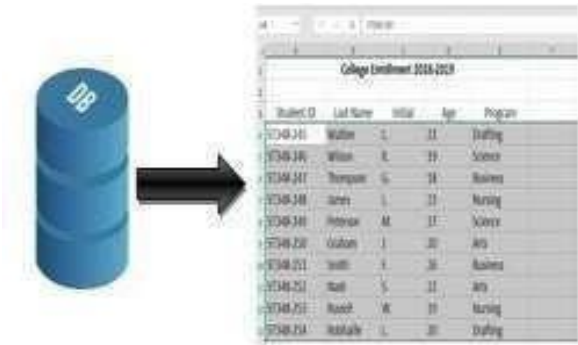


Figure 1.5

CONCLUSION

Thus, the aim of this paper is to capture the images of the students, convert it into frames (binary format), and relate it with the database to ensure their presence or absence and mark attendance according to the particular student to maintain the record. The Automated Attendance Taking always helps in increasing the accuracy, reduces the time and increasing of speed ultimately achieve the high-precision real-time presence report to meet the need for automatic classroom evaluation.

FUTURE ENHANCEMENTS

Automatic Attendance System can be implemented in larger areas like in a seminar hall where it helps in sensing the presence of many people. Sometimes the poor lighting condition of the classroom can affect image quality, which indirectly affects system performance. This can be fixed at a later stage by improving the video quality or by using some algorithm.

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Sentence

AUTOMATED ATTENDANCE SYSTEM BASED ON FACIAL RECOGNITION Ravuri Neethu Choudary¹, Potla Lakshmi Prasanna², Dr.S.Jancy³ 1 B.E. Computer science and Engineering, Sathyabama Institute of Science and Technology, Chennai, India 2 B.E. Computer science and Engineering, Sathyabama Institute of Science and Technology, Chennai, India 3 Assistant Professor, Department of Computer Science and Engineering, SIST, Chennai, India

ABSTRACT---The management of educational establishments are concerned about the regular attendance in school. As, attendance-report has become a key factor while evaluating a student, their overall academic performance alone doesn't quite cut it now. Traditionally, we are used to taking attendance either by calling out student's admission numbers or taking their signatures in a log book. They both were more time expecting and troublemaking. Subsequently, there is a necessity of PC based understudy participation in the executives' framework which will help the workforce for keeping up participation records. In this undertaking, we have actualized the computerized participation framework utilizing OPEN CV package in Python. We have anticipated our plans to execute "Automated Attendance System Based on Facial Recognition", in which it incorporates huge applications. The application incorporates profile distinguishing proof, which spares time and dispenses with odds of intermediary participation in view of the facial approval. Thus, this framework can be actualized in a field where participation assumes a significant job. This application is planned to utilize the VISUAL STUDIO CODE platform. The proposed framework utilizes the PRINCIPLE COMPONENT ANALYSIS (PCA) algorithm and Haar Cascade classifier which depends on the Face Recognizer approach. This calculation analyses the test picture and preparing pictures and decides understudies who are available and missing. We likewise utilized different other Python packages, for example, Tkinter, Math, Pandas and the Python Imaging Library. The participation record is kept up in an exceed expectations sheet which is refreshed naturally in the system. Although this project has many iterations in the past, we made it more effective by using PCA algorithm and Haar Cascade classifier, this helps us train the images of a student even when they are faced lateral to the web camera. **Keywords:** Face Recognition, Python, Tkinter, Imaging Library, Haar Cascade.

INTRODUCTION The technology aims in making a tremendous knowledge oriented technical creations now a days. Deep Learning is one among the interesting domains that enables the machine to train itself by providing some datasets as input and provides an appropriate output during testing by applying different identical learning algorithm. These days taking-attendance is considered as an important factor for both the student as well as the teacher of an educational institutes and organizations. With the improvement of the deep learning technology the machine automatically identifies the attendees of the students and maintains a report of those collected data. In general, the student's assistance of the user can be maintained in two different forms namely, Manual Attendance System (MAS), Automated Attendance System (AAS). Manual Student Attendance-taking system is a process where a teacher concerned with the respective subject teacher need to call the students name and mark the attendance by hand. Manual report may be taken as a time consuming process or sometimes it happens for the teacher to miss someone's name or pupil may answer the appearance on the absence of their others. So, the problem arises when we think about the traditional process of taking presence in the classroom. To solve all these issues we go with AAS.

Automated Attendance System (AAS) is a process to automatically automate the presence or absence of the student in the classroom by using Face Recognition Technology. The student is sleeping or awake during the conference and it can also be implemented in the exam sessions to ensure the student's presence. Student's presence can be determined by capturing their faces on a high definition monitor video streaming service, so it becomes highly reliable for the machine to understand the presence of all the student in the classroom. The two common Human Facial Recognition techniques are, Feature-based approach, Brightness-based approach. The Feature-based approach also known as local expression recognition system, used in pointing the key features of the face like eyes, ears, nose, mouth, edges, etc., and the brightness-based approach also termed as the global profile identification system, used in recognizing all the parts of the image.

LITERATURE SURVEY

2.1 A Counterpart Approach to Attendance and Feedback System using Machine Learning Techniques: In this document, the idea of two technologies has been implemented, the system of assistance and Feedback of two technologies, with an automatic learning approach. This process automatically detects the pupil's performance and maintains the student's records like attendance and their feedback on the subjects like Science, Maths, etc. Therefore the presence of the student can be made available by recognizing the face. On recognizing, the attendance details and subject details about the marks of the student is obtained as feedback.

2.2 Automated Attendance Detection System Using Face Recognition: Automated Attendance Detection pattern using Facial expressions Identification proposes that the structure is based on facial detection and acknowledgement algorithms, which is used to automatically detect the student face when the student enters the class and the system is capable to mark the attendance by recognizing them. Viola Jones Algorithm had been used for face identification which

used to detect human features using most significant approach Cascade classifier and PCA algorithms for feature selection and SVM for classification. When compared to traditional attendance taking, this system saves the time and also helps to monitor the students.

2.3 Students Attendance Systems Using Iris Detection:

In this proposed system the students are required to stand in front of the camera to detect and recognize the iris, for the system to dial the attendance for the student. Some algorithms like Grey Scale Conversion, Six Segment Rectangular Filter, and Skin Pixel Detection are being used to detect the eyes. It helps in reducing the issues of repetitive attendance and it maintains the presence of the entire class in an effective manner, but one of the time-consuming process for a pupil or a staff to wait until the completion of the previous members.

2.4 Facial Recognition-based Lecture Attendance System:

This paper process states that the system takes the attendance automatically identifications obtained by continuous monitoring. Continuous monitoring helps in estimating and improving the performance of the attendance. To get the report of attention for the day, positions and facial images of the student's present in the classroom are captured. Through continuous observation and recording the structure estimates exact seating position and the location of each student for attendance marking. The entire work is focused on the method to obtain the different weights of each focused seat according to its definite location. The effectiveness of the picture is also being taken into consideration to enable the faster identification of the image.

STANDING RECOGNITION SYSTEM

3.1 Fingerprint Based recognition systems:

In this existing fingerprint-based attendance system, a portable fingerprint device must be configured with the student's fingerprint above. Later either during conference hours or before, the student needs to record the fingerprint on the configured device to ensure their attendance for the day. The problem with this approach is that during the lecture time it may divert the attention of the students.

3.2 RFID (Radio Frequency Identification) Based recognition systems:

In the RFID-based existing system, the student needs to hold a Radio Frequency Identity Card with them wherever they go and place the ID on the card reader to record their presence for that particular day. The system is capable of to connect to RS32 and record the attendance to the recorded database. There are possibilities for the unauthorised access also. Some of the pupil may make use of other student's ID to ensure their presence when the particular student is absent or they even try to mislead it sometimes.

3.3 Iris Based Recognition Systems:

In this system, the user needs to stand in front of a camera, so that the camera will scan the eyes of the person. The scanned iris (eyes) is matched with data of child stored in the database and the appearance on their presence needs be updated. This reduces the paper and pen work of the faculty member of the institute. This also reduces the chances of proxies in the class, and helps in maintaining the person records crystal clear. It is a wireless networking technique that solves the problem of fraudulent attendance and the trouble of laying the corresponding symmetric network.

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The facial recognition technology can be used in recording the attendance through a high-resolution digital surveillance camera that identifies and recognizes the appearance of the students and the machine compares the recognized face with students' face pictures which are stored in the database previously. Once the face of the student is matched with the stored image, then the attendance is marked in respective created attendance database for further calculation. If the captured image doesn't match with the students' head in the database then the latest image is stored as a new image onto the database as updated image. In this process, there are possibilities for the camera not to capture the forms properly or it may miss some of the students from capturing due to the light significance.

PROPOSED SYSTEM

The major duty of the proposed system is to capture the face of each member and to store it in the database for their attendance. The face of the student is to be captured in such a way 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 including face mask. There is no need for the teacher to take attendance in the class manually because the system records a video and through further processing steps the face is being recognized and the attendance database will be updated.

RESULTS & DISCUSSIONS

The main working principle of the project is that, the video captured data is converted into image and further converted into binary data and to detect and recognize it. Further the recognized photograph of the person is provided with report, or else the process marks the database as absent.

Figure 1.1

4.1 Capture Images:

The Camera is fixed at a particular distance inside a classroom to capture videos of the frontal images of the entire students of the class in one complete go.

4.2 Separate as frames from the video:

The captured video needs to be converted into frames per second for easier detection and consideration of the students' face to generate the reporting database.

Figure 1.2

4.3 Face Detection:

Face Detection is the process where the image, given as an input is searched to find any face in the classroom, after finding the face the image processing cleans up the facial posture for easier recognition of the already present data. PCA algorithm can be implemented to detect the profile.

Figure 1.3

4.4 Face Recognition:

After the completion of detecting and processing the face, it is compared to the faces present in the students' database to update the attendance of the students.

Figure 1.4

4.5 Post-Processing:

The post-processing mechanism involves the process of updating the names of the student into an excel sheet. The excel sheet can be maintained on a weekly basis or monthly basis to record the students' appearance. This presence record can be sent to parents or guardians of students to report the performance of the person in the class.

Figure 1.5

CONCLUSION

Thus, the aim of this paper is to capture the images of the students, convert it into frames (binary format), and relate it with the database to ensure their presence or absence and mark attendance according to the particular student to maintain the record. The Automated Attendance Taking always helps in increasing the accuracy, reduces the time and increasing of speed ultimately achieve the high-precision real-time presence report to meet the need for automatic classroom evaluation.

FUTURE ENHANCEMENTS

Automatic Attendance System can be implemented in larger areas like in a seminar hall where it helps in sensing the presence of many people. Sometimes the poor lighting condition of the classroom can affect image quality, which indirectly affects system performance. This can be fixed at a later stage by improving the video quality or by using some

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