MASKED FACE RECOGNITION BASED ATTENDANCE SYSTEM

Ashish Maurya[1], Danish Nabi[2], Harshit Jhanwar[3], Jagrit Sharma[4], Asha MS[5]
[1],[2],[3],[4] – Final year students, Department of CSE, DSATM
[5] – Assistant Professor, Department of CSE, DSATM

Abstract

In this challenging time of pandemic, that is covid-19 people are still vulnerable to the virus and hence they want to avoid touching surfaces and taking off masks in public places. Conventional methods of attendance system like biometric system, full face recognition system which doesn't work when the user is wearing a mask now has become obsolete. So we came up with a new automated attendance system in which people won't have to take off their masks and touch surfaces. This will further prevent the spread of viruses. We are going to experiment with different sets of features so that our model will be able to recognize faces even if the person is wearing masks.

Key Terms- *Covid-19, masks, attendance system, face recognition.*

I. INTRODUCTION

In many corporate sectors and other organizations the facial recognition system has many applications like many mobile phone manufacturers have incorporated this feature in their product to unlock or to gain access to certain data. Due to covid-19 the mode of examination has been shifted from offline to online where the whole session is proctored by using facial recognition system.

Due to covid-19 the conventional face recognition system has been compromised so has been the security of various institutions. To overcome this problem we have come up with a solution .

We need to design a facial recognition system which will also work if a person is wearing a mask. The question arises, how will we approach this problem.

What set of features shall we take into consideration to recognize a face correctly. The main problem we are facing here is that most of the facial features are hidden under the mask.

Here, we are combining the facial recognition system and realtime database management system to achieve the automation of attendance.

II. METHODOLOGY

A classifier is used to detect a face from a frame. The detected face passes through a face recognizer that generates features for that face. These features are then again used to recognize faces for future inputs. For recognizing a marked face we need to filter the features so as to eliminate unnecessary features and get a model which would be capable of recognising the person even if he is wearing a mask.

Training the classifier:

IMAGE1(ref fig 1**):**

We are using Haar classifier in this case. While giving input the person shouldn't be wearing a mask. The image can be taken either through a camera or a saved picture. The input image is converted

into a gray scale image to reduce the size. Then the detected face is passed through the LBPHFaceRecognizer which generates features for a particular face. The set of features and labels are then used to train our classifier. This process is repeated multiple times for the same face. Images are captured from different angles and distances for getting a good result.

For the system to recognize a masked face correctly we need to find the set of features which is generating the required. Experimenting with different permutation and combinations of the features and eliminating the obvious feature can give us the required set of features. Now the classifier is trained for these sets of features and labels. This way we have a classifier which is trained against both masked and unmasked faces therefore it can be very efficient.

Face labeling and Attendance system:

IMAGE2(ref fig2):

Again, passing an image with LBPH Face recognizer and the trained classifier will give us the required label. The Label is the unique Id of the person detected. This unique Id could be anything like a green card number or pan card number or employee id for a corporate person or roll number for students. The generated label is then passed to the attendance system which marks the attendance for that particular person.

The attendance system can be a simple interface in any python framework like django or flask. A dictionary can be maintained for the people where the key represents the unique id and value can be either absent or present. Initially all the values would be absent in the dictionary. The value of a particular key gets updated to present if our classifier generates a label for that key. This way attendance can be recorded in a portal without human intervention in an automatic fashion.

III. ILLUSTRATIONS

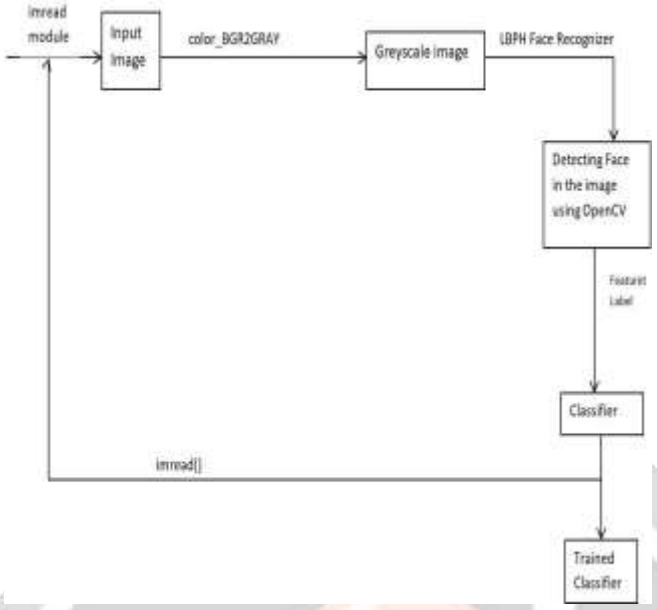
Our project focuses on recognizing the face of a person by using only a few features of the face of a person. We have used an imread module which basically takes images as an input. The input image is nothing but the face of the person who is to be recognized with the help of a high quality camera. imread is a module present in OpenCV library which reads the image from a file and converts it into a matrix, if the system cannot read the image then imread will return an empty matrix.

The input image is then converted to a grayscale image. A grayscale image refines the features of an image making it more clearly recognized by the LBPH Face Recognizer. The LBPH Face Recognizer is one of the simpler forms of facial recognition and has been in use since the year 1996. This recognizer works on a step-by step procedure. It uses 4 parameters, i.e. Radius, Neighbors, Grid X, Grid Y. We use a huge dataset which consists of multiple images taken from various angles of the person to be recognized, with the dataset comprising the same for multiple people.

Every person can be given some type of ID, or their name can be used as labels which can uniquely identify the person to be recognized. The refined dataset is then used as input in the LBPH Face Recognizer, which matches the facial features using the given dataset by splitting it and storing the intensities in the form of a matrix.

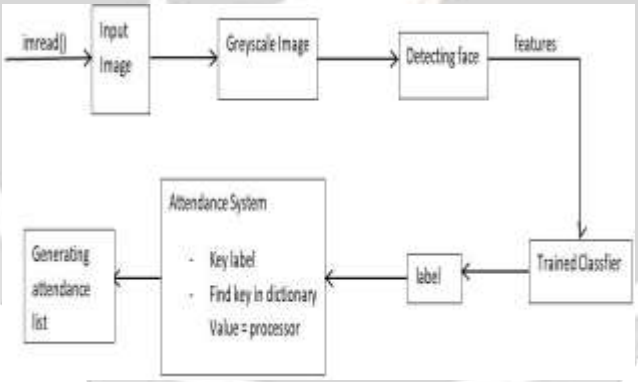
A histogram is generated which will represent the training dataset. Several histograms are generated,

which are later compared with the help of different methods for e.g.: Euclidean Distance, chi-square, absolute value, etc.



(fig1) TRAINING CLASSIFIER

The LBPH Face Recognizer detects the face in the image using OpenCV. And the labels are matched with the given dataset. The processed result is passed on to the classifier. And this processor is repeated multiple times to improve the precision of the result. The final result is called a Trained Classifier.



(fig2)

FACE LABELLING AND ATTENDANCE SYSTEM

The labels updated in the Trained Classifier are

matched with the person from the list of students. If a person is matched with the features provided, his/her attendance is registered as present. And finally the attendance list is generated.

CONCLUSION

Masked face recognition based attendance systems in today's world is quite necessary, because the conventional face recognition techniques don't work when you have a mask on, which usually is nowadays, due to the current covid-19 pandemic. For facial recognition to work with no error, it needs to recognize certain features of face which are necessary to get a match. In order to make it work, this paper provides the solution for this particular problem, where the number of features which are required for detecting and recognizing a face are reduced.

The masked face recognition is achieved by capturing the features like eyes, eyebrows, and the lines near the eyes and forehead precisely with detail. The detection part of this model is done by using HAAR cascade classifiers and the recognition part is done by using LBPH algorithm. For maintaining the attendance record of students, instead of using the conventional database, we are using the realtime cloud based database, which makes the attendance system dynamic.

For future enhancement our goal is to make the system foolproof which any facial recognition system isn't and we can also incorporate the recognition of faces wearing glasses with a mask.

REFERENCES

1. Bhattacharya, Shubhobrata, et al. "Smart Attendance Monitoring System (SAMS): A Face Recognition Based Attendance System for Classroom Environment." 2018 IEEE 18th International Conference on Advanced Learning Technologies (ICALT). IEEE, 2018.

2. Samet,Refik, and Muhammed Tanriverdi. "Face recognition-based mobile automatic classroom attendance management system." 2017 International Conference on Cyberworlds (CW). IEEE, 2017.

3. Arsenovic, Marko, et al. "FaceTime—Deep learning based face recognition attendance system." 2017 IEEE 15th International Symposium on Intelligent Systems and Informatics (SISY). IEEE, 2017.

4. Li, Xiang-Yu, and Zhen-Xian Lin. "Face recognition based on HOG and fast PCA algorithm." The Euro-China Conference on Intelligent Data Analysis and Applications. Springer, Cham, 2017.

5. Karnalim,Oscar,etal. "Face-face at classroom environment: Dataset and exploration." 2018 Eighth International Conference on Image Processing Theory, Tools and Applications (IPTA). IEEE, 2018