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Attendance system with mask detection

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Abstract- *The covid pandemic has resulted in our new normal lifestyle of wearing masks in public places and following social distancing. Therefore, developing a model for identifying an individual wearing a mask had turned obligatory. In addition, in colleges, there is a need for a safe and modern technique for students' attendance system with face recognition. This system is a combination of mask detection with attendance system for students. This system can be applied in industries, offices, companies, conferences and at other public places.*

Index Terms- *Face recognition, eigenfaces, Haar cascade, AdaBoost.*

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I. Introduction

In this situation of COVID, everyone needs to follow COVID regulations. When colleges and schools are opened, a system should operate to verify if students are entering the class with masks or not. In addition, attendance will be considered accordingly.

Face recognition with mask detection, an improved way of identifying an individual with fewer information, as the guidelines of wearing masks in communal places and following social distancing are obligatory to condense the spread of the virus. The education establishments are shut down and the coaching is made virtual. In order to open the institutions back, a proper plan has to be formed to monitor the students to combat the cluster of covids. Therefore, a real time system for mask detection and identifying an individual with a mask is vital. The traditional methods of recognizing person like fingerprints are dangerous since it is against covid regulations.

Therefore, it is mandatory to develop a system to monitor the person with no direct contact. Identifying an individual with a mask on is a mind-numbing process, since most of the facial features stay hidden.

Hence a system has to be engaged to identify an individual with fewer information about his or her facial characteristics. Image processing is broadly used in many applications like image recognition, feature extraction, pattern recognition etc. Here, the student will be detected as wearing a mask properly and allowed for attendance with facial recognition.

Existing system has limitations in recording time of entry and exit of students. We have overcome this limitation in this project. This system keeps record of entry time and exit time of students for the purpose of attendance.

II. Existing System

In the existing system, once students entered the class, they would be marked as present. However, if he/she leaves immediately attendance marks remain the same. That would be fault in attendance. System should record entry time and exit time of students in the database.

Existing system used to capture the video of every student while entering the class. System should capture the individual image of every student to increase the accuracy of face recognition.

Previous systems would be less accurate, as students would be wearing masks, less facial expression would be captured. This could decrease the accuracy of facial recognition.

III. Objectives

- To identify whether students are wearing masks properly or not.
- To mark the attendance if the mask is detected properly.
- To mark students' entry time and exit time.

IV. Technology

- **Face and mask detection**

Initially, the captured photograph is represented as a Haarlike characteristic representation. A second method of enhancing class performance involves AdaBoost. For mask detection, we undertake the custom Haarcascade. The Haarcascade characteristic is modeled the usage of fantastic and poor photographs. Positive photographs country the photographs with facemask. Negative photographs country the photographs without a facemask. For every of the photographs wherein the face is efficiently identified, preprocessing that incorporates comparison adjustment, depth and length normalization turned into performed. The preprocessed photographs are then despatched to the face reputation module.

- **Face recognition**

To perform face recognition, Eigen faces and a local binary pattern histogram (LBPH) are selected in our project. We decided to use these two algorithms because it does not require more time to implement. In addition, each has proven to be viable for implementation in a real-time Surroundings and produced correct popularity results.

- **Face recognition (Eigenfaces)**

Eigenfaces is an integrated based method which makes use of PCA to find a set of attributes that identify variations between the images. It is so useful for face detection and its recognition because of its excellence in finding the difference between varied facial information and proper face image outcome. In the training set, for every image the eigenfaces were calculated and the selected images were those images with maximum eigenvalue. After selecting the images, the weights for these images were calculated and determined accordingly for the eigenspace. Similarly we can identify a new face, by calculating the eigenvector. As a result of estimating the new face image into eigenspace Γ, we have:

$\Omega = U^{\wedge} T\ (\Gamma - \Psi)$

Where □ is the load vector representing a brand new face, □ˆ is the set of first-rate eigenvectors, □ is the combination of vectors and □ is the imply of the vectors. By decreasing the Euclidean distance, ϵ□: ϵ□ = □□□ ‖ □ − □□ ‖ , we are able to discover wherein elegance face □ belongs.

- **Face recognition (LBPH)**

The LBP technique appears to be used in many applications due to its simplicity in real-time and its ability to withstand monotonic changes in the spatial greyscale, as in the case of illumination. It uses texture information derived from a view other than the front perspective to create an apparent local appearance. The pixels of the images are labeled by thresholding the neighbour pixel. The local binary pattern for a defined matrix size of 3x3 is identified by:

$LB\boldsymbol{PH}, = \sum 2\ p\ (io - ip), P-1\ p=0\ with\ (x) = \{\ 1\ x \geq 0\ 1\ x \leq 0'$

(3) This is a combination of io and ip, the center pixel and the neighbour pixel respectively.

Equation P and R represents the use of P sample points in the neighborhood R, while equation s describes the thresholding function. The binary code for this matrix is created by comparing the pixel that represents a threshold to the center pixel, i(po). As a result, a neighbor pixel receives a zero if its value is lower than that of the center pixel; otherwise, the neighbor pixel receives a one. Every region of an image is treated separately. A histogram is then created for each region and then a total histogram is created. Chi-square comparison is used here to compare the image's histogram to the training and new face images.

- **Face recognition with mask classifier using CV**

In order to create this classifier, we will need images as inputs. Datasets comprise images of masks and images of faces without masks. It is necessary to take images of faces for our mask detector model to function. This will be accomplished by using the methods to detect frames that contain faces and then preprocessing the frames to pass them to our model.

Design and implementation

The implementation of this initiated system:

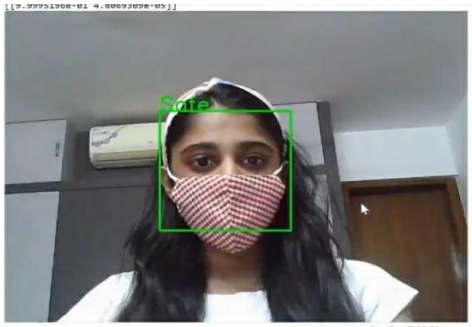
The traditional Haarcascade classifier and the efficient face recognition algorithm, the LBPH from the test displayed is utilised for implementation.

There are three main modules/sections in the implementation of the system:
Module 1: Face recording:
In the face recording module, the system collects the images of the student/person and saves them to the database. First, the system performs face detection and then captures an image using the given name or ID. The correspondence folder under the database stores only images with unique IDs. Before storing the image in the database, the image is resized, converted into a greyscale image and then normalised.

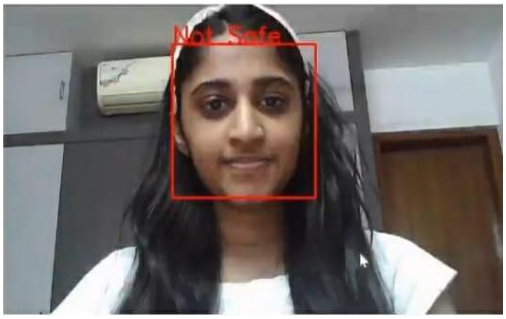
(a) Original image captured

(b) Image converted into greyscale and then stored in database

Module 2: Face and Mask detection identification:
There are several steps in the module for mask detection and facial identification. Face identity of the student/difficulty is achieved, proceeded with the aid of using masks detection. If the student/difficulty isn't always carrying a mask, the gadget indicates a warning ‘now no longer safe'. If masks are detected, the identity technique is achieved through the use of the LBPH. For every of the diagnosed faces, the framework saves information that consists of the call of the difficulty, date and access and go out time of recognition.
If a facemask is detected, the 'Safe' is displayed.



(a)Mask detection alerts safe



(b) Mask detection alerts not safe

Module 3: Attendance report generation:
A report on attendance is generated in the last section of implementation. There are three parts to the report: the time when students enter the lecture, the time when they leave, and the total amount of time spent in the lecture. A screenshot is shown in Figure to illustrate how attendance reports are created.

```
Attendance In:
     Name          Date       Time
0   Disha   05-06-2021   06:28:35
Attendance Out:
     Name          Date       Time
0   Disha   05-06-2021   06:30:14

Attendance In & Out:
    Name      DateIn    TimeIn     DateOut   TimeOut  Engage-Min  @Engage-Hrs
0  Disha  05-06-2021  06:28:35  05-06-2021  06:30:14           1         0.02
```

(a) Screenshot of report generated

V. Flowchart

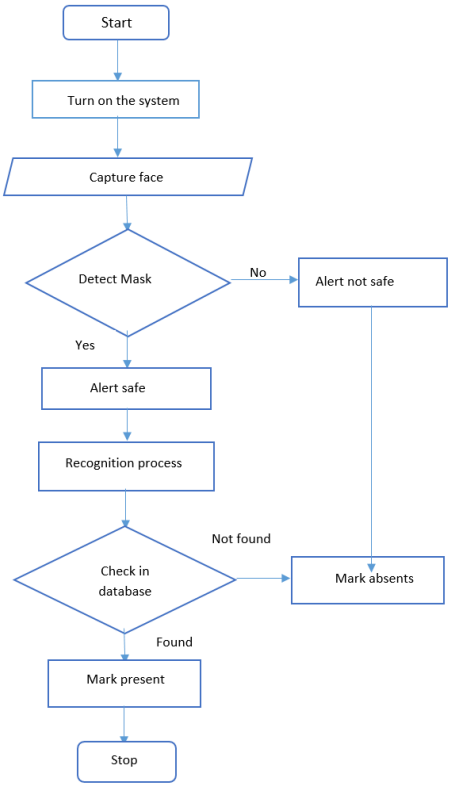


Fig. 1 Flow Chart

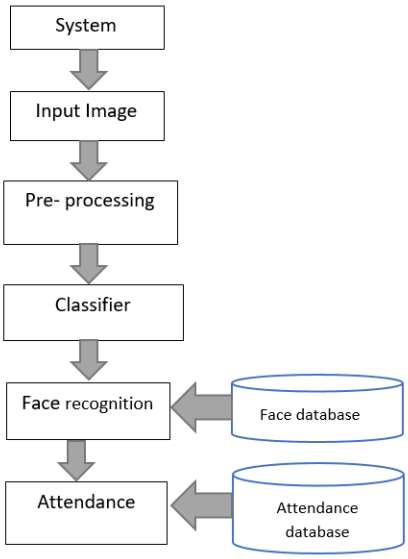


Fig. 2 Block diagram

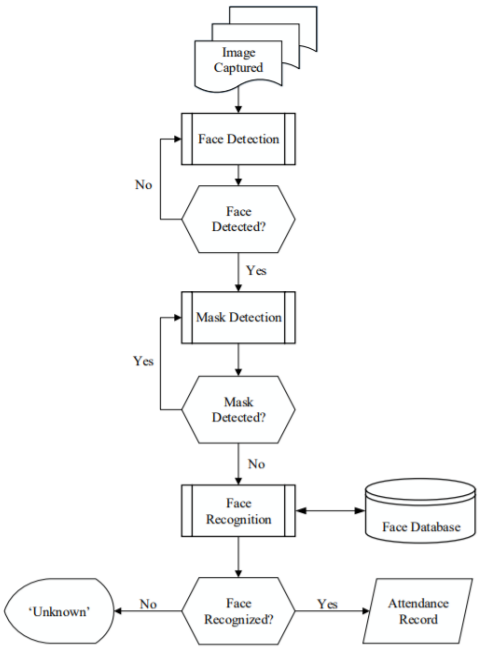


Fig. 3 Framework diagram

VI. Results

```
Attendance In:
     Name         Date       Time
0  Disha  05-06-2021  06:28:35
Attendance Out:
     Name         Date       Time
0  Disha  05-06-2021  06:30:14

Attendance In & Out:
    Name      DateIn    TimeIn     DateOut   TimeOut  Engage-Min  @Engage-Hrs
0  Disha  05-06-2021  06:28:35  05-06-2021  06:30:14           1         0.02
```

Fig. 4 Screenshot of Output

FUTURE SCOPE

As the output of this project, we are generating an excel sheet which includes the in and out time of the students. In the future we can work on an application to make this process more convenient and reliable.

VII. Conclusion

We have introduced an attendance system with mask detection using face recognition. For the conclusion, in this project, a novel face mask detector with an attendance system is proposed, which can possibly contribute to public healthcare. Nevertheless, during this pandemic situation, it is advised that wearing a mask correctly can condense the spread of such viruses around the globe significantly. And present-day arrangements depend on a touch which needs to be excluded given the situation. This system proposes safe attendance for students with following COVID regulations.

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