Face Mask Detection System

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A B S T R A C T

Due to Covid-19 crisis everyone is supposed to wear a mask and it is extremely unfortunate that some people avoid or deny wearing a mask, that being the reason why our team has built a mask detection system for commercial purposes. This system will scan every individual's face passing through the entrance and will check whether the person has their mask on correctly and which was provided by the company that has an Employee ID on it otherwise, the person not wearing a mask properly or not wearing a mask in general would get identified by the system and a notice/warning would get sent to that individual saying that they might get fined for not wearing a mask and violating the guidelines. The security admin will monitor every individual through a certain application that we will be providing and if there is a particular individual who is unidentified by the Employee ID, an alert would be sent to the admin through the same application.

Keywords: Mask Detection System, User, login, application.

1. Introduction

If an individual is wearing a mask which is not provided by the company then that individual's upper face would get scanned and that scanned image/face would get searched in the database. If an individual is wearing a mask which was provided by the company there would not be an issue detecting the individual. Also, if an individual is not wearing a mask properly/correctly or not wearing a mask in general, they will get identified and will get reported to the admin and the individual would get notified. This system serves as both face detection and mask detection. It will also mark the entry time of employees.

Raspberry Pi Camera Module: Use of camera module is made for live tracking, i.e. capturing images, of an individual who shall pass through the entrance to detect whether that individual is wearing a mask or not. If that individual is wearing a mask then, the camera would scan for the ID on the mask and collect the time of entry of that individual. In occurrence of a special case, suppose an individual has their mask on but wasn't the one provided by the Employer would lack the Employee ID in it, during such occurrence the system will detect the individual with the help of face detection algorithm.

App Notify [MD]: This application can be used to receive the alerts and notification from mask detection system. This application will be able to access all the data that is being stored on the database and cloud storage.

Proposed Algorithm : Our team is going to make use of face detection algorithms to identify the face of an individual and use the image processing algorithms to match two different images (with mask and without mask) of the same individual in the database. For the system to further function, our team might use the following mentioned open-source libraries: OPENCV, TENSORFLOW, and KERAS. Our team has planned to develop the described system using python OpenCV and face recognition library. It will run on Raspberry pi or any feasible system with mentioned hardware requirements.

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2. Working of the Model:–

Serial no. SID (student id/RFID), EID (Employee id/RFID) sticker on mask for organization to identify people.
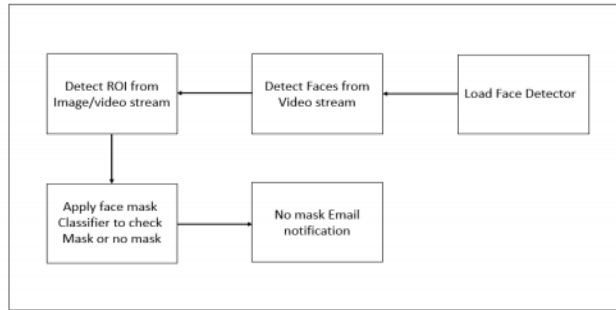

Figure 1 : Modules Diagram

The system is designed to detect the faces to determine whether an individual is wearing a face mask or not. By making use of the data which is mentioned above, we can decide whether an individual should be allowed to enter a particular organization. We can make use of this project in places hospitals, markets, bus terminals, restaurants, and other public gatherings.
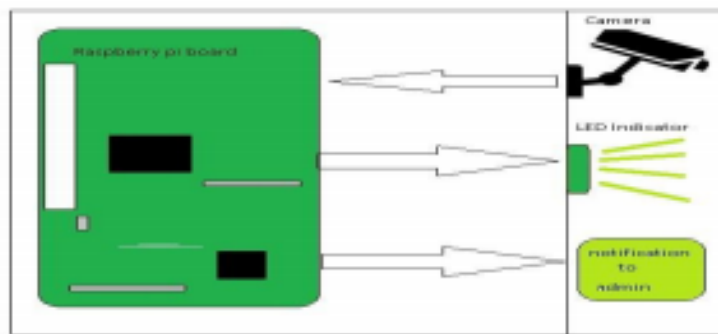

Figure 3 : Architectural Diagram

Figure 2 : Basic Connections

This project consists of a camera that will capture the image of the people entering places and detect whether an individual is wearing a mask or not.

The Mask Detection System would be used for detecting if a person is wearing a mask as per the guidelines issued by the Government. This system would make a significant use in hospitals to keep individuals not wearing a mask outside of the concerned premises.

If an organization has this system installed, our team might develop an app to make it easier for people monitoring the behavior through the camera.
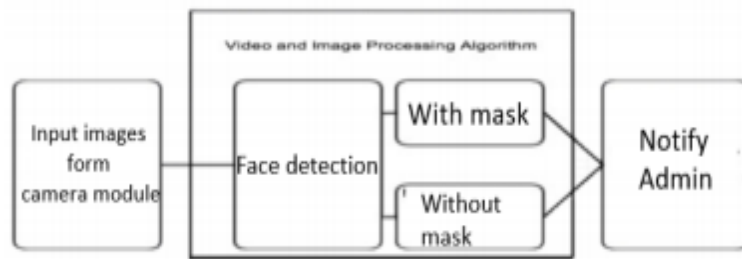
Figure 4 : Working of Model

To summarize it, the system can be used in commercial and socially active areas.
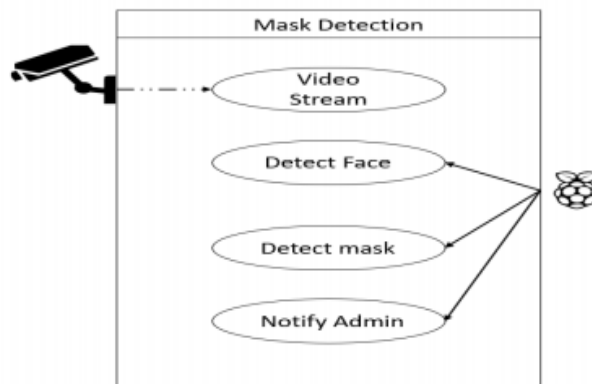

Figure 5 : Data Transfer

This system is designed to detect the faces and to determine whether an individual is wearing a mask or not. By making use of the data which is mentioned above, we can decide whether an individual should be allowed to enter a particular organization. This project can be used in the hospitals, markets, bus terminals, restaurants, and other public gatherings.

3. Experiment and Result

The test set for this evaluation experiment Mask Detection system selected from the mask and no mask database. The machine used for the experiment is Raspberry pi 4 B 2GB memory.The proposed scheme is tested using facial landmarks. From the simulation of the experiment results, we can draw to the conclusion that this method is robust.
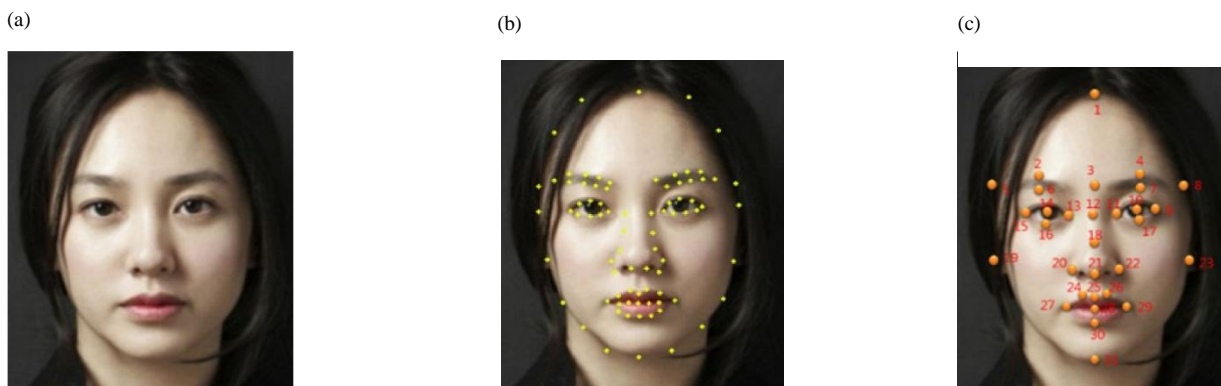
(a)   (b)   (c)

Figure 4 : (a) Original image, (b) Facial Landmarks detection, (c) Facial Landmark points
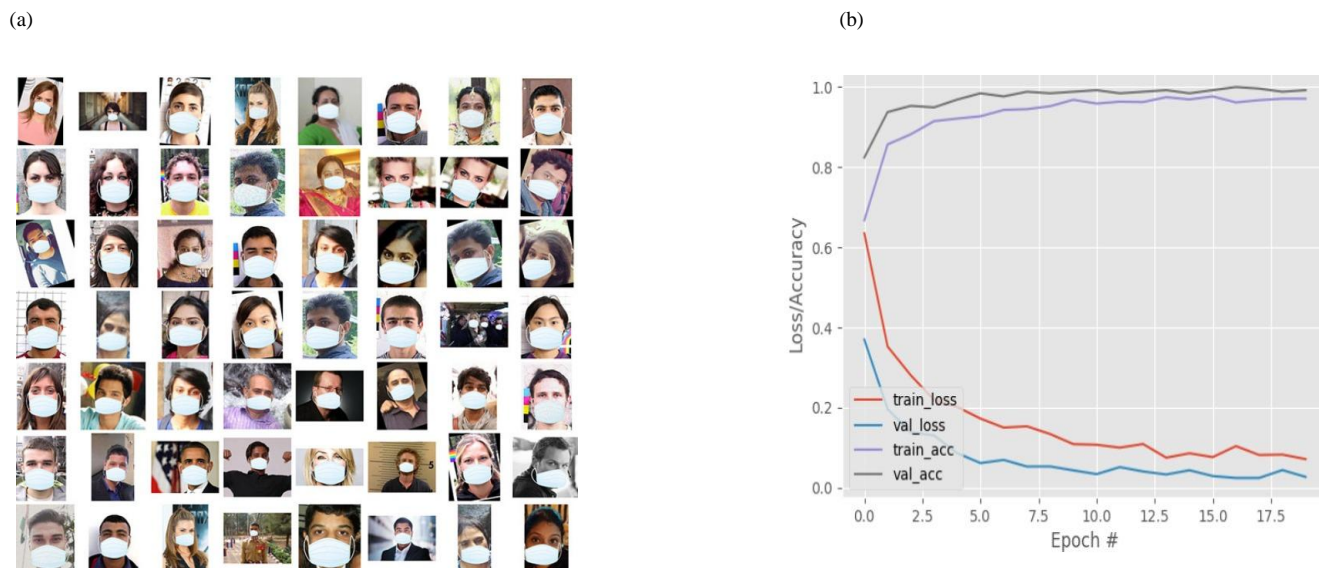
Figure 7 : (a) Data Set, (b)Training Model for mask detection

Table 1 : Results of Experiment

Sr.	Cases	Precision	Recall	F1-score	Support
1	With Mask	0.99	1.00	0.99	138
2	Without Mask	1.00	0.99	0.99	138
3	Accuracy			0.99	276
4	Macro average	0.99	0.99	0.99	276
5	Weighted average	0.99	0.99	0.99	276

4. Acknowledgements

5. References

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