

# **Facemask Detection with Face Recognition**

**Aim:** To detect if the person is wearing a facemask or not before he/she enters a premise (for ex. shop, office). Also, to make the system configurable to recognize the person if he/she has not put on a facemask.

## **Introduction:**

Wearing facemask outside home has become a mandatory thing in the ongoing coronavirus pandemic for our safety. Especially, in the public places like shopping malls, grocery stores as well as in the private and government offices/organizations it is important that people do not enter the premise without wearing facemask as it poses a serious risk to everyone present there. Despite, knowing the risks involved there will be many people who will not wear a facemask at public places. So, this system will detect someone who is not wearing a facemask.

## **Use cases:**

There are two cases for the system to be considered.

### **1. Only facemask detection:**

Most of the public places fall under system's this use case because these places are visited by new people everyday and the system does not have data to recognize the person who is not wearing a mask. Also, at public places our main goal is to make sure everyone is wearing a mask to ensure the safety and not to recognize them. So, in this use case we can detect if person has worn a facemask or not. And, if anyone who has not worn a facemask will be detected then system will give a warning message to concerned individual like security personnel.

### **2. Facemask detection with face recognition:**

All the corporate offices, government offices etc. where there is no general public interaction and only the staff of that organization visits the office are suitable for this use case of the system. As there will be certain number of employees in an office it is easy to keep the data for the task of face recognition. Also, it is crucial for the authorities of the organisation to note the behaviour of the employees because one employee who does not wear mask poses a threat to himself and other colleagues. If any of organization's employee falls ill it can lead to various troubles. So, in this use case system does the work of first use case and on top of that the system can recognize that person using face recognition technique if he/she is not wearing a facemask.

## Technologies used:

Computer vision, Deep Learning, Image Processing

## Working:

The system mainly has three working stages for first use case only first stage is applicable and for second use case all three stages are applicable. First of all, the system will apply the facemask detection model which is trained on the dataset of 700 different images of people wearing a facemask and 700 different images of people without a facemask using a YOLO (You Only Look Once) algorithm on the stream of video which comes from the camera. After applying the model, it decides whether the person has worn a facemask or not. If not, then an alert message will be prompted.

### Results after first stage of processing

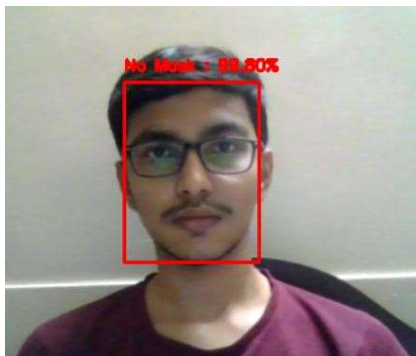


Fig. 1: Without facemask

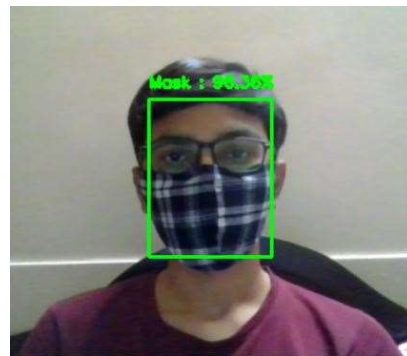


Fig. 2: With Facemask

Now, if the person has not worn a mask then process of second stage initiates. In this stage, the system will extract the ROI (Region Of Interest) which is the person's face in this case from the video feed using haar cascade face detection algorithm. So, now all the unnecessary details from the input is removed and only important part of the frame is sent to the process in third stage. In the third stage, the model built on the dataset of each person's facial images using SSD (Single Shot Detection) algorithm. There is also provision to add new faces in the face recognition system in which there will be 100 photos of the person clicked automatically and model will be retrained with the new updated database.

### Results after third stage of processing

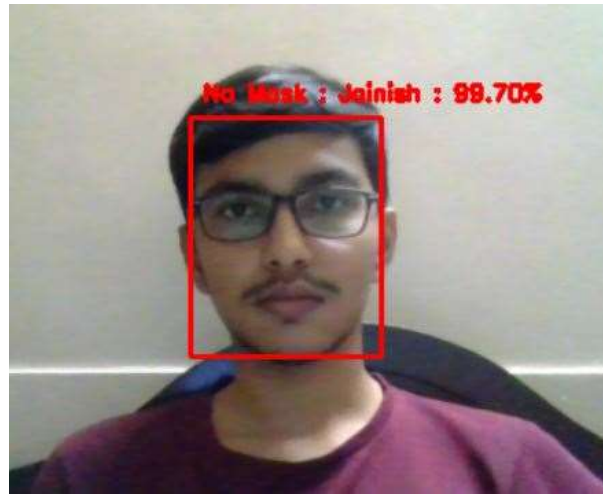


Fig. 3: Face Recognition

- It also works with skin coloured facemask.

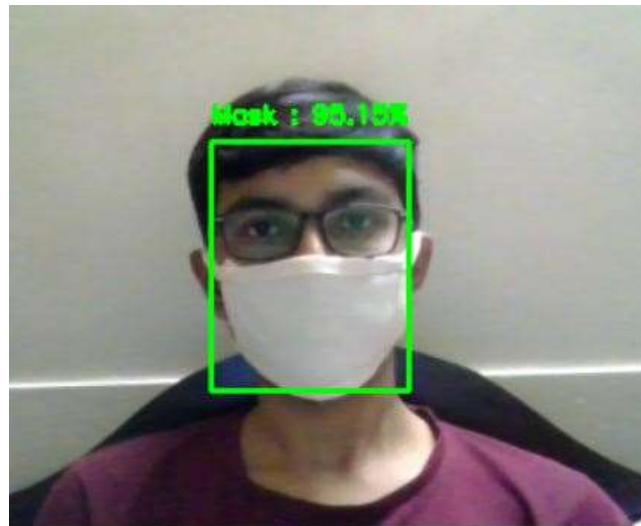


Fig. 4: Detection with skin coloured facemask