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The Face Mask Detector System: An Approach to Reduce the Risk of Corona Virus Spread

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Abstract- The present scenario of COVID-19 demands an efficient face mask detection application. Since disease is wide spreading across globe and affecting the world dangerously, it becomes crucial to implement few rules to minimize the risk. Reports indicate that wearing face masks while at work clearly reduces the risk of transmission. The main goal of this project is to implement Face mask detector system at entrances of colleges, airports, hospitals and where chances of spread of COVID-19 through contagion are relatively higher. It is an object detection and classification problem with two different classes (Mask and without Mask). In this paper we propose a system that restricts the growth of COVID-19 by, while entering the place everyone should scan their face and then enter ensuring they have a mask with them. If anyone is found to be without a face mask, alert will be generated. Moreover, developing the face mask detector system is very crucial in this case. This paper aims to develop the face mask detector which is able to detect any kinds of face mask. In order to detect the face mask, a Viola Jones algorithm is used. The proposed face masks detector system able to detect the people who wear and do not wear the face mask accurately. This paper provides a precautionary measure of COVID-19.

Keywords- COVID-19, Face Mask Detection and Viola Jones algorithm.

I. INTRODUCTION

The spread of COVID-19 is increasingly worrying for everyone in the world. This virus can be affected from human to human through the droplets and airborne. The novel corona virus COVID-19 had brought a new normal life. India is struggling to get out of this virus attack and the government implemented lockdown for the long way. Lockdown placed a pressure on the global economy. So, the government gave relaxations in lockdown.

Declared by the WHO that a potential speech by maintaining distance and wearing a mask is necessary. The biggest support that the government needs after relaxation is social distancing and wearing of masks by the people. But many people are getting out without a face mask this may increase the spread of COVID-19.

In highly populated countries, monitoring people to identify whether wearing mask. Nobody can keep an eye on every person coming in the work space is wearing a mask or not.

So, the need of Face mask detection arose. Hence face mask detector serves as a strategic solution to avoid the disease spread.

Hence, we are using image processing techniques for identification of persons wearing or not wearing face masks. In order to detect a face mask, the object detection algorithm can be implemented. The model in this paper uses the Viola Jones Algorithm. It is an object detection algorithm to detect the faces.

In real time images are collected from camera and it is processed using Viola Jones algorithm. Although it can be trained to detect a variety of object classes, it was primarily by the problem of face detection.

II. RELATED WORK

A system that restrict the growth of COVID- 19 by finding out people who are not wearing face mask in a smart city network where all the public places are monitored with Closed Circuit Television (CCTV) cameras. Firstly, CCTV cameras are used to capture real-time video footage of different public places in the city. From that video footage, facial images are extracted and these images are used to identify the mask on the face.

Object detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones. Applied machine learning techniques to distinguish between people wearing face masks versus people not wearing face masks. The Principal Component Analysis (PCA) which provides a better recognition rate in the Principal Component Analysis.

III. METHODOLOGY

The proposed system shown in the Figure 1 consists of capturing the image using webcam, pre-processing the image, detection of face using Viola Jones algorithm, classification based on selected features, Identifying the persons with / without mask and generating alert.

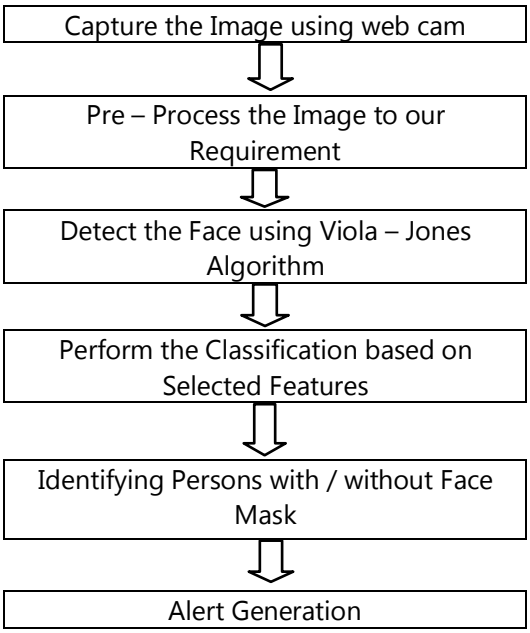

Fig 1. The Face Mask Detector System.

In proposed system the image is captured by the webcam required pre-processing before going to the next stage. For the captured image, the face is to be detected using Viola Jones algorithm. Viola Jones detector proposed a real time object model to detect different classes of objects. It uses 24*24 base window sizes to evaluate any image with edge, line and four rectangular features.

Haar like features are like convolutions to check whether given feature is available in an image or not. After the detection, classification technique is to be performed based on that selected features lips, nose, mouth etc., different parts of the face and using that trying to detect whether a person has taken mask or not. The alert can be generated using speech synthesizer.

Our proposed system can detect the person with / without mask under following cases:

- **Case1:** If the person is identified with face mask i.e., both mouth and nose are covered. The proposed system will provide an alert of "Thank you for wearing a mask".
- **Case2:** If the person is identified without face mask. The proposed system will provide an alert of "Please wear a mask".
- **Case3:** If the person is identified with not wearing the mask properly i.e., only nose is covered but mouth is not covered with mask. The proposed system will provide an alert of "please wear a mask properly".
- **Case4:** If the person is identified with not wearing the mask properly i.e., only mouth is covered but nose is not covered with mask. The proposed system will provide an alert of "please wear a mask properly".

IV. RESULTS

The proposed system has been programmed for all the cases mentioned in the methodology using MATLAB R2019a software.

Fig 2. Output for Case 1.

The face mask detector system identified the person is wearing the mask properly.

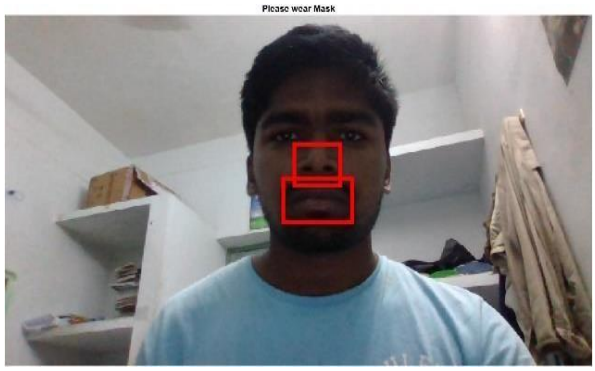

Fig 3. Output for Case 2.

The face mask detector system identified the person without mask.

Fig 4. Output for Case 3.

The face mask detector system identified the person is not wearing the mask properly i.e., only nose is covered, mouth is not covered with mask.

Fig 5. Output for Case 4.

The face mask detector system identified the person is not wearing the mask properly i.e., only mouth is covered but nose is not covered with mask.

V. CONCLUSION

From the experiment results, the face mask detector system is successful in identifying the persons wearing face mask or not wearing face mask that is a precautionary measure of COVID-19. The Viola Jones algorithm helps classify the real time images into uses cases like people wearing mask or people not wearing mask by identifying the boundary box set. This model works well for by allowing a single person through entry point.

The face mask detector can be employed in any places like hospitals, bus stations, railway stations, malls, educational institutions and other public serving facilities to avoid spread of the novel corona virus among community.The proposed system faces difficulties in classifying faces covered by their hands since it is almost similar to the person wearing.

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