Face Mask and Social Distance Detection

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ABSTRACT -*Increasing numbers of cases of COVID-19 provide insight into the pandemic's spread.However, wearing the face mask in order to prevent the transmission of droplets in air and maintaining appropriate physical distance between the people can help to fight this pandemic.*

This project is helpful in detecting face masks and social distancing on a video feed using object detection and Deep learning. OpenCV, TensorFlow/Keras are the software requirements used to build a Convolutional Neural Network (CNN) model to detect face masks. Face masks will be detected in real-time video and in images. CNN algorithm is used for object detection, image classification and recognition and the specialty of this algorithm is its convolutional ability. YOLO algorithm is popular because of its speed and accuracy of detection of objects and YOLO algorithm abbreviated as "You Only Look Once". This YOLO algorithm detects the people in frame and check the social distancing.

Key Words: **Face Mask, Social Distance, Convolutional Neural Network, openCV, Keras, and Tensorflow***.*

1. INTRODUCTION

Several million people worldwide have been infected with COVID-19, according to data gathered by the World Health Organization. With the current situation, as COVID-19 is increasing along with its different variants, it is necessary to maintain social distancing and wear masks. It is also advisable to keep away from social gatherings to prevent the further spread of corona infection. And yet some people walk around without wearing a mask. It is quite tough at times to keep a watch on such activities. Hence the authorities need advanced technologies to regulate these kind of activities. The purpose of this project is to supervise the COVID norms accordingly. This system can be enforced in entrance of educational institutions, commercial centres, healthcare centres, metro-stations and in between the streets.

1.1 LITERATURE SURVEY

Bosheng Qin and Dongxiao Li [1] "Identifying Face-Mask Wearing condition". Faces with and without masks can automatically be distinguished by the model. Test data were relatively small for SRCNet models. Facemask-wearing conditions identification could not accommodate different postures or dynamic environments.

Preeti Nagrath[2] "SSDMNV2: a real-time DNN based face mask detection system" using SSD and MobilenetV2. Both during training and development of the image dataset, SSDMNV2 correctly identified both masks and mask less faces. It has not been tested in real environments or with real-time CCTV yet, as the model is trained with artificial images.

Abdellah Oumina [3] "Control the COVID-19 Pandemic: Face Mask   Detection" using Transfer Learning. Face features are extracted from images using CNN. A machine learning classifier SVM and KNN is applied to further process the extracted feature. When the SVM and MobileNetV2. More complex algorithms are required to produce more precise and faster results.

M Loey [4] "Hybrid deep transfer learning model with machine learning methods for face mask detection". Combining SVM, Decision trees, and ensemble methods, this hybrid model detects facial masks. Real-life video streaming could not be used for face mask detection in the study.

Zekun Wang [5] "Fast In-browser Face Mask Detection with Server   less Edge Computing". A system-agnostic no-installation face mask detection solution is presented in this article to alert individuals who are not wearing a mask or who are wearing it incorrectly/wrongly. There is some detection ambiguity in the present dataset, since the no masks and wearing masks are grouped together.

Naser Hossein [6] "Social Distancing using   IoT". PIR sensors are used to detect targets that are within 1.5 meters of the sensor. After detecting an object that violates social distancing norms, the system will trigger an audio alarm. A wearable device is suggested in order to implement this technique.

Vishwesh M S [7] "Social Distancing and Face Mask Detection from   CCTV Camera". The system will identify whether the person is wearing a mask or not and if more than one person is present it will calculate the distance between person. This system has some limitations like hard to detect the face of person or person when they are

partially visible to camera and it will fail to identify the object in lowlight.

K.N Baluprithviraj [8] "Artificial Intelligence based smart door with face mask detection". The smart device is designed with a particular component to get the person's GPS location of the CCTV camera and the concerned authority can detect the image with meticulous time is sent through message/SMS to the concerned authority. The model can recognize the face in any direction. It can also detect if more than one face is present in the frame.

Saharsh Arya [9] "Study of various Measures to Monitor Social Distancing using Computer Vision:a Review". Various machine learning technique are studied and its application to social distancing protocols are reviewed in this paper. According to the review made in this paper YOLO v3 most popular object detection algorithm. It is faster and accurate than Single Shot MultiBox (SSD).

"COVID-19 precaution technique by real time Face Mask Detector by using Machine Learning"[10] The system divides data into two categories and displays the resulting data depending on whether the subject is wearing a mask or not. Using this approach makes it simple to train both pre-recorded and real-time data with excellent accuracy. The system could be used only to detect face mask. The social distance protocol could not be detected.

2. PROPOSED SYSTEM

The aim of this project is to detect face mask and monitor social distancing between the people. The system ensures that the COVID safety protocols are followed in an efficient way.
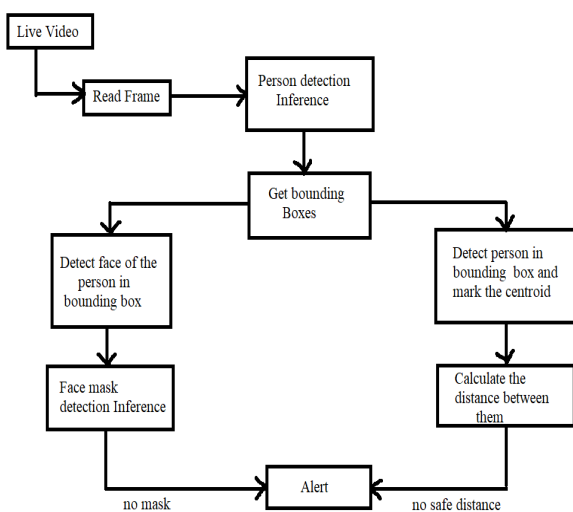

Figure1: Methodology

2.1 FACE MASK DETECTION

Face Mask Detection system detects whether people are wearing masks or not using Artificial Networks. The face mask detection process starts by capturing the images from the camera. In this system, TensorFlow and OpenCV programming are used to detect if a face mask can be detected and to determine if the person is wearing one or not. If the person wears mask the display is green bounding box with safe alert whereas if the person is detected without wearing a mask then red bounding box appears with an alert message.
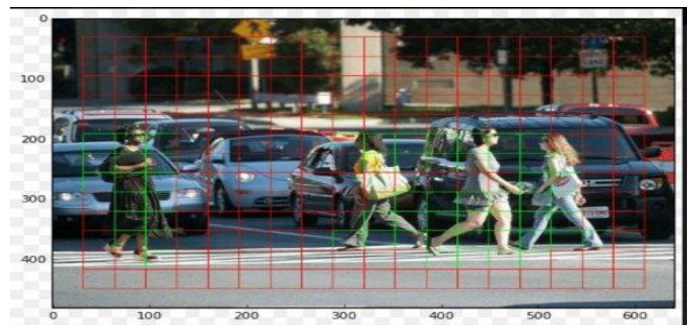

Figure 2: Face Mask Detection

2.2 SOCIAL DISTANCE DETECTION

Detecting two or more people in one frame using the Social Distance detection system is possible. By making use of Euclidean Distance, system detects whether the person is following the social distancing or not. If the physical distance is maintained then it will show in Green Rectangular-box otherwise the designed system will indicate the concerned by displaying alert in rectangular box in red colour.

Figure 3: Social Distance Detection

3. CONCLUSION

This project has been developed to come up with an efficient way for detecting facemask and social distancing. In this pandemic situation when a person does not follow the COVID-19 safety protocols in workplace, public-gathering and business establishments. This model will detect face masks using Keras and Tensor flow. CNN algorithm helps to adjust the brightness and high contraction of the images. Using this algorithm, we can detect mask even if a person wearing glasses, beard faces etc. YOLO algorithm helps to detect the people in frame and check the social distancing. Hence this project ensures that the COVID norms are followed in a more efficient way.

References

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