Face Mask Detection and Social Distance Monitoring using Machine Learning Architecture

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Abstract:- COVID-19 has affected the world badly. Studies have demonstrated that wearing a facial covering is one of the insurances to diminish the danger of viral transmission. And many public places as well as public service providers require customers to use the service and place only if they wear mask correctly. Sometime it may not be easy to manually track the customer, whether they are wearing the mask or not. That's why this technology holds the key here. In this system, we propose face mask detection using image processing which is one of the high-accuracy and efficient face mask detector. This proposed system is of three stages i.e. 1. Image preprocessing 2. Face detection and crop 3. Face mask classifier. Our system is capable of detecting masked and unmasked faces and can be integrated with cameras and other hand detecting the distance between two people whether they are maintain distance or not .

Keywords:- Covid_19, Image Processing, Mask, CNN , SSD.

I. INTRODUCTION

In Wuhan, China at the end of 2019 Corona Virus was detected. From that time, it has been spreading like a wild fire in a timber area. Millions have been affected and around have unfortunately passed away as on 30th of December 2020, nearly a time since this contagion came to actuality. People who have this illness can take up to 2 weeks to cure, with the threat of having to suffer fresh medical problems caused by it. Kiddies and senior folks individualities have ended up being at the most elevated peril to get the infection, which might indeed bring about death. Latterly, it has been concentrated on to contain the infection than to fix it. The infection spreads through the air, communicated by one existent to another by contact, yet also by talking and playing. The solicitude was advanced to WHO (World Health Organization) which recommended that facial coverings and social removing is the response to it, until a fix is created. Putting a facial covering on can dwindle the peril of getting tainted by an extraordinary degree, not simply to the one wearing it yet also to the others that he interacts with. Wearing curtains each time we go out is commodity we can do with little exertion that can adequately save lives, and that's definitively why it's in such a lot of interest now of time. Hence we've proposed a system with two modules i.e. Face mask and social distancing

II. RELATED WORK

Sahana Srinivasan et.al [1] provides a comparative study of different face detection and face mask classification models. Finally, a video dataset labelling method is proposed along with the labelled video dataset to compensate for the lack of dataset in the community and is used for evaluation of the system. The system performance is evaluated in terms of accuracy, F1 score as well as the prediction time, which has to be low for practical applicability. The system performs with an accuracy of 91.2% and F1 score of 90.79% on the labelled video dataset and has an average prediction time of 7.12 seconds for 78 frames of a video.

In [2] proposed a system where For evaluation of the trained model, mAP (Mean Average Precision) was calculated for both the use cases (Social Distancing & Face Mask Detection), it works by comparing the ground-truth bounding box vs the detected box and, in the end, returns the score. The higher the mAP score would be, the better model is in the detection of objects. Mean Average Precision was calculated for two different thresholds (0.25 % & 0.50 %) with 101 recall points. Three different classes were created for classification those were Good, Bad & None, for which True Positive & False Positive values were calculated with ROC Curve for better understanding.

In [3] surveys various deep learning networks to develop such detectors. In this survey, the existing object detection models used for surveillance and people detection are analyzed. The one-stage and two-stage detectors along with their applications and performance are outlined in a comprehensive manner. Deep Learning models such as AdaBoost, Voila-Jones, variants of CNN including ResNet, VGG-16, single-shot detectors MobileNet, and versions of YOLO are discussed and compared.

In[4] system focuses on a solution to help enforce proper social distancing and wearing masks in public using YOLO object detection on video footage and images in real time. The experimental results shown in the paper infer that the detection of masked faces and human subjects based on YOLO has stronger robustness and faster detection speed as compared to its competitors. Their proposed object detection model achieved a mean average precision score of 94.75% with an inference speed of 38 FPS on video.

In [5] proposed a system where they have taken one of the measures used to prevent COVID-19 spread and aimed to develop a deep learning model to categorize people with or without a mask at public places such as schools, colleges, and corporates. Developed algorithm using concepts of deep

transfer learning and fine-tuning. The system developed on the MobileNetv2 base model, the head of it was replaced by the custom face mask detection algorithm and enabled the training of face masked and non-face masked images. The testing results have shown an accuracy of 98% on both categories with mask and without mask..

III. OBJECTIVES OF SYSTEM

- To prevent the spread of Corona virus by promoting the use of face masks with the help of effective technology to detect the face mask.
- To take necessary precautions for the safety of society by predicting the future outbreaks of COVID-19.
- To ensure a safe working environment.
- To save the lives of people.

IV. MOTIVATION

Our main motive, Face mask discovery with Social Distancing is the task of relating an formerly detected object as that person wear mask or not and they're walking with maintaining Social Distance to each other.
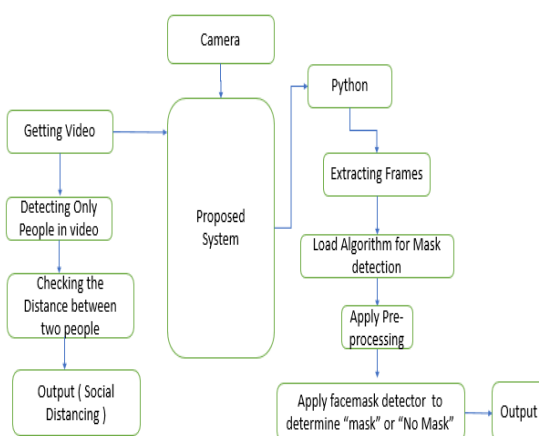
V. SYSTEM ARCHITECTURE

Fig. 1: System Architecture

VI. METHODOLOGY

We're developing the design for detecting whether person is wearing a mask or not and indeed for measuring the temperature of person. This system focuses on how to identify a person wearing a mask on image or videotape sluice with the help of Deep Learning and Machine Learning using Keras, TensorFlow, OpenCV and the Scikit-Learn library. We've used proposed armature which is an accurate and effective and can be applied to bedded device.

For the determination the model designed calculates ROI (Region of Interest), and latterly on cipher bounding box value for a particular face and insure that the box falls within the boundaries.. The " Green" color box will be for with mask and " Red" color box will be for without mask. Formerly all discovery is executed we will display the affair.

As well same will be for social distancing sensor module. Alert is been generated consequently.

VII. CONCLUSION

In this epidemic situation, where all people in countries are featuring to get back to normal routine, this system will play effective part in covering the use of face masks at workplaces. As the technology are blooming with arising trends the vacuity so we've new face mask sensor which can conceivably contribute to public healthcare. With the increase and blooming technology and arising trends in ways. We've proposed as small systemi.e new face mask sensor which can conceivably contribute to publichealthcare.We're using OpenCV, tensor inflow, keras and algorithm to descry whether people were wearing face masks or not. By the development of face mask discovery we can descry if the person is wearing a face mask and indeed the social distancing where we're calculating the distance and detecting whether the person is following the social distancing or not.

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