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Social Distancing Analyzer Using Deep Learning Model

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Abstract: *The SARS-CoV2 virus causes the unstoppable infection known as Covid disease (COVID-19). Anyone can contract COVID-19, become very ill, or pass away at any age. The majority of infected people will experience mild to direct respiratory illness. The best method to help prevent the spread of infection is to practice of social distancing implies keeping up with atleast 2-meter distance in open areas. Motivated by this documentation of social distancing this application is created by utilizing deep learning model for computerized individual detection, tracking and between individuals distance identification in crowd areas by utilizing pre recorded recordings and open sourc object recogniton pretrained model utilizing YOLOv3 calculation utilizing this we can figure out whether individuals are following social distance or not and in light of that it will make red or green limits over it*

Keywords: Covid-19, Deep learning, object detection, machine learning, and social distance

I. INTRODUCTION

Covid is a sizable collection of many viruses. Some of them infect people with the common virus, while others infect animals like bats, cattle, and camels with respiratory diseases. An international pandemic has been sparked by the sickness that was originally discovered in Wuhan, China, in late 2019. COVID-19 can be contracted from those who already have the disease. When a person with COVID-19 hacks or exhales, tiny drops from the lips or nose that are released can cause the infection to spread from person to person. These drips fall near the person on equipment and surfaces. In order to treat or prevent the spread of the infection within the local region, it is important to take into consideration the cause and mode of transmission of the causing infection in cases of breath sickness. Several therapeutic drug organisations and pandemic scientists are attempting to increase COVID-19 vaccinations, although a cure may not yet be accessible. As a result, effective steps are being taken globally to stop the spread of contamination. All affected nations are under lockdown to protect social separation because it is believed to be the best spread plug in the current circumstances. Social isolation, often known as "physical separation," is a strategy for maintaining a safe distance between you and other people. According to the world health organization(WHO) standards,its far recommended that individuals schould hold somewhere around 2-meter to sense social distance from each individual.

II. LITERATURE SURVEY

Various studies have been done on social distancing using different techniques. Narinder singh et al.[8] proposed by utilising a single shot detector and a CNN (convolution neural network), assemble a container with the identified individuals contained within the frames (SSD) Its violation index is displayed as 3, 2, 2 and 2.33 in the image. Mahdi Raxaei et al.[7] proposed using YOLOV4 framework to mapping accurate people detection and also locates places where probability of virus infection is maximum. Anand[2] proposed by using YOLOV3 algorithm and computer vision detects the distance of two people and also a non-complaint pair of people is indicated with red frame. Sneha Madane et al.[11] proposed by using for real-time social spacing monitoring and analysis, SOTA models EfficientDet and DETR performed better than both forms of EfficientDet.Krisha Bhambani et al.[6] proposed to detect both social distance and mask detection in real time using YOLO algorithm. Sergio Saponara[10] proposed a apllication using Bird-eye view to detect body temperature of peoples in the crowd. Imran Ahmed et al.[5] proposed by using for human action recognition, It uses the YOLOv3 paradigm. To see if the distance value is greater than the maximum allowable social or physical distance, the violation limit is defined. G V Shalini et al.[4] proposed bounding boxes are placed in this frames using the YOLOV3 model algorithm, and spacing is computed from bypassing the object class and just analyzing the people class. Sahana Srinivasan et al.[9] proposed to do people tracking, social separation violation identification, face recognition,

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and face mask classifications utilising object detection, clustering, and a binary classifier controlled by a Convolution Neural Network (CNN). YOLOv3, Density-based spatial clustering of algorithms incorporating noise (DBSCAN), Dual Shot Face Detector (DSFD), and MobileNetV2 based binary predictor have all been used to accomplish it on datasets of video footage.

A wearable social distancing sensor was proposed by F.A. Ahmad Naqiyuddin et al. [3] that detects the distance between two individuals using a micro-controller and an ultrasonic sensor and sends a warning if the person disobeys the rule. The algorithm is able to recognise social support and distance in local residents' behaviour.Afiq Harith Ahamad et al.[1] proposed for image processing, the MobileNet Single Shot Multibox Detector (SSD) object recognition model and the OpenCV library were used. The spacing between individual people in the differentiated tracking area is measured between both the central points as well as the colliding border. If unsafe distances between people are detected, notices or alerts can be sent to keep the distance safe.

III. PROPOSED METHODOLOGY

To determine the security distance between two people using the proposed methodology, a social distancing analyzer tool was created. YOLOv3 model is used to recognize objects and coco dataset containing 80 layers from this layer we are detecting individual class. After detecting individual class we need to track detected person and draw a boundary. This proposed methodology is mainly focus on people detection by measuring distance and calculate the total violation of the people.

3.1 Algorithm

Step 1: Insert the input video
If it is true then go to the step 2
If it is false go to step 1
Step 2: After step1 the input vedio will be divided into various vedio frames
Step 3: By using YOLOv3 it will check the individuals
Step 4: It then computes the distance seen between centroid of the bounding boxes.
Step 5: Then it will detect the safe and unsafe in the form of green and red boxes
Step 6: Finally it will calculate the total violation of the particular input vedio.

3.2 Blok Diagram

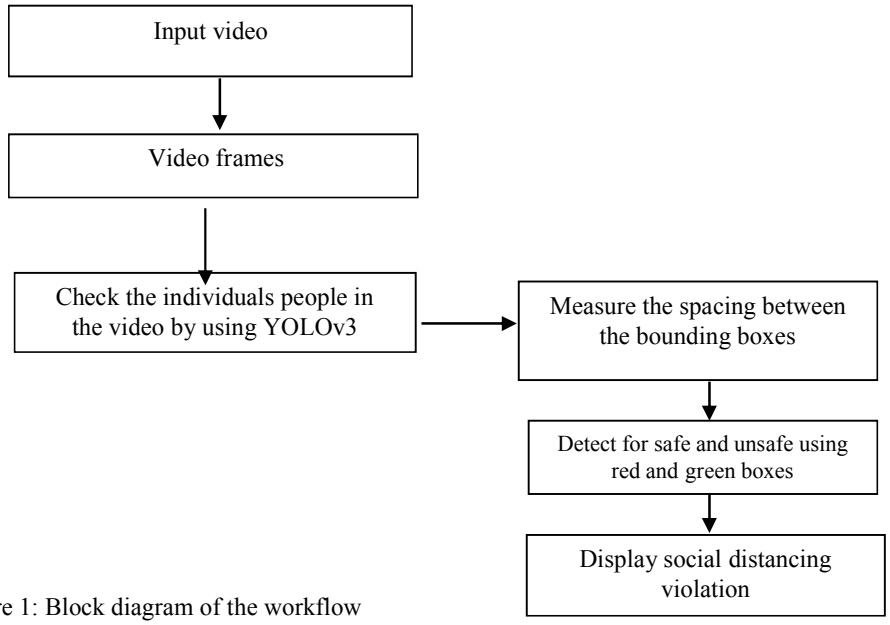

Figure 1: Block diagram of the workflow

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Security camera video of any crowded location can be used as video frame. The video frame patterns obtained from all these cameras are fed into the detection and localization using YOLOv3 to locate human presence. For measuring social distance, parameters such as 'centreline' of person location and 'distance' among many such cluster centers are evaluated, and a warning is produced by changing the colour of the frame of human recognise from red to green. Symbolizes those who follow social distance, while red represents someone who does not follow social distance, resulting in a violation of social position.

IV. EXPERIMENTAL RESULT

YOLOv3 comparison study with some other deep learning techniques

Model name	Rate of true detection	Rate of false detection
Mask-RCNN(pre-trained)	92%	0.5%
Fast-RCNN(pre-trained)	90%	0.7%
Faster-RCNN(pre-trained)	92%	0.6%
Proposed work(YOLOv3 pre-trained)	95%	0.4%

Table 1: Analysis of experiment result

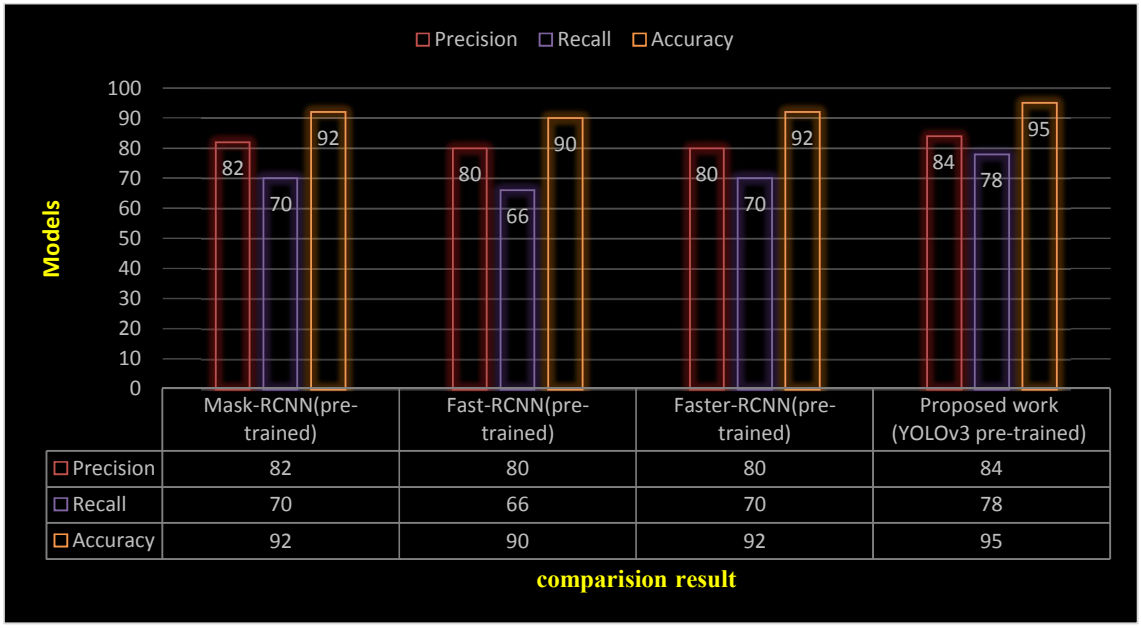

Figure 2: Pretrained method on data set comparison chart with other method

V. RESULT

Figure 3: The outcome of the social distancing analyzer

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VI. CONCLUSION

The article proposes social distance analyze in pre recorded recordings using deep learning model and computer vision. This can easily detect who is adhering to social distance and who is not, as well as determine the amount of violations in the recordings. Persons who are following distance on a street or in any public area can detect it and indicate it with a green border, while those who are not following distance can detect it and indicate it with a red border. Due to this can easily identify whether that place is safe or not. Using YOLOv3 pretrained model we get 95% exactness rate to recognize social distance analyze of peoples groups in jam-packed regions and also shows violation. In future,the work can be enhanced by adding different features, for example mask identification and human heat level detection

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