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Monitoring Social Distancing using YOLO v3

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Abstract
The covid-19 pandemic has brought global crisis and severely impacted the world and has now infected more than 150 million people worldwide. The process of softening the curve of the coronavirus will be difficult if people do not take the necessary protocols to prevent the spread of the virus. Following Social distancing and wearing masks are two enhanced methods that need to be followed strictly to prevent the spread of the virus. The objective of this project is to monitor social distancing among people by automating the process. In the proposed approach we use the Yolo v3 object detection model to identify people in the background and in-depth tracking of identified people with the help of binding boxes. We will be using YOLOv3, which is trained on Coco dataset for object detection.
Keywords: *Covid-19, Social distancing, Monitoring, YOLOv3, Object detection.*

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I. INTRODUCTION

Globally, as of 5 July 2021, there have been 183,560,151 confirmed cases of COVID-19, including 3,978,581 deaths, reported to WHO.Covid-19 belongs to the family of coronavirus-caused diseases which was initially reported in late December 2019. Its deadly spread worldwide has caused both global health and economic crisis. Even though several pharmaceutical companies, health care organizations, medical experts, and scientists together developed vaccines for this deadly virus. Until the majority of the world population is vaccinated, we need to look for alternate measures to control the spread of this virus. One such measure is social distancing which is being encouraged even after the development of vaccines because it is the only feasible approach to stay completely safe.

Social distancing is not a new concept. It is potentially one of the most effective nonpharmaceutical ways to control the spread of contagious disease. Social distancing aims at reducing physical contact between a possibly infected individual and healthy persons. As per the WHO norms, it is prescribed that people maintain at least 6 feet of distance from each other to follow social distancing. Proper social distancing is the best measure to reduce infectious physical contact which reduces the infection rate. Automating the process of monitoring social distancing using a deep learning model makes it easier to detect social distance violations in theatres, restaurants, and other public places. when it comes to object detection, the YOLOv3 model is considered one of the best object detectors. Hence a useful algorithm for our system.

II. LITERATURE SURVEY

[1] Paper name: Detection of workers without the helmets in video based on YOLOv3.
Authors: Jing hu, Xiaowei Gao, Hefeng Wu, Songhe Gao
This paper proposes a real-time detection application for wearing helmets based on YOLOv3 with alert function. which has been successfully used in several construction sites where there is a variety of potential risk factors threatening workers personal safety. In this system, workers are identified first by YOLOv3 and this dataset is then identified whether wearing helmets or not. Theoretical analysis and experimental results show that the proposed system not only satisfied the helmet deduction task in real-time but also with high detection accuracy.

[2] Paper name: Helmet detection based on improved YOLOv3 deep model
Authors: Fan wu, Guoqing Jin, Mingyu Gao, Zhiwei Hu, Yuxiang Yang.
This paper is based on YOLOv3 full regression deep neural network architecture, which utilizes the advantages of densenet in model parameters and cost to replace the backbone of YOLOv3 network for future extraction. The test results showed that the improved model compared with the traditional YOLOv3 has increased accuracy by 2.44% with the same detection rate.

[3] Paper name: Application of YOLOv3 in road traffic detection.
Authors: Ren Anhu, Niu Xiaotong, Bai JingJing, and others.
This paper proposes a real-time detection method for traffic flow at traffic intersections in order to calculate the traffic volume of different models at traffic intersections. Through the analysis and experiment of the YOLOv3 network, the vehicle detection mAP of different models is 87.06%and the detection speed is 38 frames/sec. The results showed that the system can efficiently detect vehicles and realize real-time statistics of traffic at traffic intersections.

III. METHODOLOGY

A. Object Detection*:*

Object detection deals with identifying and locating objects of certain classes in a frame. In this application, we first take input video and apply object detection only for people class using the object detection model YOLOv3(which is a deep learning model designed for fast object detection) which will filter and detect only people from the frame.

B. Finding the centroids of bounding boxes:

The detected human objects are visualized as bounding boxes and the centroids of these bounding boxes are calculated using the coordinates of the bounding boxes.

C. Calculating distance between people:

Then the distance between people is calculated by checking the distance between their bounding box centroids using the Euclidean distance formula.

D. Monitoring social distancing:

Further based on the distances calculated. If the distance between people is found to be less than 90px they are surrounded by red bounding boxes and considered as not following social distancing otherwise they are surrounded by green bounding boxes.

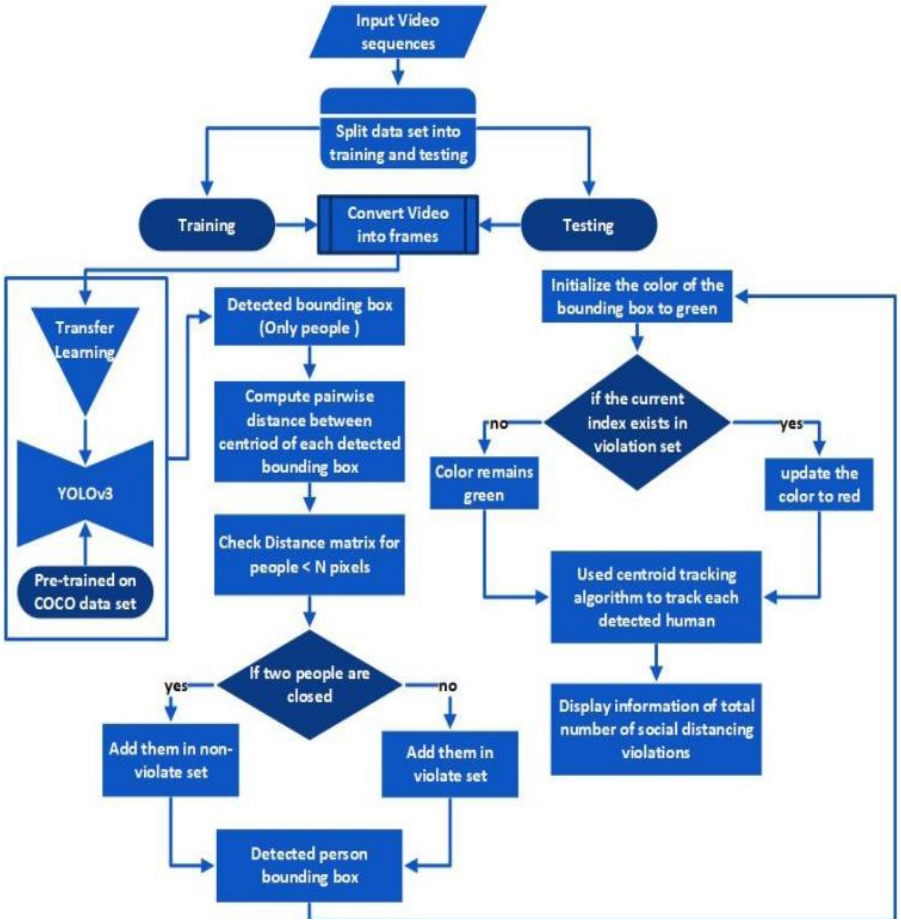

Fig 1. Flowchart

IV. RESULTS OF IMPLEMENTATION

Below are some Screenshots of the sample output of the working program model which shows the total number of violations and the people not following social distancing surrounded by red bounding boxes whereas people following social distancing are surrounded by green bounding boxes.

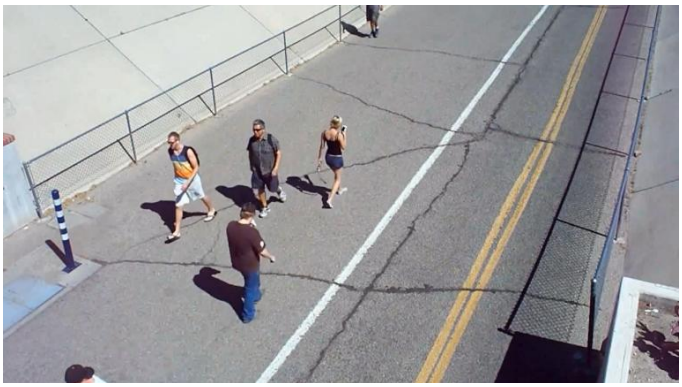

Fig 2. Input Snapshot

Fig 3. Output Snapshot

V. CONCLUSION

The system proposes a system for monitoring social distancing protocol using the deep learning YOLOv3 network. Using computer vision, the distance between people can be calculated and people not following social distancing protocol will be shown in red bounding boxes. The results showed the system can detect people who are not following social distancing. The system can be useful in many environments such as offices, colleges, airports, railway stations, banks, and many other public places.

REFERENCES

[1]. https://ieeexplore.ieee.org/document/8966045
[2]. https://ieeexplore.ieee.org/document/8743246
[3]. https://ieeexplore.ieee.org/document/9101888
[4]. https://www.youtube.com/watch?v=eBlRTel6AJY
[5]. https://www.youtube.com/watch?v=uf7Hy3_YZiQ
[6].https://www.pyimagesearch.com/2020/06/01/opencv-social-distancing-detector/
[7]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7603992/
[8].https://towardsdatascience.com/covid-19-ai-enabled-social-distancing-detector-using-opencv-ea2abd827d34
[9]. https://www.youtube.com/watch?v=4eIBisqx9_g
[10]. https://www.analyticsvidhya.com/blog/2018/12/practical-guide-object-detection-yolo-framewor-python/
[11]. https://www.pyimagesearch.com/2020/02/10/openc v-dnn-with-nvidia-gpus-1549-faster-yolo-ssd-and-mask-rcnn/