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# A Novel Approach for Social Distance Detector Using YOLO v3

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**ABSTRACT:-** If people don't take steps to stop the spread of the virus, the global Covid-19 scenario will make it hard to slow down the spread of the Corona virus. Since there is no vaccine, the only way to stop the epidemic is to stay away from people. The proposed framework uses the YOLO v3 object detection model to find people in the background. Bounding boxes and assigned IDs are used to keep track of the people who have been found. The results of YOLO v3 are compared to the results of other popular modern models, such as CNN-based regional speed (convolution neural network) and single-shot detector (SSD), in terms of average accuracy (mAP), frames per second (FPS), and loss values, which are determined by object classification and location. Later, the L2 line shown in pairwise is figured out by using links and the size of the bounding box to get a three-dimensional feature space. The name of the infringement index is being thought of as a way to make the public deviation process more consistent. From the experimental analysis, it is clear that YOLO v3 with a detailed tracking scheme shows good results with a moderate mAP and FPS score to track community deviations in real time. We are running this project with the help of the YOLO v3 object acquisition model and the OpenCV image processing library. The project will be important in a place where there will be a lot of people, like a shopping mall, a movie theatre, or an airport. With this project, we can make sure that people go through the socialisation process.

**KEYWORDS:** YOLO v3, Covid-19, Social Distancing, Pretrained Model, Webcam, CNN.

## I. INTRODUCTION

Distancing oneself from others is not a new concept. Diseases that are easily transmitted may be prevented by establishing a social distance. This indicates that individuals should physically distance themselves from one other, as the term suggests. As a result, it becomes more difficult for a disease to spread (such as corona virus). The Corona virus is responsible for the condition known as COVID-19. Late December 2019 was the first time it was publicly reported. This lethal virus has so far eluded the efforts of several health care organisations, medical professionals, and scientists.

It's become a global disaster because of the rapid spread of the Corona virus sickness. Covid-19 has been determined to pose a greater threat to the general population if they lack immunity. People are still advised to maintain their distance from others despite the existence of vaccinations since it is the only way to be entirely safe. People throughout the globe are now looking for additional methods to curb the spread of this illness. All nations impacted by the illness are required to use social distance as the most effective means of preventing the spread of the disease at this time.

With the purpose of reducing the impact of the Corona virus pandemic while inflicting as little harm to the economy as possible, this study is being conducted. Detecting persons who are socially isolating themselves from one another is another goal of the project. Reducing physical contact between persons who may have been infected and



those who are not is the purpose of establishing social distance. Keeping at least six feet of distance between oneself and another is recommended by the World Health Organization (WHO). Keeping a social distance is the greatest strategy to reduce the risk of contracting a contagious disease. Patients battling the Corona virus epidemic may benefit from a lower peak that is more compatible with the existing health care system. There is no better technique to analyse epidemiological phenomena than using mathematical models. New technologies, such as Convolutional Neural Networks, Deep Learning, and AI, may be used to impose social distance. It's hoped that YOLOv3 and DeepSort will be used to track down suspicious-looking pedestrians and determine whether or not they are behaving in an unseemly manner. If the index of violations exceeds a certain threshold, a notice should be shown on the screen for those who are supposed to see it. Then, processes may be used to alert the public to the dangers. There should be no usage of sound alarms since they might generate panic. The article elaborates on the problem definition, the objectives, and the implementation process for such a system.

### **Incitement**

The most effective strategy to prevent the transmission of contagious illnesses is to keep people isolated from their social networks. Using drones and other forms of monitoring, some police agencies have been able to locate big groupings of individuals and subsequently enforce the law to break them up. In these critical instances, physical intervention may assist to flatten the curve, but it also introduces new dangers to the public and places more strain on the workforce. The findings of a lot of study have been made public in the previous several years. In order to halt the COVID-19 epidemic, it is necessary to restrict individuals from coming into contact with one other. It's just not something that most people are accustomed to doing. Like a mall, movie theatre, or airport; this software may be utilised in settings where many people are likely to congregate.

## **II. LITERATURE REVIEW**

We'll look at some of the research on deep learning's use to finding individuals in this part. In-depth research, as well as other recent planning and purchasing operations for items, are discussed as well.. Object detection using machine learning has been the subject of recent reviews. An item or a person may be found in a computer's segmentation function and the building of a constructed environment from a video picture. Artificial intelligence and a broad variety of high-quality materials have emerged as research themes in the recognition of a wide range of materials and the acquisition of artificial intelligence. Nguyen et al. conducted a detailed examination of the most recent technology and the issues that arise while using it. Researchers are studying how humans and robots learn, how to stop a loop, and what it takes to identify items in real time, among other issues. The usage of a deep convolutional neural network (CNN) for image recognition has been demonstrated to perform well on a number of benchmarks. Multi-layer perceptron neural networks with convolutional, small sample, and fully integrated layers make up the Deep CNN method. Classifying each object based on its database is then done by all the network levels. CNN was one of the phases of deep learning, which employs supervised learning techniques that are effective at locating an item in a variety of various settings.

For example, CNN has made great strides with the aid of a new computer software and a vast database like Image-net. In network architecture, techniques, and novel concepts, many have considered how to make advantage of CNN's various forms of object detection. In recent years, CNN models like Alex-net, VGG16, InceptionV3, and ResNet-50 have been taught to perform things that impact the way people see objects.." It is because of the neural network's structure that in-depth learning in object recognition has been so successful in learning high-quality characteristics that are not already in the database. Modern, high-tech equipment for information collecting, on the other hand, has both advantages and disadvantages in terms of precision and speed. It's possible that the item appears in many locations across the photograph and is of varying sizes.

These algorithms were built using a CNN model to locate numerous classes in different areas of the photos. CNN's quickest and most accurate method to learn about new topics is via its You Just Look Once (YOLO) programme.

The best approach to prevent the spread of contagious illnesses is to isolate yourself from the rest of the world. On January 23, 2020 [13], an extraordinary action was taken to combat the outbreak of COVID-19, which occurred in Wuhan, China, in December of 2019. First-week-of-February was the busiest week of the year for confirmed cases in China, with an average of 2,000 per day in January and 2,000 to 4,000 per day in early February. Relief came afterwards when no new verified cases were reported for five days in a row up to March 23, 2020 [14]. As far as we know, this is the first time it has occurred since the epidemic. In this way, it can be shown that COVID-19 control measures were initially implemented in China, and then spread over the globe.





Prem et al. [15] were interested in learning how the COVID-19 outbreak spreads when persons are separated by distance. For the purpose of simulating how the epidemic spreads, the scientists used SEIR models (susceptible-exposed-infected-removed). Decreasing social distance too rapidly or all at once may cause a secondary peak to occur early, which may be smoothed by gradually removing interventions [15]. Our health depends on taking steps that cost the economy in order to reduce the spread of disease. According to Adolph et al. [16], officials were unable to agree on early adoption in the United States. Long-term, this is harmful to the general public's health. Many scholars are trying hard to make up for the loss that social isolation has caused to economic progress. Based on this, Kylie et al. [17] examined the relationship between the region's economy and the strictness of social distance. Some activities might be tolerated at low levels without creating a major epidemic, according to the findings of the research.

There have been several technological approaches to halting the spread of new coronavirus since the epidemic began [18, 19, 20]. Countless affluent nations, such as India and South Korea, use GPS technology to keep tabs on persons who are at risk of infection or are suspected of being sick. That way, they won't come into contact with someone who isn't sick. This app utilises GPS and Bluetooth to locate COVID-19 patients in India's Arogya Setu App. It also aids in keeping others away from the ill individual [21]. When it comes to finding big gatherings of individuals, several police agencies use the use of drones and other surveillance cameras to locate them [22, 23]. In these critical instances, physical intervention may assist to flatten the curve, but it also introduces new dangers to the public and places more strain on the workforce.

Research in the field of human detection utilising visual surveillance systems has been around for a long time, but it can only go so far [24]. These recent advancements show a need for intelligent systems that can locate and record human behaviours. The objective of human identification is lofty, but it is difficult to achieve due to factors such as low-resolution video, variations in stances, clothes, lighting, and backdrops, as well as the limitations of machine vision. In order to increase detection performance, it is important to be aware of these issues.

An item in motion may be tracked down in two ways: by tracking down the thing itself [26] and by figuring out what it is. Finding items in the first step may be aided by methods such as background removal [28], optical flow [29], and spatiotemporal filtering [30]. Subtracting from a backdrop frame (the initial frame) is done by subtracting pixel or block differences from a current frame. Adaptive Gaussian mixture, temporal differencing, hierarchical background models, warping background, and non-parametric background [32] are some of the most prominent methods for removing background noise. To discover moving regions in a batch of pictures, flow vectors associated to the item's movement are characterised for a particular period of time in the optical flow-based object recognition approach [29]. This method requires a lot of processing power and is sensitive to problems like noise, colour, illumination and other non-motion related factors. [34] A spatio-temporal filter-based strategy was proposed by Aslani et al. [30] as an alternative method for detecting motion. If you use this approach, the motion parameters may be discovered by an examination of the three-dimensional (3D) spatial and temporal characteristics of a moving subject in an image series. Easy to use and don't demand a lot of computational resources make these approaches useful. Noise and ambiguity in shifting patterns restrict their effectiveness, though [35].

### **III. PROPOSED METHODOLOGY**

The YOLO-COCO Detector will be used in this study. It was decided to create two folders: one for the detection and setup and a second one to store our pre-trained model. Coco.names, yolov3.cfg, and yolov3.weights make up the YOLO-COCO file. To locate things, we employ models that have previously been trained. The main python file, which we'll execute to verify that the programme is working properly, is also located in the main folder, along with the two subfolders we created. Three files are connected to the main Python file: one for specifying parameters, one for finding and labelling individuals, and a third for using the trained model. To record the video file, we utilise our laptop's camera when we open up the main document The trained model and configuration file go to work as soon as the live video is detected. It then utilises all of the data to identify the persons in the frame who are not following and those who are following social distancing." There is a 10-second pause between each warning message in the application. More and more alerts will appear if more individuals violate the laws of social distance. There is a pop-up notification that appears on the side of a live broadcast.

IV. IMPLEMENTATION DETAILS

As you can see in this figure, YOLO v3 is used as the object detection model in this example of the sequence diagram. Using the pre-trained models, the social distance of all persons in the live video frame is assessed once object detection begins operating. A red or green box will be painted around the person in the live video frame that has been detected by the model that has been trained, and an alert will be sent depending on the count. The options are chosen based on the requirements that have been specified. Anyone who happens to be viewing the video at the time will be able to notice the warning and take the appropriate actions to maintain social distance. Bottom left corner of the screen will display the number of persons who don't adhere to the social distance guidelines, indicated by red boxes. The laptop's bottom right corner will light up with a notice when a preset threshold is met.



Fig -1: Sequence Design

Proposed Data Flow diagram

There will be a single Python file that is connected to the other two files in the folder and has access to the trained model that will be used to search for individuals in order to execute this particular application. In order to discover individuals, we will utilise the detection.py file, and the social distancing config.py file will determine how far away we need to be before sending an alarm when running the file social distance detector.py.

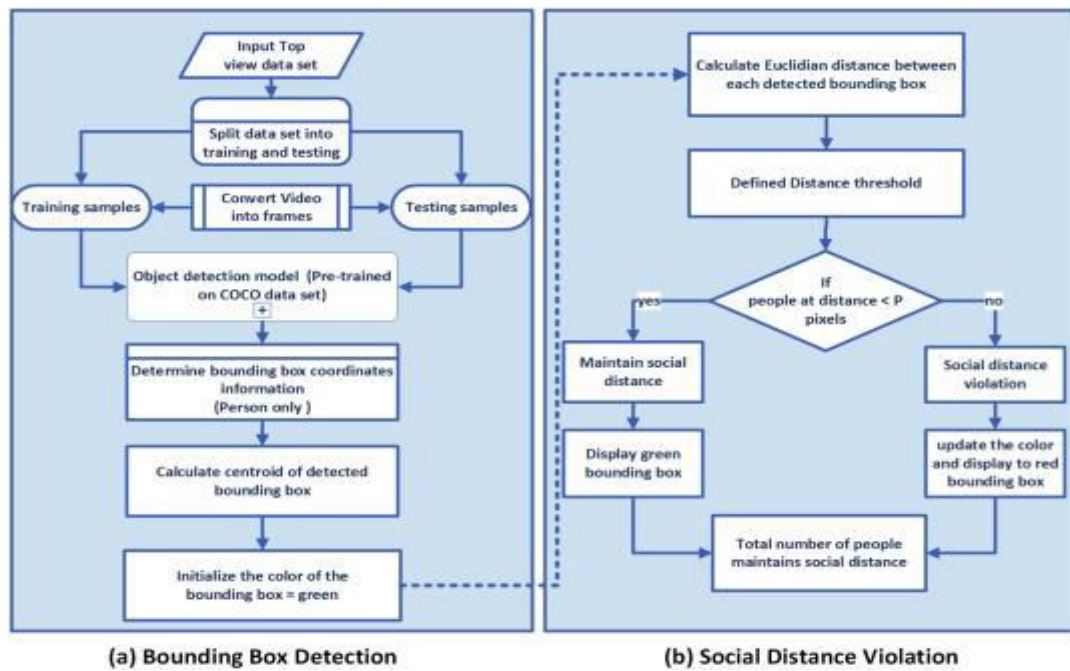


Fig -2: Proposed Data flow diagram

### V. EXPERIMENTAL RESULTS

For the sake of illustration, I've included some screenshots from the actual functioning programme model. Two phases are involved. First, the video is used to count the number of pedestrians, and the total number of pedestrians is presented in the bottom right corner. The warning notice that appears in the lower right corner of the screen was introduced in the second stage.



Fig -3: The Video Input

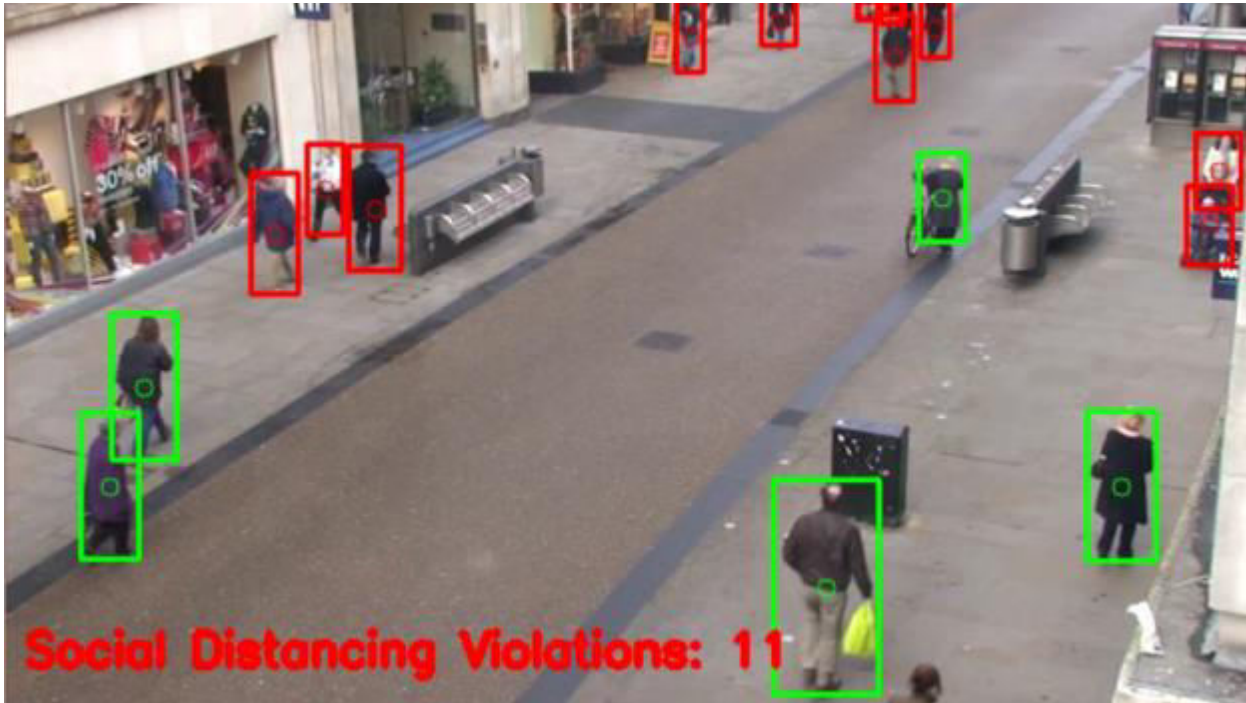


Fig -4: The Stage 1 Detection



Fig -5: The Stage 2 Detection with Warning Notification



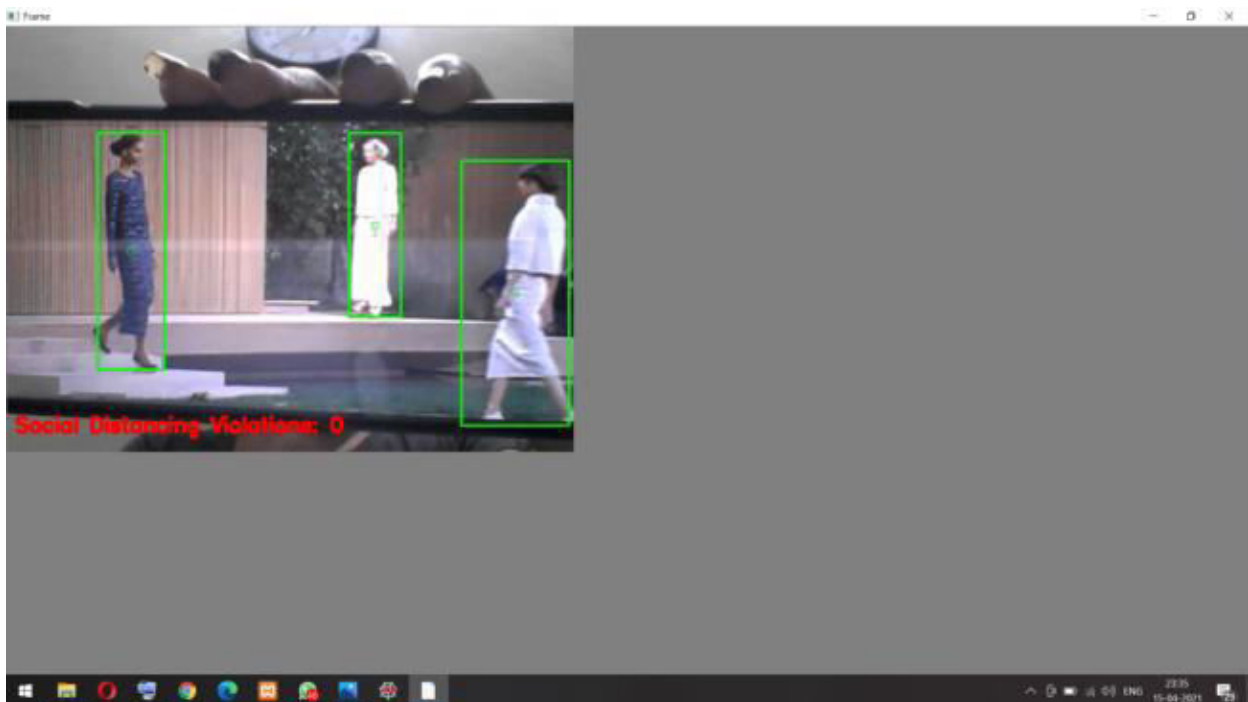


Fig -6: The Stage 2 Detection without Warning Notification As Their Is No Violation

## VI. CONCLUSION

A technique for detecting social aberrations was developed using an in-depth learning approach. With the use of computer vision, persons who do not observe the law will be represented in red Frame and red line. The suggested approach was verified using camera footage of persons going along the street. According to the findings, the recommended approach is Other venues, such as the workplace, a restaurant, or a school, may utilise these methods to assess social isolation. Expanding and integrating additional detection methods like mask detection and human body temperature detection, upgrading computer hardware, and evaluating camera view may all help improve the project even further.

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