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# Social Distance Detection and Alert System using Deep Learning and Computer Vision

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**ABSTRACT:** A methodology for social distance detection utilizing deep learning to figure out how to monitor the distance between pedestrians to lessen the spread of Novel Covid-19 virus. The discovery tool was created to make individuals aware social distancing with one another by analysing a real time video capture. The pre-trained object detection model using the YOLO V3 algorithm was given video frames from the camera as the input and subsequently was utilized for social distancing detection. Afterwards, the video frame is being changed over into a hierarchical 2-dimensional view for distance estimation among the people. The distance between individuals is assessed and any rebellious sets of people inside the showcase would be demonstrated with a coloured boundary. The proposed technique is executed on a live footage of people strolling in the city or real-time camera view. This framework allows for the proper implementation of social separation rules between different individuals in a crowded place.

**KEYWORDS:** Social Distancing, Deep Learning, Computer Vision, Euclidean Distance, Pedestrian detection, YOLO, Region of Interest, Coloured Boundary boxes.

## I. INTRODUCTION

Humans are social beings, as is evident by the fact that in ordinary day by day interaction people unknowingly interact with one another to achieve goals or to exchange views. The WHO has proclaimed Novel Covid-19 as a pandemic because of the significant expansion in the quantity of cases across the globe. All through the world, around 493,392,853 individuals were contaminated by COVID-19 and around 6,165,833 individuals lost their lives. The principle wellbeing measure proposed by WHO is to wear a mask and to keep social separation with others to diminish the hazard of contamination while sneezing or coughing. To control the spread of illness, numerous nations have forced a lockdown where individuals are entitled to remain at home in this critical period. Clearly given individuals' fervour to begin working, they sometimes disregard the execution of social separation. Thus, this system plans to indulge the authorization of social separation by giving computerized identification of social separation infringement in jam-packed places with the assistance of deep learning strategy. It focuses on diminishing the actual contact between the infected individuals and solid individuals. Henceforth, viewed this point as critical to acquire robotization in social distancing.

Paper is coordinated as follows. Area II portrays related work of the current frameworks to keep up with social distancing among individuals. The stream outline/flow diagram addresses the progression of the algorithm. After recognition of walkers, the Euclidean distance computations and Region of Interests (ROI) assessment are depicted in Section III. Area IV addresses trial after effects of the executed framework. At last, Section V presents a conclusion.

## II. RELATED WORK

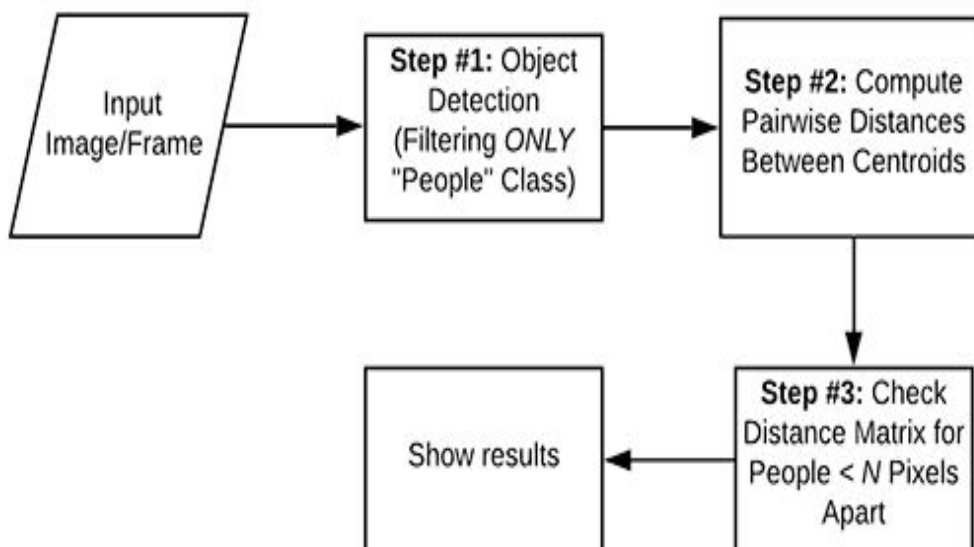
Social Distancing is, as of now, the most reliable approach to check the spread of Novel Coronavirus. At present, there is no such observation framework to keep up with or to check whether social distancing is kept up in the open spots like Malls, Schools, Market Places and many more. In current Scenario, CCTVs don't screen or caution while social distance isn't kept up with. Numerous countries, which includes India and South Korea, have utilized the technology of GPS to follow the improvements of the tainted individuals to screen the opportunity of their presentation among strong people. The organization uses the Arogya Setu app in India to locate people with Covid-19 through GPS and Bluetooth tracking.

Deep Convolutional Neural Network is a multilayer perceptron neural network deep learning algorithm comprising numerous convolutional, sub-sampling, and fully connected layers. Having followed that, the weights in the network's entire layers are tuned for every classification task based on its dataset. The Prediction model, which is supervised classification technique is robust in identifying the object in many situations, and is one of the divisions in deep learning for object detection in images. Because of the latest powerful computational system and massive dataset such as the Alex net and VGG16, CNN has had impressive results in high resolution identification jobs.

In terms of precision and time consumption, the best object detectors with deep learning, in today's era, have their merits and drawbacks. Within the image, the item may have multiple geometric orientations and configurations. As a result, real-time object classifiers based on the CNN model, like R-CNN and YOLO, have been implemented to identify multi-classes in distinct regions of images. In terms of both efficiency and precision, YOLO (You Only Look Once) is perhaps the most effective deep CNN-based object identification algorithm.

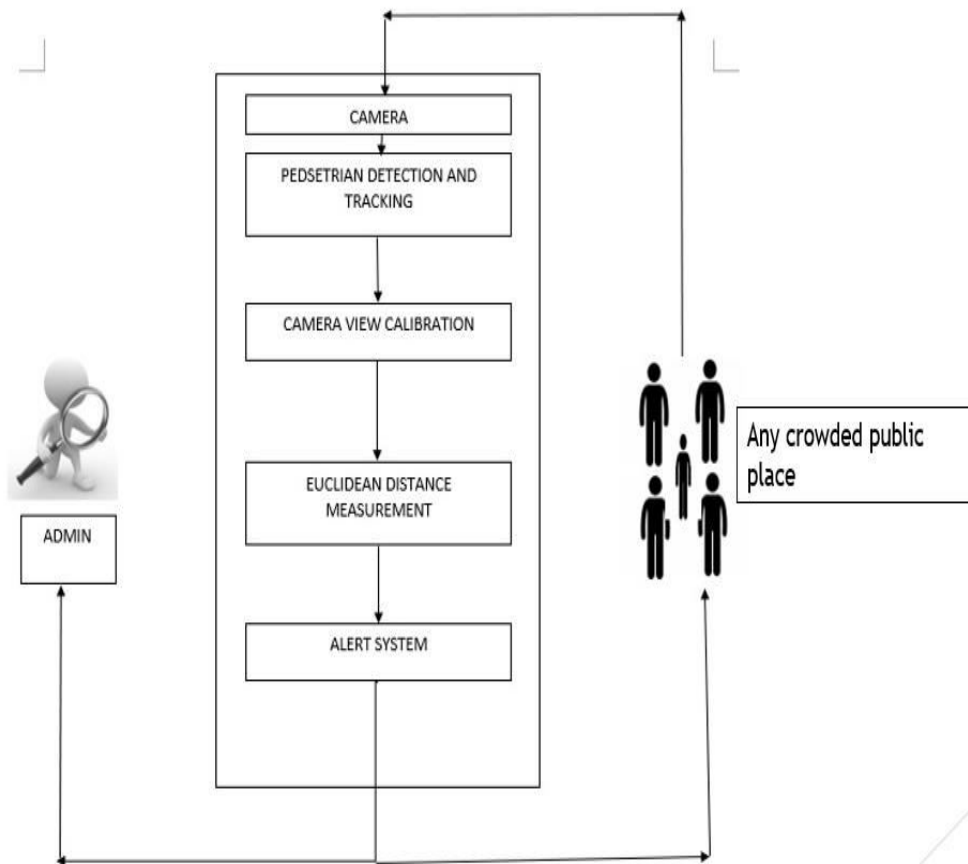
### III. METHODOLOGY

At first a model will be created in view of the YOLO algorithm will be utilized to identify the person or walker in the video outline. An outline box will be drawn over the identified individuals to distinguish them and measure the distance between them while concurrently tracking them at the same time with the aides of Euclidean distance between their centroids and current position.



The area of interest (ROI) of a picture which targets around the walker strolling road will be changed into a hierarchical 2-dimensional view which contains 480×480 pixels. There is a direct correlation between the distance between the people and the number of pixels measured in the hierarchical view. The Euclidean length between walkers' pair will be estimated and scaled by the pixels in the picture. According to the limit least length, any length closer than the permissible length between any two people will be shown with coloured boundaries that work as prudent alerts.

In the event that the distance between two individual is greater than the limit least distance, then, those people will be shown with a green limit box around them. This part of the system indicates social distancing is not being adhered to in a certain area when distance is greater than 5m.



#### IV. EXPERIMENTAL RESULTS

Based on Deep Learning and YOLO V3 algorithm, the figures show how social distancing from video feeds is achieved.

Fig. (1) shows the video frame which will be given to the model.



Fig. (1)



Fig. (2) is the 2D top-down transformation obtained through video frame.

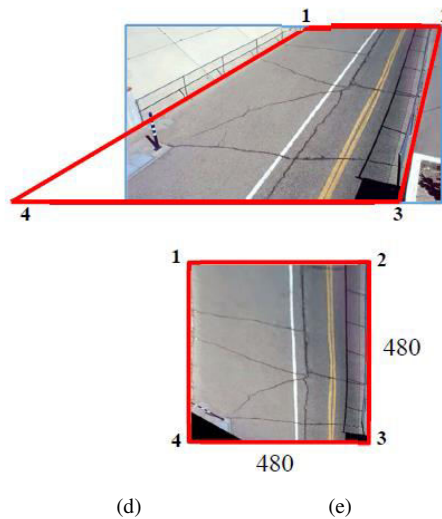


Fig. (2)

Fig. 3 describes the coloured boundary boxes which depict whether social distancing is being followed and the number of violations.





## V. CONCLUSION

A computerization of social distancing detection utilizing computer vision and deep learning model is proposed. Using the algorithms in deep learning and computer vision, the space among individuals is frequently calculated and any tainted pair of people will be shown with appropriately coloured boundaries. The system was tried using a footage from a CCTV showing individuals walking on the street. Based on the simulation results, the proposed strategy is efficient in determining an individual social separation in crowded places such as offices, restaurants and schools.

Furthermore, the job can be enhanced by increasing the walker discovery calculation, coordinating other location computations such as mask identification, and increasing the equipment's processing power. Handling those challenges allows for a speedy inspection of the overall population in order to identify prospective activities that may pose a threat to prosperity, particularly in the case of ongoing pandemic outbreaks.

Additionally, by facilitating the walker recognition system, incorporating other identification techniques like human body temperature detection, increasing the computing capacity of the equipment, and aligning the camera aspect vision, the task could be refined still further.

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