

## Social Distance Detection

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### Abstract

Social distancing detection using deep learning to evaluate the distance between people to mitigate the impact of this coronavirus pandemic. The detection tool was developed to alert people to maintain a safe distance with each other by evaluating a video feed. The video frame from the camera was used as input, and the open-source object detection pre-trained model based on the YOLOv3 algorithm was employed for pedestrian detection. Later, the video frame was transformed into top-down view for distance measurement from the 2D plane. The distance between people can be estimated and any noncompliant pair of people in the display will be indicated with a red frame and red line. The proposed method was validated on a pre-recorded video of pedestrians walking on the street. The result shows that the proposed method is able to determine the social distancing measures between multiple people in the video.

**Keywords:** social distancing; COVID-19; human detection and tracking; distance detection;

### 1. INTRODUCTION

In this paper a The novel generation of the coronavirus disease (COVID-19) was reported in late December 2019 in Wuhan, China. After only a few months, the virus became a global outbreak in 2020. On May 2020 the World Health Organization (WHO) announced the situation as pandemic [1,2]. The statistics by WHO on 8th October 2020 confirm 36 million infected people and a scary number of 1,056,000 deaths in 200 countries.

With the growing trend of patients, there is still no effective cure or available treatment for the virus. While scientists, healthcare organizations, and researchers are continuously working to produce, appropriate medications or vaccines for the deadly virus, no definite success has been reported at the time of this research, and there is no certain treatment or recommendation to prevent or cure this new disease. Therefore, precautions are taken by the whole world to limit the spread of infection. These harsh conditions have forced the global communities to look for alternative ways to reduce the spread of the virus.

Social distancing, refers to precaution actions to prevent the proliferation of the disease, by minimizing the proximity of human physical contacts in covered or crowded public places (e.g., schools, workplaces, gyms, lecture theatres, etc.) to stop the widespread accumulation of the infection risk

Therefore, social distancing now claims to be even more important than thought before, and one of the best ways to stop the spread of the disease in addition to wearing face masks. Almost all countries are now considering it as a mandatory practice

According to the defined requirements by the WHO, the minimum distance between individuals must be at least 6 feet (1.8 m) in order to observe an adequate social distancing among the people. Recent research has confirmed that people with mild or no symptoms may also be carriers of the novel coronavirus infection. Therefore, it is important all individuals maintain controlled behaviors and observe social distancing. Many researches work such as have proved social-distancing as an effective non-pharmacological approach and an important inhibitor for limiting the transmission of contagious diseases such as H1N1, SARS, and COVID-19.

## 2. PROPOSED SYSTEM

1. The aim of this paper is to monitoring the distance between the peoples.
2. Prepare the thermal images or streaming a video from a thermal camera which contains people.
3. Applying the deep learning object detector to detect people in thermal images or video streams.
4. Check the number of persons that are in the images or video stream.
5. Compute the distance between the centroid of the bounding boxes which are enclosed to the detected people.
6. Finally, the algorithm will decide for safe or unsafe social distancing based on the number of persons and the measured distance between the centroid of bounding boxes

## 3. MODULES

### 3.1. Object Detection

Object detection is a computer vision task that involves both localizing one or more objects within an image and classifying each object in the image. It is a challenging computer vision task that requires both successful object localization in order to locate and draw a bounding box around each object in an image, and object classification to predict the correct class of object that was localized.

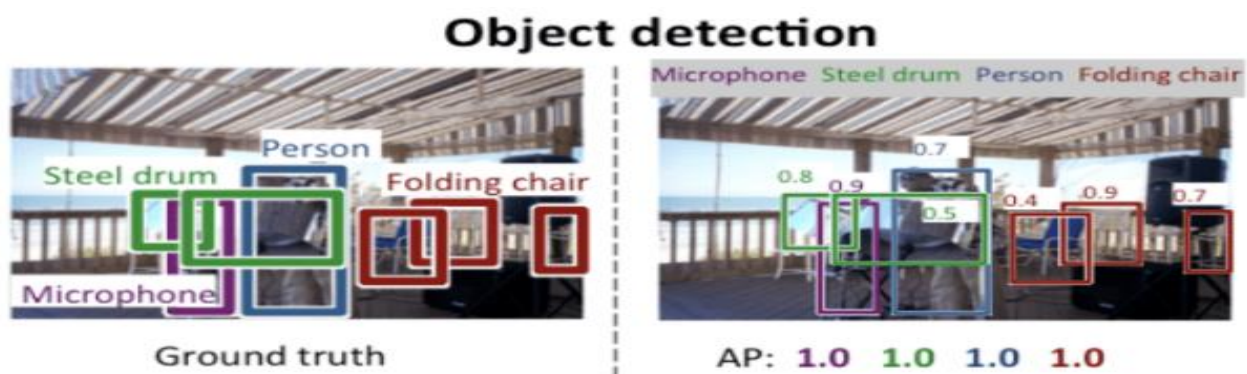


Figure No.1 object detection

### 3.2. Distance Calculation

NMS (Non-maxima suppression) is also used to reduce overlapping bounding boxes to only a single bounding box, thus representing the true detection of the object. Having overlapping boxes is not exactly practical and ideal, especially if we need to count the number of objects in an image. Euclidean distance is then computed between all pairs of the returned centroids. Simply, a centroid is the center of a bounding box. Based on these pairwise distances, check to see if any two people are less than/close to 'N' pixels apart.

### 3.3. Threading

Multi-Threading is implemented in 'mylib/thread.py'. If you ever see a lag/delay in your real-time stream, consider using it. Threading removes OpenCV's internal buffer (which basically stores the new frames yet to be processed until your system processes the old frames) and thus reduces the lag/increases fps. If your system is not capable of simultaneously processing and outputting the result, you might see a delay in the stream. This is where threading comes into action.

set Thread = True in the config

### 3.4 Real-Time Alert

If selected, automatically make an sound alert in real-time. Use case: If the total number of violations (say 10 or 30) exceeded in a store/building, project simply alert the staff. In this project can able set the max. violations limit in config (Threshold = 15).

### 3.5 Desired Violations Limits

Violations limits can also set your desired minimum and maximum. For example, MAX\_DISTANCE = 80 implies the maximum distance 2 people can be closer together is 80 pixels. If they fell under 80, we treat it as an 'abnormal' violation (yellow). Similarly, MIN\_DISTANCE = 50 implies the minimum distance between 2 people. If they fell under 50 px (which is closer than 80), we treat it as a more 'serious' violation (red). Anything above 80 px is considered as a safe distance and thus, 'no' violation (green).



Figure No.2 calculate violations

#### 4. CONCLUSION

Social distancing along with other basic sanitary measures are very important to keep the spread of the Covid-19 as slow as possible. But this project is only a proof of concept and was not made to be use to monitor social distancing in public or private areas because of ethical and privacy issues.

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