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# Social Distancing and Mask Detection Using Live Feed

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**ABSTRACT:** The paper presents a methodology for social distancing detection and Mask Detection using deep learning to evaluate the distance between people to mitigate the impact of this coronavirus pandemic. The practice of social distancing is imperative to curb the spread of contagious diseases and has been globally adopted as a non-pharmaceutical prevention measure during the COVID-19 pandemic.Covid19 has given a new identity to wearing a mask and social distancing. Accurately and efficiently detecting masked faces is increasingly meaningful. . The detection tool was developed to alert people to maintain a safe distance from each other and wear masks by evaluating a video feed. As a unique face detection task, face mask detection is much more difficult because of extreme occlusions which lead to the loss of face details. The YOLO-based deep learning algorithms have made great breakthroughs in many computer vision areas including face detection.

**KEYWORD:-**social distancing, Mask Detection, YOLO, COVID-19.

## I. INTRODUCTION

The onset of the COVID-19 pandemic has led to an increase in the importance of social distancing to intervene in the spread of the virus by curbing social interactions and maintaining a physical distance. Social distancing can be defined as a non-pharmaceutical disease prevention and control intervention enforced to curb contact between those who are infected with a disease and those who are not, so as to stop or diminish the rate and extent of the transmission of the disease within a community. Eventually, this leads to a decrease in the spread of the disease and the fatalities caused by it. Centers for Disease Control and Prevention (CDC) safety guidelines dictate that a distance of at least 6 feet must be maintained between two individuals in both indoor and outdoor spaces. At the end of this decade, the face has got a new identification due to the rise in COVID19 cases. COVID-19 is a virus that gets inflicted when an infected person comes in contact with any other person. An infected person can leave traces of viruses on things around him. His spit or touch is observed to be the most infectious medium to carry this virus. Hence as a way of precaution people all around need to wear a face mask to prevent them and everyone around them to get infected by the VIRUS. To implement social distancing, group activities and congregations such as travel, meetings, gatherings, workshops, and praying had been banned during the quarantine period. The people are encouraged to use phone and email to manage and conduct events as much as possible to minimize the person-to-person contact. To further contain the spread of the virus, people are also informed to perform hygiene measures such as frequently washing hands, wearing a mask and avoiding close contact with people who are ill. However, there is a difference between knowing what to do to reduce the transmission of the virus and putting them into practice.

## II. RELATED WORK

I. This section highlights some of the related works about human detection using deep learning. A bulk of recent works on object classification and detection involving deep learning are also discussed. The state-of-the-art review mainly focuses on the current research works on object detection using machine learning. Human detection can be considered object detection in the computer vision task for classification and localization of its shape in video imagery. Deep learning has shown a research trend in multi-class object recognition and detection in artificial intelligence and has achieved outstanding performance on challenging datasets. Nguyen et al. presented a comprehensive analysis of state-of-the-art recent development and challenges in human detection.

II. Multi-scale feature extraction for single face recognition The Single sample face recognition has always been a hot but difficult issue in face recognition. By considering selecting robust features and generating virtual samples simultaneously, the paper proposes a multi-scale support vector transformation (MSSVT) based method to generate multi-scale virtual samples for single image recognition. The methods to solve the problem

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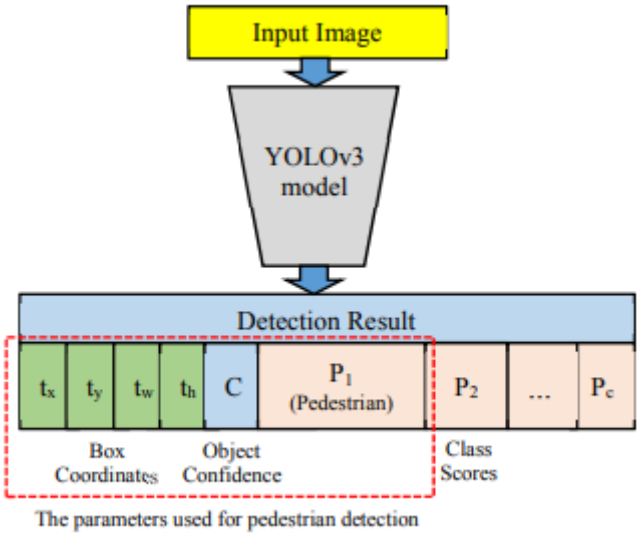
are divided into two categories. One is to look for and select features that are robust to the number of samples, from the point of view of feature selection, such as PCA and 2DPCA. But when each person has only one face to be trained, the feature information extracted from the feature extraction algorithm will also be very limited, resulting in bad recognition performance. The other is to generate multiple virtual samples from the point of view of the extended sample, thus reducing the impact of the sample size.

III. The current state-of-the-art object detectors with deep learning had their pros and cons in terms of accuracy and speed. The object might have different spatial locations and aspect ratios within the image. Hence, the real-time algorithms of object detection using the CNN model such as R-CNN and YOLO had further developed to detect multi-classes in different regions in images had been developed. YOLO (You Only Look Once) is the prominent technique for deep CNN-based object detection in terms of both speed and accuracy.

IV. Face and Gender Recognition System Based on Convolutional Neural networks The proposed Face and Gender Recognition System realizes the combination of image face recognition and gender recognition module, which enables not only face recognition but also gender recognition in complex backgrounds. Based on the ResNet50 neural networks, we use the global average pool (GAP) instead of the fully connected layer before the final output, followed by the softmax layer, which reduced the size of the networks. By constructing such a simple structure, the accuracy of the system recognition has been improved.

## III. YOLO ALGORITHM

I. Pedestrian detection Deep CNN model was the object detection approach was proposed that mitigated the computational complexity issues by formulating the detection with a single regression problem [11]. When it comes to deep learning-based object detection, the YOLO model is considered one of the state-of-the-art object detectors which can be demonstrated to provide significant speed advantages that will be suitable for real-time application. In this work, the YOLO model adopted for pedestrian detection as shown in Figure 3. The YOLO algorithm was considered as an object detection taking a given input image and simultaneously learning bounding box coordinates (tx, ty, tw, th), object confidence, and corresponding class label probabilities (P1, P2, …, Pc). The YOLO trained on the COCO dataset which consists of 80 labels including human or pedestrian classes. In this work, the only box coordinates, object confidence and pedestrian object class from detection result in the YOLO model were used for pedestrian detection.



The parameters used for pedestrian detection

II. Camera view calibration::-The region of interest (ROI) of an image focused on the pedestrian walking street was transformed into a top-down 2D view that contains 480×480 pixels as shown in Figure 4. Camera view calibration is applied which works by computing the transformation of the perspective view into a top-down view. In OpenCV, the perspective transformation is a simple camera calibration method that involves selecting four points in the perspective view and mapping them to the corners of a rectangle in the 2D image

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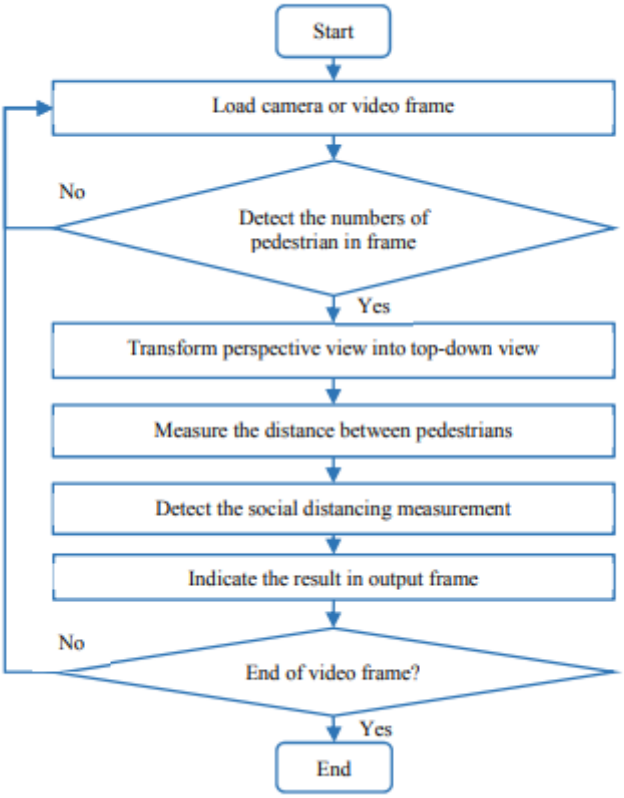
view. Hence, every person is assumed to be standing on the same level flat plane. The actual distance between pedestrians corresponds to the number of pixels in the top-down view that be estimated.




III. Distance measurement::-In this step of the pipeline, the location of the bounding box for each person (x, y, w, h) in the perspective view is detected and transformed into a top-down view. For each pedestrian, the position in the top-down view is estimated based on the bottom-center point of the bounding box. The pedestrian detection algorithm. The YOLO algorithm is also able to detect the half body of the pedestrian as an object by showing the bounding box, the position of the pedestrian corresponding to the middle-point of the bottom line is estimated based on the bounding box will be less precise. To overcome the detection errors, the proposed methodology had been improved by adding a quadrilateral box to observe the appointed region in an image as shown in Figure 8. Hence, only the pedestrians walking within the specified space will be counted for people density measurement

## IV.CONCLUSION

A methodology of social distancing detection tool using a deep learning model is proposed. By using computer vision, the distance between people can be estimated and any non-compliant pair of people will be indicated with a red frame and a red line. The proposed method was validated using a video showing pedestrians walking on a street. The visualization results showed that the proposed method is capable to determine the social distancing measures between people which can be further developed for use in other environments such as offices, restaurants, and schools. Furthermore, the work can be further improved by optimizing the pedestrian detection algorithm, integrating other detection algorithms such as mask detection and human body temperature detection, improving the computing power of the hardware, and calibrating the camera perspective view.

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