SOCIAL DISTANCING DETECTION

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Abstract - *In the world of clever technology the place where everything is being built using technology. As technology is enhancing day by day the need for technical systems is additionally growing.*

The paper presented here is a user-friendly deep learning social distancing detection that simplifies the task of preserving safe distance between each other. The foremost intention of this project was to alert pedestrians to maintain a safe distance. The video frame or a photo is given as input. The real-time object detection YOLO algorithm which was pre-trained using the COCO dataset detects the objects I.e. pedestrians from the frame by the usage of bounding box regression. Moreover, using the centroid points of the bounding boxes the distance between them is being estimated using the centroid formula. The pedestrians violating the default distance are displayed in red bounding boxes and the ones who are no longer violating are displayed in green. Thereafter, it displays the whole no. of violations and alert messages on the screen. The technique was once established on a pre-recorded video of pedestrians as well as an image.

The result suggests that the technique is in a position to determine no. of violations in the frame and additionally helps to maintain social distance.

Keywords-YOLO algorithm,COCO dataset, Social distancing detection,Bounding box regression

I.INTRODUCTION

As we all are conscious that COVID-19 instances are rolling out throughout the world day by day. The COVID-19 virus can unfold from a contaminated person's mouth or nostril in small particles when they cough, sneeze, speak, sing or even breathe. At this, the term social distancing appears to be spoken more, be it social media or any news channel. This idiom appears to be immersing all over. And the first-rate way to sluggish down the transmission is to inculcate the social distancing manner in our life. Also, as suggested by WHO, to shield ourselves and others through contamination we need to remain at least 6 feet away from each other. But it appears to be aggravating to keep impervious distance in this pandemic.People would possibly be keeping distances and some would perchance not. So, to make it easier, we have designed a social distancing detection system. It is a real-time object detection computing device that simplifies the work of preserving social distance.

This device is designed to aid the users to retain a secure distance from each other. It helps the users by exhibiting the no. of violations and alert messages. Hence, users will be capable of holding the social distance.

II.PROPOSED APPROACH

As we all know, the imitable condition that is going on due to the COVID-19 pandemic. And in this pandemic, retaining a protected distance manually is such a disturbing task. People want to be maintaining distances, and some would perchance not. So, to make it easier, we have designed a social distancing detection system that helps users to keep their social distance from others. We have used the YOLO algorithm which is pre-trained by the usage of the COCO dataset. YOLO algorithm is a real-time object detection algorithm that determines the bounding boxes and classification of the objects precisely. YOLO firsts divide the image into N grids. Each N grid has an equal dimension location of S*S. After this, image localization and detection is utilized on the grid. The distance between the centroid elements is estimated with the use of the centroid formula. Thereafter, distance is in distinction to the default distance and the pedestrians who are close to each other are displayed into red bounding boxes and the ones who are no longer are displayed into the green. Therefore, the whole no. of violations and an alert message is displayed on the screen. By displaying the alert message, users will be able to maintain a safe distance from each other.

III.ARCHITECTURE

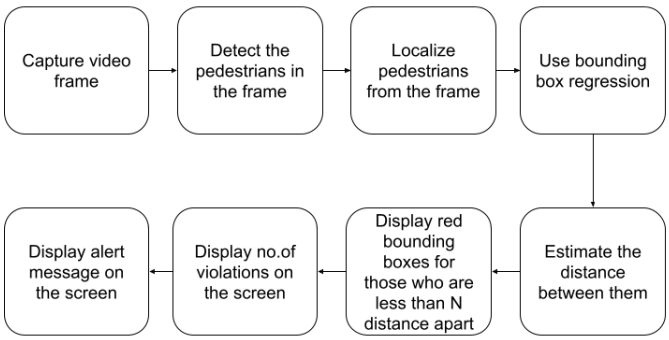

Fig-1- System Architecture

The user needs to give the digital camera frame or a pre-recorded video and image can be given as input. After that, the real-time object detection mannequin YOLO algorithm pre-trained using the COCO dataset will examine the pedestrians from the frame through the usage of bounding box regression. Thereafter, the system will estimate the distance between them by the usage of the centroid elements of the bounding box. The pedestrians who are close to each other are displayed in red bounding boxes and the ones who do not are displayed in green. As a result the whole no. of violations and alert messages is displayed on the show display screen.

IV. METHODOLOGY

1. YOLO algorithm: YOLO is generally a real-time object detection algorithm that follows a regression approach which essentially is quite significant. This algorithm helps to discover the bounding boxes as nicely as the class of the object subtly specifying its location. YOLO algorithm first splits the frame into N framework where each framework is having equal dimension region of S*S. These N frameworks are liable for image localizing and determining. Moreover, the objects are determined from the frame which is quite significant. Because of its speed and accuracy, the objects are determined in only one execution of the YOLO algorithm in a sort of major way. Hence, this is the reason the YOLO algorithm outperforms all other models.

2. COCO Dataset: Common objects in Context or COCO is particularly a large-scale object detection segmentation and a captioning dataset which for all intents and purposes is fairly significant. It consists of a couple of sets of excessive datasets each made for a unique machine learning task. Algorithms for object detection and classification can essentially be pre-trained using the dataset in a major way. The COCO dataset has a specific layout that exactly defines how your notations i.e. bounding boxes, objects, classes, etc. are saved on disk. The COCO dataset is deliberately biased towards person class, so it determines person class more accurately which is quite significant.

3. Python: Python is a markup language, which is specifically practicable. It is advised to be mostly applied in a fluctuation of functions such as big data, software program, internet improvement, computerization and normally getting tasks executed for the most part. It is used to automate tasks to construct websites, creating a variety of programs. Python helps programmers to complete complex tasks without encountering coding problems which is significant.

4. NumPy: NumPy may be a multipurpose library of python which is employed for handling arrays. NumPy essentially stands for Numerical Python which functions in the domain of algebra. It gives array objects quicker than the python list. Since; NumPy may be a library of python but it's partially written in Python and for computations, C language is employed.

5. SciPy: SciPy, which specifically symbolizes scientific python, is particularly an open-source public library of python that makes use of NumPy underneath. It mostly has additional features that are often to be used for very large statistics and computer learning. SciPy can also be used for performing complicated numerical operations, optimization, integration, graphic processing, etc.

6. Imutils: Imutils mostly is a sequence of features that helps to make primary image processing functions such as resizing, translation, relocation, rotation, extraction of the skeleton, picture scaling, etc. It is a python package, which particularly is in all likelihood to be based on. It is able to call the OpenCV interface simply.

7. OpenCV: OpenCV is an open-source library that is used for picture processing, computing device learning, and computer vision. OpenCV has additionally been used in true time operations, the place where it makes the responsibilities greater and easier. Using OpenCV we can manage films and snapshots from which the objects, human faces, and even handwriting can be identified. When OpenCV is built-in with one of a kind libraries it affords

V. IMPLEMENTATION

The system captures the image then using the YOLO algorithm and COCO dataset it will detect the people from the frame. Thereafter using the centroid formula the distance between all detected people will be calculated. Based on these distances, if two people are less than provided distance system will generate red boxes around them and green for others, System will show the number of social distancing violations performed in the frame on the screen and also if the violations are greater than the

specified number then alert message will be displayed on the screen.

VI. ADVANTAGES

1.Conventional video supervision computing system requires security officers to display the video screen, which can moreover lead to false results which isn't trustworthy and there are possibilities that some would possibly violate the distance so to avoid this we have designed a system that does not require human beings to monitor the screen, it captures the video itself and recognize the pedestrians that are violating which is now no longer possible manually.

2. We have designed a social distancing detection system that simplifies the work of retaining impenetrable social distance.

3. We have used the YOLO algorithm which is a real-time object detection algorithm that detects the bounding boxes and class of the image which consists of objects internal in only one execution of the algorithm.

4. COCO dataset, which is an open-source high first-rate dataset. It is immoderately biased towards person class, so it detects its person class precisely

5. Social distancing detection system shows no. of violations and alerts users via displaying the alert message.

6. YOLO algorithm works properly due to the actuality that it is pre-trained with the usage of the COCO dataset.

7. YOLO algorithm which we have used outperforms all other models due to the actuality of its pace and accuracy.

VII. RESULT

The YOLO algorithm works properly in real-time object detection operations. It determines the bounding boxes and class of the image that consists of objects in solely one execution of the algorithm. It gives a lot of fairly higher performance in a generally big way. Also, the system will help users by displaying the no. of violations and alert messages, so that they can keep a secure distance. It also displays the pedestrians that are violating red bounding boxes and who are not into the green. All this is proven in the images illustrated below.

Fig-2: Output-1

Fig-3: Output-2

Fig-3: Output-3

VIII. CONCLUSION

The system was designed keeping in mind the simplicity of use via the users so that users will particularly be able to use the device in their everyday life in a subtle way. Social distancing detection is an environment-friendly real-time object detection device that essentially helps users in maintaining a safe distance. The foremost aim was to help users in retaining a safe distance and alert the ones who are violating by showing the alert message on the screen. This system proposes a very high-quality deep gaining knowledge of the system that simplifies the work of preserving social distance using the YOLO algorithm which

was pre-trained through the COCO dataset. The result indicates that the proposed approach is supposed to be used in any working surroundings because of its velocity and accuracy

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