Imposing security in the video surveillance

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Abstract. In case of a crime scene or any other investigating task, the recorded surveillance video footage plays a very prominent role in studying the situation. It is a very challenging duty for the surveillant officer to look after many such videos without missing the important details. Thereby, the officer has to be assisted with an efficient tool to ensure grabbing clear and unambiguous information from the video footage. The foremost step is to detect people and other objects distinctly as well as accurately. Along with the detection pointing out the detected objects has to be done by drawing bounding boxes around them. For this to happen the Machine has to be trained very well that in such a way that it should be able to detect all the objects in the video footage accurately. It is a challenging task to identify a moving object in public places. Set of regulations and restrictions are to be followed to put an association or commonality cautiously. This project is aimed to support and assist the surveillant officers in their investigations.

INTRODUCTION

In the everyday scenario of the security guards having an eye over protected areas in order to make sure that no offensive movements are being carried on, but often in real-time watch out it is not certain to find out the actual reasons and people who have contributed to the committed chaos, it requires a thorough investigation of the past events that which are captured in the surveillance cameras [1]. The officers have to keenly observe every particular detail in the scenarios so as to draw conclusions, which require in-depth analysis of the video records [2, 38]. It is certain to miss out on a few minor clues and movements in the process of investigating therefore in order to have a clear view of the events and movements in the video footage the officer is to be assisted with proper techniques so as to see through as much information as possible and in a distinct manner [3, 37]. To put an association or commonality cautiously This project is aimed to support and mitigate this pandemic along with minimal loss of economic endeavors and propose a solution to maintain the social distance among the people gathered at any public places.

RELATED STUDY

The process of object detection [4] has been witnessing a rapid revolutionary enhancement in the field of computer vision [5, 35]. As the Object Detection [6, 36] technique involves various object combinationsand their classification [7, 34] as well as the specified object localization process [8, 32] makes it one of the most challenging aspects in this domain of computer vision as the main goal of the detection process [9, 33] is to determine whether the object selected in a specific image can effectively categorize various objects they belong to [10].

The process behind the Object detection Mechanism is very complicated and is being simplified over the course of time. There are various object detecting algorithms evolved since the evolution of the object identifying necessity [11]. A Few of the most used Object Detection Algorithms are Fast R-CNN [12, 9], Histogram of Oriented

Gradients (HOG) [13], Single Shot Detector (SSD) [14. 33], etc. All these algorithms use a unique architecture of CNNs to generate highly accurate detection [15,39].
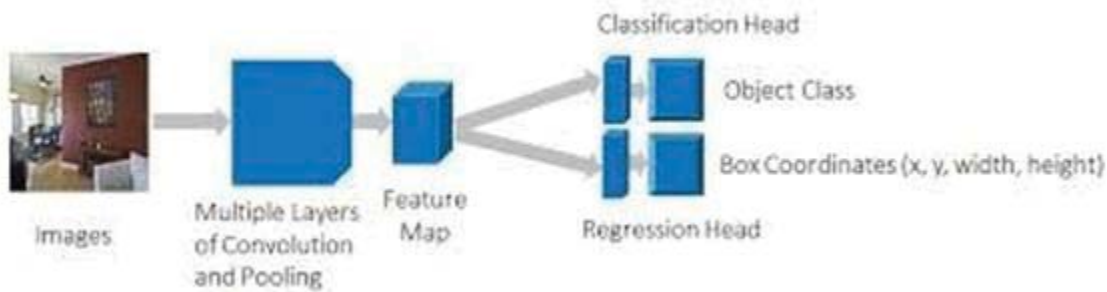

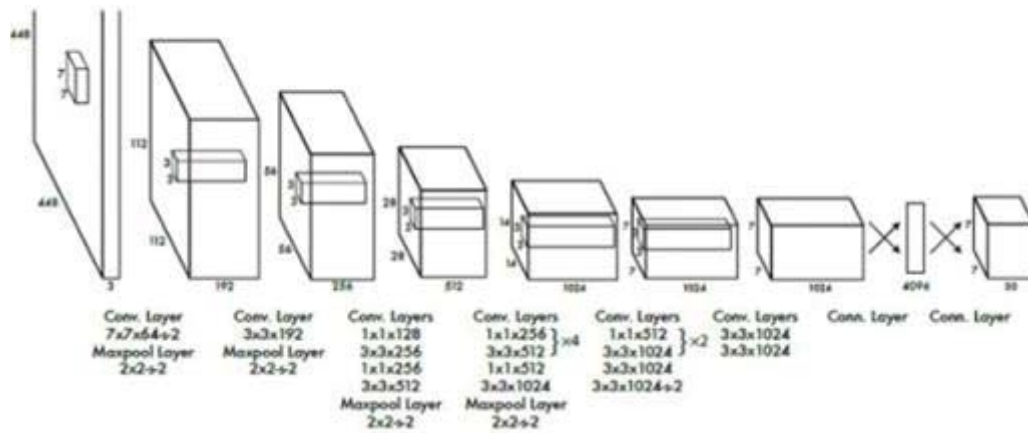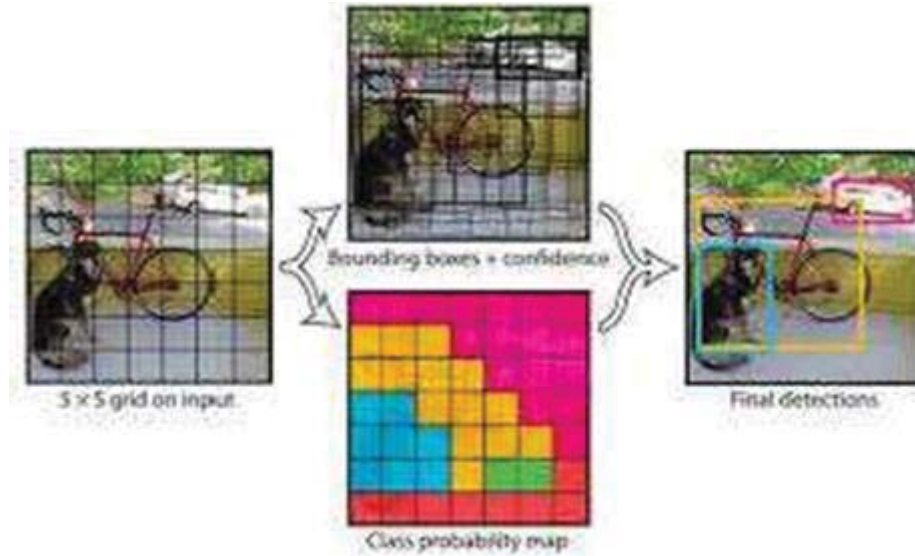**FIGURE 1.** Proposed Model

FIGURE 2. Proposed Architecture Model

PROPOSED MODEL

The YOLO framework [16] which also known as You Only Look Once is the proposed Object Detecting architecture for the paper [17]. It deals with object detection differently as the process involves by considering the entire image as a unique instance for implementing the prediction process using their own bounding boxes [20] the process of coordinating and fetching the class probabilities from those boxes is a vital aspect [19]. One of the major advantage of implementing YOLO framework [18] is consideration of its implementation speed which is an outstanding one in terms of execution that is 45 frames per second is the best while performing the generalization process of object representation as best of the algorithms are implemented for performing the object detection [21].

FIGURE 3. Architecture Implementation

The proposed model First takes in the trained weights and then loads them into the Object Detection Architecture [22] and now the machine is ready to analyze the input by considering the trained model with a input video [23]as shown in figure 1 which is fed withingthe model to attain the traces from the input video detected frame by frame with various seeds that are considered.

FIGURE 4. Identification of objects Model

Almost all the captured frames are verified based on the proposed object detection architecture that makes use of YOLO framework which detects people in the video frame drawing a bounding box around the detected Objects i.e., Humans with a confidence score at the top of the bounding boxes [24]. After detecting humans in the frame then the models run the object tracking method so as to track the movements of the detected objects in the frame [25]. The bounding boxes and the centroids are thereby taken into consideration for tracking detected objects' relative paths.
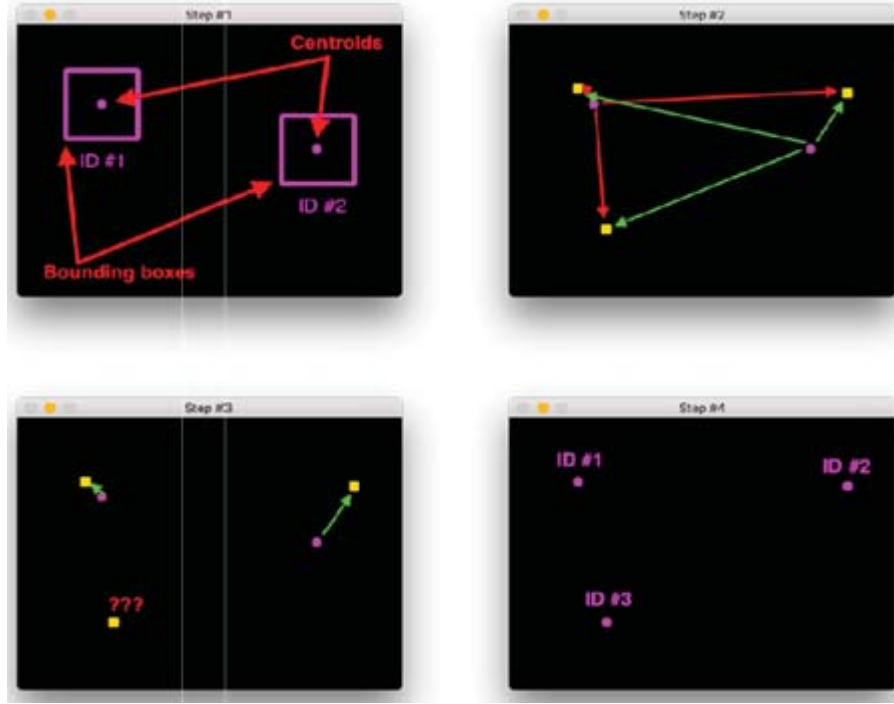
FIGURE 5. Processed Model

EXPERIMENTAL SETUP

The Social distancing surveillance is implemented using python language. Libraries like NumPy [27], SciPy [28], OpenCV [26], etc., are used. Initially, the model is fed with trained weights [29]. From surveillance cameras [30], the recorded footage is taken and then this video is given as input to the model for the analysis. Then the python notebook [31] environment setup runs the code and analysis, and then finally produces a downloadable output video. The downloaded output video displays all the detected objects to the officer clearly in a distinct way[48-50].
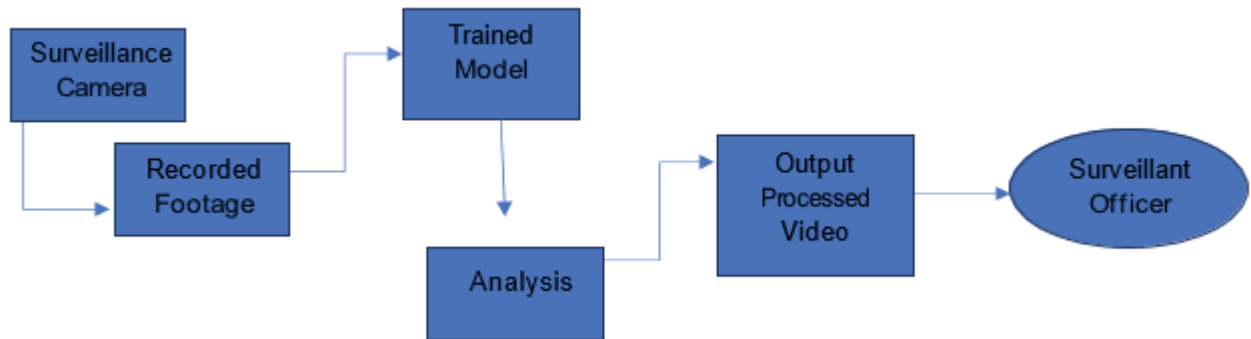
Layout

FIGURE 6. Flow layout of Proposed Model

THE RESULT ANALYSIS

The model after being trained successfully using the standard weights gets certainly ready for the detection process. The YOLO framework, thereby synthesis the input video frame by frame following the standard analysis

procedure[45-47]. By virtue of the YOLO algorithms standard state of the art Object Detection technique, the analysis is carried out successfully without any anomaly. After the successful execution of the model, it generates a downloadable output video. Thereby, the surveillant officer downloads the video and takes a note of the violations, and keeps them further processing.

FIGURE 7. Object Identification Process

The processed output video displays the visual aid as shown above. All the objects in the vicinity of the surveilling camera are detected. All the detected objects are therefore represented in each distinct bounding box. The model accurately detects the objects and thereby draws a bounding box around it showing the detection accuracy percentage. The bounding boxes of the objects belonging to the same class are given a color in such a way a unique color is assigned to each distinct class. Thereby this helps the surveillant officer to have a clear view of the scenario without ambiguity[40-44].

CONCLUSION

The proposed project provides the Surveillant officer with a clear view of objects present in the location, The movement of the objects, and other relative information. Relying on these visual aids the surveillant officers could carry on their investigation with high precision and in a productive manner. Output videos are to be stored for future references and can easily be referred to without much stress in the observation process. This project improves the productivity of the video footage investigation process and thereby contributes abundantly in studying situations, knowing the whereabout of the suspension outbreak, and finally drawing clear conclusions of recorded scenarios.

FUTURE SCOPE

We can make our project to the next level by implementing some other features just like the moving cameras; we can place multiple cameras to observe at each and every angle. We can give the input as a live streaming video.

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