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Breaching Personal Bubble Detector using Image Processing

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Abstract: *Due to unknowing and incaution the epidemic because of covid 19 has brought a global extremity with deadly spread to further 180 countries and almost 147 million verified cases along with 3.11 million death encyclopedically of 26 April 2021. Due to unavailability of vaccines as well as epidemic is out of control so the only doable is to follow social distancing. And this thought inspire us to bring the idea of social distancing using image processing which involves deep learning from robotization and monitoring. The frame uses the YOLO v3 model object discovery to separate people in motion from the background and to descry bounding boxes around people. The introductory idea of this composition is to dissect the violation of social distancing indicator rates how many people are not following rules of social distancing in a particular time.*

Keywords: Social Distancing, Object Detection, Yolo, Image Processing.

I. Introduction

As we know Covid -19 is badly affecting global health and economic conditions. Since this virus spreads from one person to another through close contact, each individual should maintain a safe (i.e. minimum distance to avoid close contact) distance from one another. But we are doing this from two years still we are not able to completely overcome this pandemic. Main reason for this is we are not able to maintain safe distance from one another. But as we know we humans are social beings and it is very difficult to monitor everyone manually.

So to end this problem of manually operating social distancing, we introduced a detector (system) which will detect whether the following individual is breaching personal bubble or not. Our system uses image processing to detect distance between individuals. If the minimum required distance to avoid the spread of virus is followed it shows no risk involved and if the distance is not maintained it shows risk involved. The detector uses camera on recorded video to capture the minimum required distance.

This system can be used in every public places surveillance system by government officials .This system can also be used in schools, offices to maintain social distancing.

II. Literature Review

During the current Covid scenario when the covid-19 was at its peak. Various research came out stating different methods regarding the norms or the ways covid-19 can be reduced to a good extended. From those prevention methods Social Distancing was the one effective. During that time period Yadav et al. [1] presented a module raspberry pi4 is connected with camera mainly CCTV cameras to automatically track live public places for the prevention of coronavirus .A particularly Designed Module was installed to detect whether the people were following social distancing or not and further on it checked whether the person is wearing a mask or not the following module worked in two steps . First the Identification was done for the person violating social distancing is wearing a mask or not In that case a photo was captured of that following person and further on was send to Police control room for further investigation and required actions They Actually received an accuracy of 91% . Singh Punn et al. [4] proposed a real-time primarily based totally deep getting to know method to monitor social distancing the usage of item detection and monitoring approaches. The variety of violations changed into given with the aid of using calculating the variety of businesses fashioned and the violation index time period computed because the ratio of the variety of humans to the variety of businesses.

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Further on an Innovative method was researched by Nadikattu et al. [7] The main purpose of this method was to give an alert if a person comes in contact within 6-ft radius with another person . For this method an AI Smart Device was used cause it resulted to be much handy and more accurate for the detection purpose. Ghoraiet al.[8] presented a deep learning module that basically alerted two persons coming in contact within a CCTV camera frame. The dataset used was Pose Net module for people detection. In this case as the basic distance in between persons as advised was 6-ft from the method recommended by Feng et al.[11]

For the purpose of fastening the module we compared many modules like RCNN,SSD,YOLO V3.Yang et al [3] introduced a AI camera-based-real time system to monitor Social Distancing. The people in CCTV Footage .firstly are assigned a square frame if the following person is found on a safer distance the assigned frame was indicated in green frame and it the two persons came in contact with each other violating their 6-ft distance the assigned frame turned into red colour indicating that the social distance in violated from following persons. In Sener et al[2] proposed a method for extracting motion of people on public spaces.They achieved a accuracy of 93.8% .

For a better understanding a standard comparison was done in between PASCAL VOC, COCO and ILSVRC datasets and the conclusion was that SSD had more accuracy among them and is more accurate. The accuracy of SSD300 is 73.99% and for SSD512 is 76.3%

Model	Accuracy(%)
Yadavetal.[1]	91
Seneretal.[2]	93.3
Liuetal.[3](SSD300)	74.3
Liuetal.[3](SSD512)	76.8
ResNet-50	86.5

Figure: Comparison of the accuracy values of the different methodologies.

III. System Architecture Design

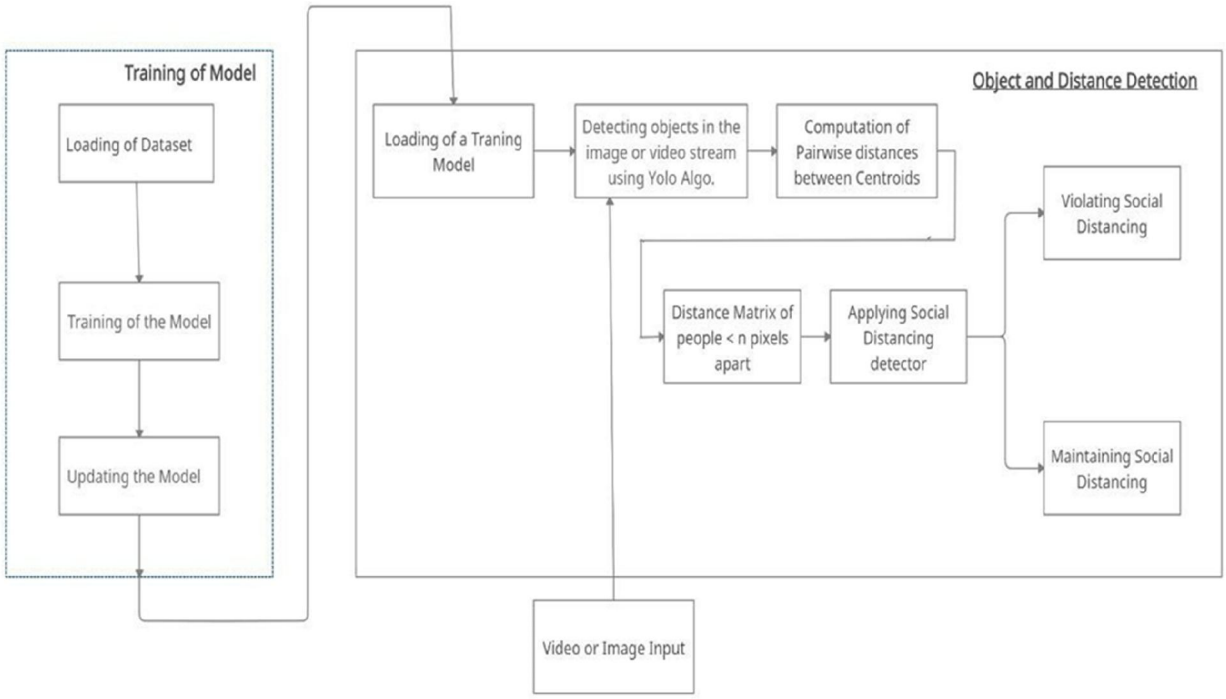

Figure: System Architecture Diagram

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For the implementation of our module Firstly a Input video is passed in our system. Further on Through Image processing peoples are detected which has been trained by the coco dataset. Further Each detected person is assigned with a Centroid point for the basic distance calculation between them and with the help of Euclidean Formula pairwise distance will be calculated by this the persons violating social distancing the frame assigned to them will turn red and if they are on a safer side the frame will indicate green colour also the basic number of people violating social distancing is indicated with numbers on the bottom left side.

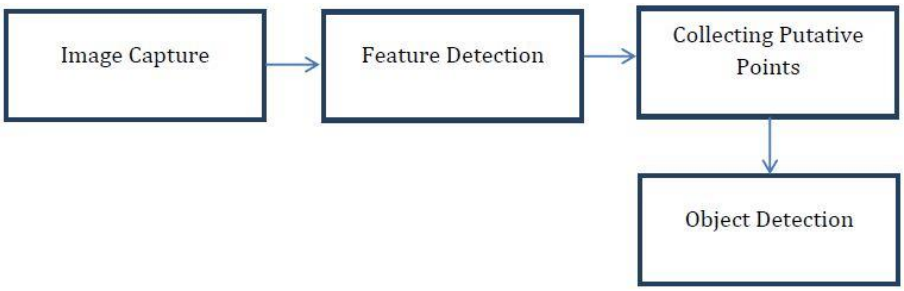

Figure: Block Diagram for Object Detection.

IV. CONCLUSION

In the last years starting from Covid-19's first wave we have observed that Social media has played an important role in controlling the spread of virus So on a module based on python and open cv assigned with coco dataset and yolo algorithm makes possible for detecting people violating social distancing in a particular CCTV footage leading to overall controlling of social distance violations and making people maintain social distance. Based on the tasted results the overall objective is achieved and with good accuracy .However there are some limitations on this module based on different outdoor Environmental Conditions the Difficult scenes for detecting people . Further on in Future with better improvements and some advanced technologies a better and more accurate module can be invented.

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