International Journal of Innovative Research in Engineering
Volume 3, Issue 3 (May-June 2022), PP: 191-195.
www.theijire.com
ISSN No: 2582-8746

An Social Distance Violation Detector System

Shrikant A. Shinde [1], Sakshi Bondre [2], Priyanka Parmar [3], Khushboo Patil [4], Pratiksha Yewalkar[5]
[1]Professor, Department Computer Technology, Sinhgad Institute of Technology and Science, Pune, Maharashtra, India
[2,3,4,5]Students, Department Computer Technology, Sinhgad Institute of Technology and Science, Pune, Maharashtra, India

How to cite this paper:
Shrikant A. Shinde [1], Sakshi Bondre [2], Priyanka Parmar [3], Khushboo Patil [4], Pratiksha Yewalkar[5], "An Social Distance Violation Detector System", IJIRE-V3I03-191-195.

Abstract: *In computer science, the term artificial intelligence refers to any human like intelligence exhibited by a computer, robot, or other machine. In popular usage, artificial intelligence refers to the ability of a computer or machine to mimic the capabilities of the human mind learning from examples and experience, recognizing objects, understanding and responding to language, making decisions, solving problems. One of the principles and best measures to contain the ongoing viral episode is the support of the alleged social distancing. To agree to this limitation, governments are receiving limitations over the base between close to home separation between individuals. Given this real situation, it is critical to enormously gauge the consistence to such physical requirement in our life, so as to make sense of the purposes behind the potential breaks of such separation impediments and comprehend if this suggests a likely danger. Video Social Distancing is significant for a nonintrusive investigation of whether individuals follow the Social Distancing limitation, and to give insights about the degree of security of explicit territories at whatever point this imperative is abused. It has been first viewed that, estimating Video Social Distancing isn't just a mathematical issue, however it additionally infers a more profound comprehension of the social conduct in the scene. The point is to genuinely identify possibly risky circumstances while keeping away from bogus alerts the entirety of this by following current security strategies. We used python for implementing the algorithm which will help to detect violator for social distance. As well as HTML, CSS to create the User interface which will help user to register into the system and login. Once login user can upload the video and will get the output video by processing it on YOLO model. Thus System is implemented successfully and can be useful in Future also.*

Key Word: *Social Distance, Covid-19, Computer Vision, Yolo Technology, Violation Detector*

I. INTRODUCTION

The coronavirus (COVID-19) is an infectious disease with very fast transmission. The coronavirus was first discovered in Wuhan, China. Until now, it has spread widely too many countries, including Indonesia. Therefore, the World Health Organization (WHO) declared the coronavirus outbreak a pandemic. Recently, daily positive cases in Indonesia have reached 4,000 and even 5,000 cases per day. Currently, the government is still conducting studies related to vaccines to be given to Indonesian citizens. The target of vaccines is to stay healthy and become immune to the coronavirus. Besides waiting for a safe corona vaccine, various other preventive efforts are also being carried out. When leaving the house to go outside, there are restrictions on crowding. The public is urged to keep a distance from other people to avoid spreading the coronavirus from the droplets of other people that are infected with the coronavirus. Keep the distance between people to a minimum of one meter. The coronavirus spreads quickly from person to person through sneezing, coughing, direct speech, and even exhaled breath. We need social distancing activities to prevent the spread of the coronavirus. Several applications for social distancing began to be developed this year. Ahamad et al .conducted social distancing research using Region of Interest (ROI) segmentation. In this study, indoor and outdoor social distancing experiments were conducted. The results obtained were 100% accurate in indoor testing, but in outdoor testing on all video experiments, the accuracy was below 70%. This unfavorable result is due to many false negatives and false positives of people detection.

II. RELATED WORK

In proposed system the approach of a "Social Distance detector System" which aims to detect individual person and distance within them as well as alert them if distance is less than 2m. It uses four steps i.e. input frames, object detection, distance measuring and alert system. For capturing a frames we use online input frames in which frames are captured from images. From object detection we have two approaches or technologies which gives more accuracy i.e. YOLO technology and Single shot detector. Then distance within two centroids and if it seems to be less then system will alert. The Main advantage of the planned system proficiently isolates the picture into a few segments and calculate distance easily.

Afiq harith ahamad[2],gives another approach to detect a person and alert them is based on segmented region of area. In this study, the person detection algorithm consists of two parts. The first part is configured to compare the distance between the computed center points of the bounding boxes for each detected person. The distance will be compared with the default social distance range. The default pixels for social distance varies on the frame input. The drawback of system is Sometimes Fails to locate person and thus it inaccurately measures distance.

In 2005,Navneet Dalal and Bill Triggs[3] gives the technique for detection called Histogram of Oriented Gradients (HOG) which is an improvement to VJ and balances feature transformation using each pixel in the image and comparing it with the surrounding pixel to locate the contrast and further pixels are replaced by arrows with contrast difference. HOG calculates the horizontal and vertical component of the gradient's magnitude and direction of each individual pixel and then organizes the information into 9-bin histogram to determine shifts in the data. HOG method is very sensitive to image rotation.
In 2010,Debalina Barik, Manik Mondal[4], Author gives object detection for computer vision is one of the key factors for scene understanding. It used to accurately determine the object from multiple objects based on their shape, edges. Methods used are Bottom up approach with a graph based segmentation, Graph partitioning grouped all that images which have same or similar characteristics. Based on the characteristics like shape, color, edges object is detected.

Topic consists of social distancing face mask detection for the events of coronavirus, alleviation in such pandemic can be solved by social distancing as well as putting on its face mask [5]. This small step of wearing a face mask as well as following social distancing would save lots of lives as the spread of the virus could be mitigated. YOLO stands for You Only Look Once, this algorithm is used for Object Detection as well as Object Tracking, this research uses YOLO for calculating the social distancing identifying face mask on people's face with the help of Object Detection, whereas tracking the face and people in the frame for counting the objects and keeping a record of that object in the next frame is done by Object Tracking.

Item "discovery issues have been proficiently tended to be as of late created progressed strategies. In the most recent decade, convolutional neural organizations (CNN), area based CNN, and quicker district based CNN utilized locale proposition methods to produce the objectless score before its arrangement and later creates the jumping boxes around the object of enthusiasm for perception and other measurable investigation [6]. In spite of the fact that these techniques are productive yet endure as far as bigger preparing time prerequisites. Since all these CNN based methodologies use grouping, another methodology YOLO considers a relapse based strategy to dimensionally isolate the bouncing boxes and decipher their class probabilities. In this strategy, the planned system proficiently isolates the picture into a few segments speaking to jumping boxes alongside the class likelihood scores for each segment to consider as an item [7].

III. METHODOLOGY

3.1Proposed Method:-

Social Distance Violation System is design with the help of technologies like Deep learning, YOLO V3, Faster RCNN, Single shot Detector etc. In which taking video as an input we will capturing images and extract the frames. Then we will detect a person from the frame and draw bounding boxes around the detected person. After that, by using a tracking algorithm we calculate the distance between two persons. If the distance is less than 2m then it is considered a violation of social distance rule.

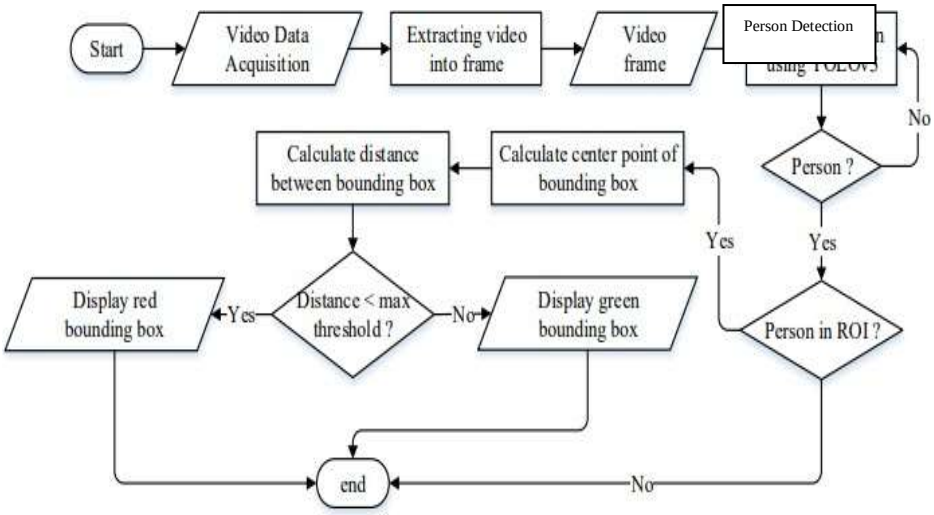

Fig 1. Architecture Diagram

3.2 Proposed Algorithm:-

Algorithm 1:
1. Set d as threshold and initialize the algorithm.
2. Select the first frame and set it as a key frame.
3. If no frame is captured go to 5.
4. Start the comparison of current captured frame with the selected key frame.
5. Calculate the difference between them
   a. If the d ¿ difference then select the current frame as next key frame.
   b. If the d ¡ difference then go to
   c. Go to next frame.

YOLO is an algorithm that uses neural networks to provide real-time object detection. This algorithm is popular because of its speed and accuracy. A video fame is a solo picture or motionless shot that shown as fraction of a larger video. Key-frame is the frame that can represent the content of a section of a video. The key frames are the frames which has drastic change than the previous frame. In proposed system, the key-frame extraction is done with the help of color histogram.

3.3 Mathematical Model:-

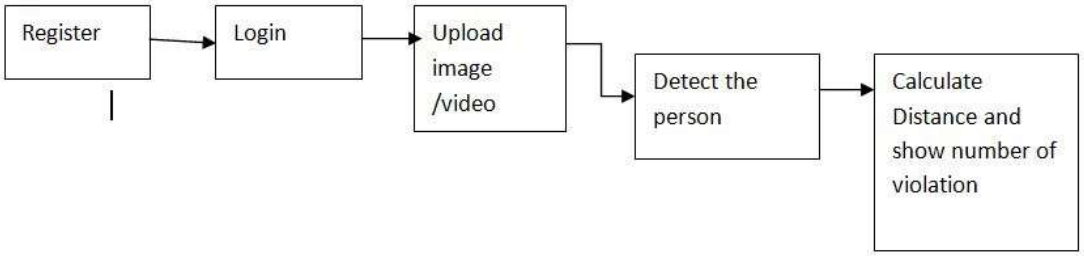

Fig 2. Mathematical Model

• Set Theory:

The yolo v3 network predicts four coordinates for each bounding box.
zx = (sx) + mx
zy = (sy) + my
zh = qhe
zw = qwe
S = s, I, O, F, e, V
Where s = Start of program
I = I1, I2
I1 =image,
I2 = location if required
O= O1, O2
O1= Detection of Person.
O2= Number of violations.
F= F1
F1= Distance calculations
E=end of program V = Failures and success conditions.
Success if:

- Person detected accurately.
- Distance detected accurately.
- Accurate No. of violation.

Failure if:

- More time consumption by the system.
- Hardware failure.
- Software failure.
- Improper network connection.

IV.EXPERIMENTAL SETUP

To system needs a computer and we required OS to be installed (i.e. Windows, Ubuntu).The computer this software going to be installed need to have Java Eclipse IDE equal or above, Windows 7. On that Windows platform java, java version 1.8.* will be installed and that will be the platform the particular software will be run. As well as we required MYSQL for database and python installer. System uses a YOLO algorithm and our YOLO Detector is checked against the COCO dataset consist of 80 labels. This system work as website and its required web browser to run system.

V.RESULT

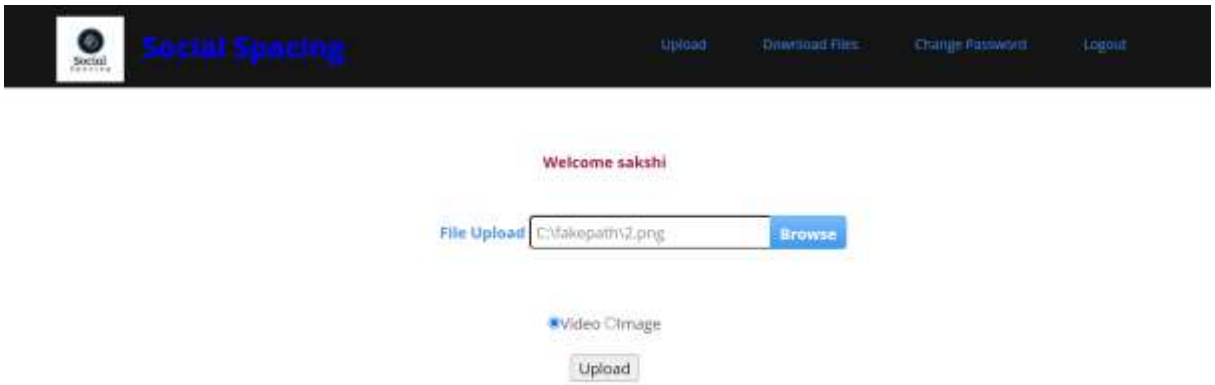

Figure 3. Upload file Page

Figure 3 shows the upload file window. User can upload the image or video. User must select file from device and then click on the upload button.

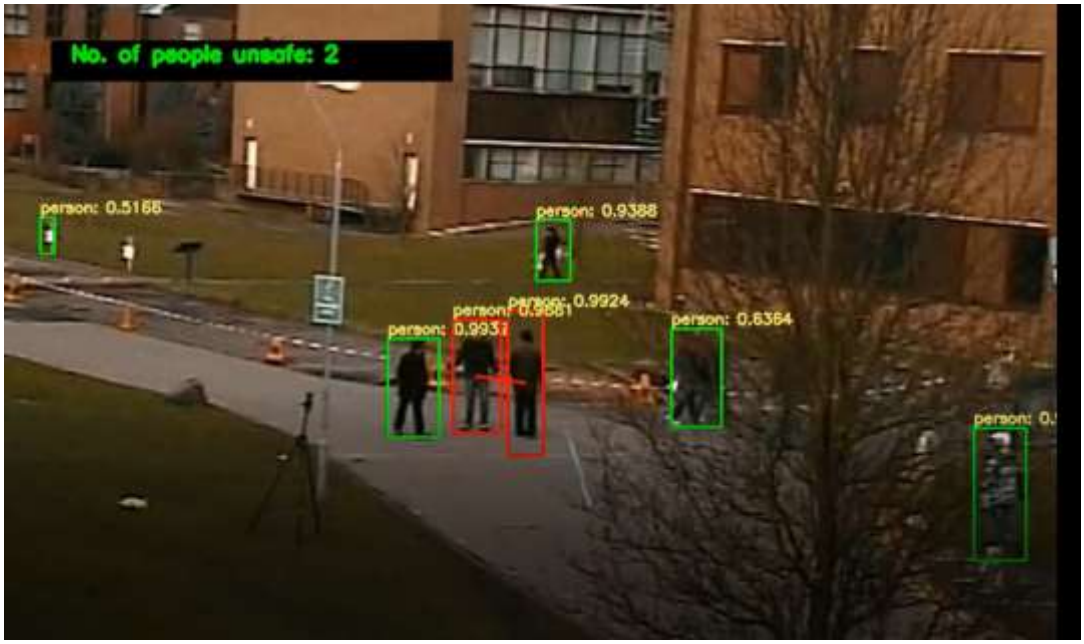

Figure 4. Download Output Page

Figure 4 shows the Output in which shows alert message of no of people is unsafe. And if person is unsafe it will create red boundary around person and who has green boundary box around person are in safe region and output will be in the form video file.

VI.CONCLUSION AND FUTURE WORK

Social distancing is an essential action in preventing the spread of the coronavirus. In public places, prevention has been carried out by placing officers to supervise people to carry out social distancing. Supervision of this officer also limited visibility. Therefore, making an intelligent system for monitoring social distancing violations is made. The important step in making a social distancing system is people detection. The system's accuracy in people detection is a successful measure of the social distancing system. YOLO is a clever convolutional neural network (CNN) for doing object detection in real-time. The social distancing system is made using YOLOv2 for people detection with distance measurement using Euclidean Distance. The Common Objects in Context (COCO) dataset and Euclidean Distance calculations to calculate the distance from 2 human objects to detect social distancing violations. After testing using the camera to object distance from 4 to 15 meters, the accuracy of this system can be calculated, namely the accuracy of human detection using YOLO-v2. The proposed system fairly accurate social distance between people and give count of people that not followed the rule of social distance. This project will help to detect the person who are not following the social distance.

In the social distancing experiment, the PETS2009 video dataset uses a threshold of 30 pixels to calibrate the 1-meter distance on the video. Then the Town Centre video dataset uses a threshold distance of 50 pixels to calibrate the 1-meter distance on the video. So we aim to reduce the threshold and also increase the speed of algorithm currently it take 1 min for one image.

References

[1]. *S. Degadwala, D. Vyas, H. Dave and A. Mahajan, "Visual Social Distance Alert System Using Computer Vision Deep Learning," 2020 4th International Conference on Electronics, Communication and Aerospace Technology (ICECA), 2020, pp. 1512-1516, doi: 10.1109/ICECA49313.2020.9297510.*

[2]. *A. H. Ahamad, N. Zaini and M. F. A. Latip, "Person Detection for Social Distancing and Safety Violation Alert based on Segmented ROI," 2020 10th IEEE International Conference on Control System, Computing and Engineering (ICCSCE), 2020, pp. 113-118, doi: 10.1109/ICCSCE50387.2020.9204934.*

[3]. *N. Dalal and B. Triggs, "Histograms of oriented gradients for human detection," 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05), 2005, pp. 886-893 vol. 1, doi:10.1109/CVPR.2005.177.*

[4]. *D. Barik and M. Mondal, "Object identification for computer vision using image segmentation," 2010 2nd International Conference on Education Technology and Computer, 2010, pp. V2-170-V2-172, doi: 10.1109/ICETC.2010.5529412.*

[5]. *K.Bhambani, T. Jain and K. A. Sultanpure, "Real-time Face Mask and Social Distancing Violation Detection System using YOLO," 2020 IEEE Bangalore Humanitarian Technology Conference (B-HTC), 2020, pp. 1-6, doi: 10.1109/B-HTC50970.2020.9297902.*

[6]. *M. Andriluka, S. Roth, and B. Schiele, "People-tracking-by-detection and people-detection-by-tracking," in 2008 IEEE Conference on computer vision and pattern recognition. IEEE, 2008, pp. 1–8.*

[7]. *A. Yilmaz, O. Javed, and M. Shah, "Object tracking: A survey," Acm computing surveys (CSUR), vol. 38, no. 4, pp. 13–es, 2006.*