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Person Detection for Social Distancing and Safety Violation

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ABSTRACT:
As today the planet is facing a sever surge within the covid-19 spread thisoften happened thanks to people not following the most preventive measures like Sporting mask, maintain social distance and sanitizing the hands and objects regularly. The paper suggest how for social distancing detection using open cv and Machine learning to calculate the space between the people and to scale back the spread of corona virus. Corona virus. This detection device was developed to seem at the social distancing in crowded areas and alert if particular distance between the people is maintained this is often achieved by using input as a video from a live camera using YOLOv3 .This machine includes numerous modules like object detection, Video capture module, distance calculation, and communicate modules, those had been want to save people from not maintain social distancingKeywords: Covid-19, Machine Learning, YOLOv3, video capture module, speak module

1. INTRODUCTION

Corona virus cause harm to the humans and it's also termed as covid-19, As per records it had been first originated in in Wuhan metropolis, china in December 2019 after which the world of world health organization(WHO) has declared a serious outbreak and therefore the countries has imposed a lockdown to regulate the spread because it's a mass spreader and dreadful virus and lots of humans has lost their life's and lots of were hospitalized and thanks to covid-19.Each day there are registering a huge no of covid positive cases and maternity rate was also past strange. And now a days the daily workouts of humans are coming to normal therefore the WHO and ICMR has given major principles and guidelines and to avoid contact of COVID-19 people should maintain social distance, they need to placed on mask and also sanitize or wash their hands frequently

Based on the knowledge from WHO and ICMR, the coronavirus spreads from an individual to an individual through alittle droplets from the nose and mouth while they cough or sneeze or talk. In other words, social distancing is that the best practice where people can minimize the contact with people who had been effected, by means of retaining the space as a minimum one meter faraway from one another .

This study is proposed to support the actions on Covid19 spread. It provides an answer for detecting people gathering publicly places including banks, shopping department shops , clinics, non-secular locations or to avoid a mass gatherings etc. The concept of person detection algorithm is employed to accurately detect a person's presence in areas and is then followed by measuring the space between the detected people.

In addition to social distancing measure, this study also includes person detection in unwanted or restricted area where the people weren't allowed like military place, plane paths, and nuclear stations. Where this algorithm are often used like people entry point and if detects an individual it gives an alert during which it are often used for minimizing the incidents to be happen

When utilizing Deep Learning techniques, there are two main approaches to Object Detection, the primary being designing and training a specification from scratch, including the form of layers and therefore the initialization of weight parameter values.

typically social distance calculation could also be done by using image processing in in images.

however now the utilization of Open cv we are capable of get the social distance violence in video stream.

In future we will implement this system in real time application like wireless networks which are related to CCTV cameras in order that we will monitor the crowded places and detect and reduce the covid-19 spread

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2. LITERATURE SURVEY

2.1 Title: Using raspberry Pi and GSM survey on home automation

Authors: Shrikrushna Khedkar; G.M. Malwatkar

In Resent year Popularity of Home automation has been increasing thanks to low cost and ease through Smartphone and tablet connectivity. it's an automation of home or house hold activity. Raspberry Pi may be a small computer, which was introduced within the year of 2012; it's currently a mainstream system subject to extensive availability which will be utilized in home automation. it's estimated that up to 2020 there'll be near about 50 billon internet enable devices available.

Home automation may contain centralize controller which control lightning within the house, HAVC(Heating, Ventilation and air conditioning), Security locks of gates, doors and other system to supply improve comfort, connivance security and energy efficiency.

The aim of this Paper is to develop a home automation application using RPI and GSM.

2.2 Title: People Counting in Elevator Car Based on Computer Vision

Authors: Honghui Fan, HongjinZhu and Dongming Yuan

To detect the amount of passengers in an elevator supported computer vision technology, image pre-processing and human contour detection algorithms were proposed. After the target image was edge-detected and morphologically eroded, a binary image containing only human targets was obtained.

The edges of the image were detected using canny operator, it had been best suited for the sting detection of the physical body contour in elevator. Person counting was mainly performed by using morphological mark outline connection area counting method.

According to the algorithm flow chart, the important elevator monitoring video was tested and verified. the amount of individuals with fewer numbers (less than 10 persons) was highly accurate.

2.3 Title: Detection of pedestrian crossing road

Authors: Joko Hariyono; Kang-Hyun Jo

Detection of zebra crossing road is described during this paper. Single camera is employed to detect pedestrians, thus classify them as a zebra crossing road or not. The moving pedestrian is detected using improved sparse optical flow method. The proposed technique consists of three main components.

First, overlapping blocks are applied in consecutive images. KLT tracker is employed to seek out corresponding corner feature in consecutive images. Second, classify each block into motion region (foreground) and background, where each block is processed by a cascade composed of three classifiers.

Third, probabilistic generation of the foreground mask is performed. The classification decisions for all blocks are integrated into final pixel-level foreground segmentation. In order to classify the pedestrian crossing road, a walking human model is proposed. It is calculated by the region volume of the detected bounding box. A walking human is defined because the ratio of the width divided by the peak of the detected bounding box.

To make certain that the moving object may be a walking human, ratio of the centroid location from the bottom plane divided by the peak of bounding box should satisfy a constraint

3. EXSISTING SYSTEM

The existing system deals with independent implementation of each module without any integration of the modules. YOLO is an algorithm that deals with detection of object and also it deals with the various methods required for the actions to be taken with the detected objects. YOLO is an algorithm which detects the objects either in the image or in the video given by the user. The existing system of yolo for my project deals with the detection of distance between the two identified objects which is either present in the image or in the video hardcoded by the user at the time of implementation. The existing system also doesn’t support the live video capture for social distance measuring. Also the existing system is implemented in various ways such as they will be implemented each module in different use cases. The existing system has each module left individually and is

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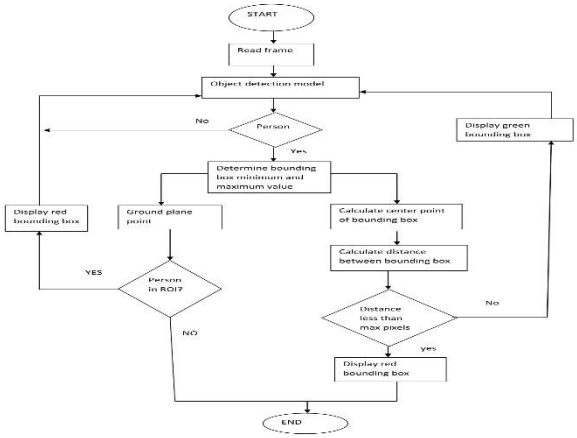
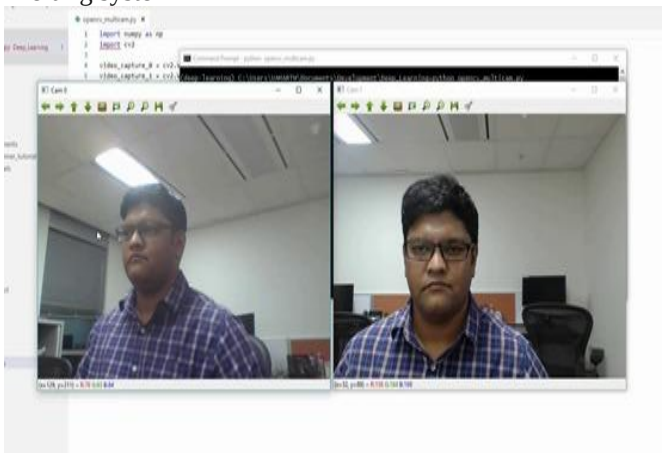
not integrated. It also doesn't support the speak module which is supposed to alert the people when they come close to each other which is must to be followed in the current scenario. This system cannot implement the alerting system to prompt the messages given by the user.

4. PROJECT IMPLEMENTATION



The project can be implemented using the following modules:

1. Video capture module
2. Social distancing analyzer
3. Alerting system



The first is the video capture module, this is the first and foremost step of the system. As we know video capture is a term used to record the movements of the objects that come into the focal range of the camera. This phenomenon can be used in the above mention system to detect the objects that come in the focal range of the camera and detect their moment. This module is developed using Opencv library. It is developed in such a way that when more than one objects gets into the focal range of the camera it starts recording the movements of the detected objects and helps for various algorithms to take various necessary actions required for implementation of various systems. In this module the above module helped to capture the objects that come into the focal range of the camera.

The immediate module to the above mentioned module is social distance analyzer. This is the second module but plays a key role for the backend work to be done for implementation of the system. This module helps in calculating the distance between the objects that are captured. The distance calculation is done in such a way that it fixes the line of control between the two captured objects. Loc refers to the boundary line set between the captured objects in such a way that the objects should not cross the limit set by the user at the time of implementation. This module is developed based on the algorithm called YOLO, which is used to perform the operations on the objects captured in the previous module. In this algorithm firstly it captures the objects that comes into the range of camera. Once the objects gets captured it will be fixing a center point known as focus point. After setting the focus points for each of the objects, this module action comes into the process.

Here this module sets the LOC between two objects probably around 1.8m. When either of the objects crosses its boundary it will start alerting by printing a message on the screen. In this module the system also calculates the distance between the focal points of the objects. The calculation of distance done in all the directions of the

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object with respect to the points of the objects captured by the camera. Based on the distance calculated the system starts calculating the boundary distance and alerts when they come in to or crosses the boundary limit set by the user at the time of implementation.

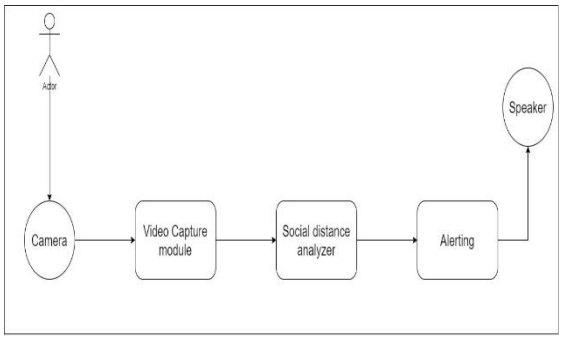
Also this module helps in finding social distance between the objects captured and the also alerts the system when the objects are getting closure to each other.

This is the last module of this project. This code triggers when the object moves close to the LOC. When a classified object moves close to the LOC then the alert system will announce the prompt message given by the user.

This module is developed using pyttsx3 library. This module requires a speaker to connected to prompt the message given by the user.

5. METHODS

5.1. SYSTEM ARCHITECTURE



When the objects or person comes infornt of the camera the video capture model enables and detects the objects in the video and then the next module which is a social distance analyzer comes into action and the boundary boxes around the objects comes and the center point is calculated if the distance between two or more objects in the video are satisfied then it shows okay if they violate the minimal distance then the next module which is alerting module comes into action and alerts the supporting staff by sounding alert in speaker and printing alert messages

5.2 METHODOLOGY

A. Object Detection Model

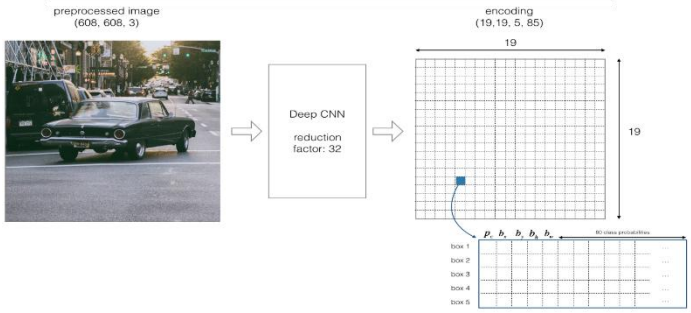
In this study, Caffe deep learning model framework is used to run the object detection model. The model chosen is MobileNet SSD due to the short time taken for the execution.

B. Threading Parallelism

In Python 3, threading allows the different part of the program to run concurrently. In this study, using threading will improve the execution time to process the object detection on each frame. Multithreading approach will be used to run the frame and processing the object detection at the same time.

C. Masking frame for ROI area estimation

Masking is a technique in image processing which define as a small image piece and use it to modify a larger image. Masking involves setting some of the pixel values in an image to zero and some other background value It will isolate the image, f, by masking the area of ROI[. Video for an instance is a series sequence of images that been play in a certain amount of time. In this study, OpenCV masking method will be used to create ROI for each frame of the input frame.



D. Determine person location

In determining the position of a person's bounding box as well as the segment involved, each ground plane point is used to compare the ROI range. The ground plane of a human walking model. Surveillance cameras are usually placed at high places as the overhead camera especially to monitor a certain area e.g. high-risk area or

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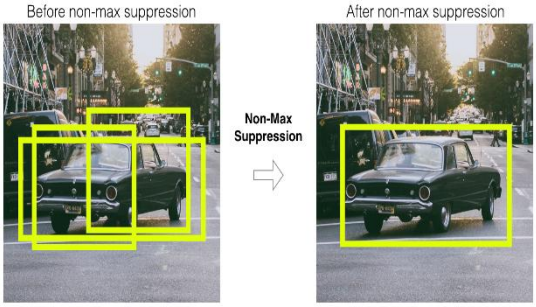
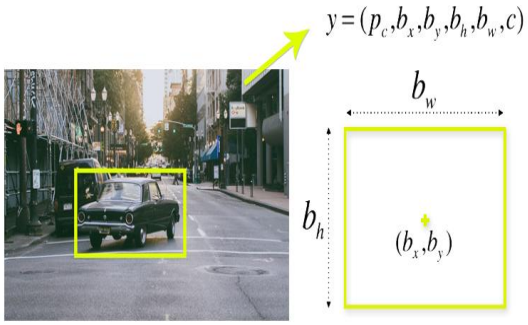
areas of interest for an organization. In this case, it is more suitable to compare the ground plane for the detection box instead of using the center point value.



E. Calculate the center point of a bounding box

To measure the center point, of the bounding box for the detected person, midpoint equation. Each of the minimum and maximum value for the corresponding width, and height and, of the bounding box will be used to calculate the center point of the bounding box.



F. Calculate distance between bounding box

To measure the distance, and between each of the detected person in the, distance equation. In this study, the center point of the bounding boxes is taken to determine between two different locations of the bounding boxes. After getting the center points value, the algorithm will calculate if the distance is lower or higher than 300 pixels.

6. SOFTWARE REQUIREMENTS

- Operating System
- Python Language
- Python Programming
- IDE or compiler or interpreter for python

6.1 HARDWARE REQUIREMENTS

- External camera
- Monitor
- Keyboard
- Mouse
- Ram(Min. 4GB)
- HDD(Min. 500GB)
- Processor i3(Min.)

6.2 LIBRARY REQUIREMENT

- Numpy
- Time
- OpenCv
- Math
- Pyttsx3

6.3 Technology Requirement

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- Machine Learning
- Internet of Things
- Computer Vision

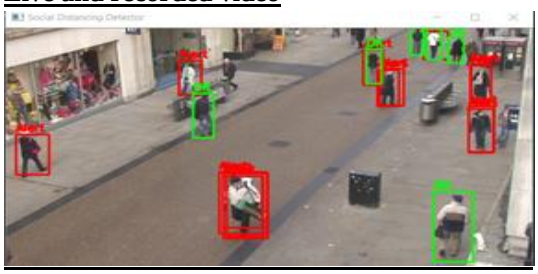
7. RESULTS AND CONCLUSION

7.1 Result

Thus, the system can be used as an alerting system where it alerts all the people in an area when they get close to each other without following the principle called social distancing and will alert the people that they are in the danger zone, this can be done in three processes image, recorded video and live video

Image recognition

Live and recorded video



7.2 conclusion

A methodology of social distancing detection tool using an opencv model is proposed. By using computer vision it measures the distance between any two objects that comes into the frame and a red boundary with alert mgs is showed. The proposed method was verified using a video in which a group of people were there and the distance between them is measured and also by connecting a real-time camera in which it measures the distance between two objects which come comes into frame. 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 environment such as office, restaurant, and school. Furthermore, the work can be further improved by adding a human body temperature sensor and mask detecting in real time.

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