

Social Distancing Detector using Open CV and Raspberry PI

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Abstract- Recently, the outbreak of Coronavirus Disease (COVID-19) has spread widely around the world and thus social distancing has become one of mandatory means of preventing physical contact. This paper emphasizes a perspective that uses Open-CV and Raspberry Pi to keep track of pedestrians and avoid congestion. The launch can be performed using CCTV and Drones where the camera will detect the crowd in the place with the help of an object detection and calculate the effective Euclidean distance between them. The Euclidean distance between two people will be calculated in pixels and is compared to the average distance and if it is considered below the normal range local authorities or local police officers will be notified.

Keywords- CCTV, COVID-19, Open CV, Social Distancing, Raspberry Pi,.

I. INTRODUCTION

This epidemic has taken the world by and has made it worse, as there is no vaccine available for infectious diseases which is why social segregation has emerged as one of the best ways to prevent the spread of all infectious diseases in the present, past or future such as COVID-19 [1]. Social Distancing means people should keep themselves physically apart at least at a distance of six feet. Cases have been increasing at an alarming rate and thus social isolation or exclusion is very important.

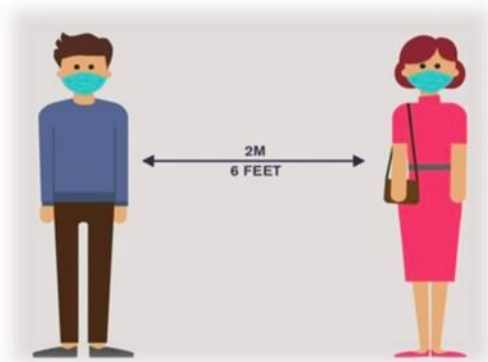


Figure. 1. Showing persons 6 feet apart

Social Distancing Detector to find the distance between people. It is used to control the spread of infectious diseases. Maintaining a Community Distance is a difficult challenge in many areas such as markets, buses, railway stations etc. The detector is designed to provide some mechanism so that people will be alert and maintain a proper distance. To monitor the movement of persons in public places we can use CCTV by which we can keep track of human activities in public places and we will be able to calculate and effective distances between people and detect violations of public space throughout the city. This proposed survey will help people to stay from infectious diseases.

II. LITERATURE SURVEY

Rucha Visal et al. proposed a Covid-19 public grade monitoring program using Open CV and Deep Learning in the year 2020 [1]. The method is to keep Social Distancing emphasizes using Open CV, Computer Vision and Deep Learning. Keeping track of pedestrians and avoid congestion. To implement this program, we have used CCTV and Drones where the camera can detect a crowd with the help of object detection and detect the distance between them i.e. the Euclidian distance.

Since the spread of the coronavirus, many countries have used technology-enabled solutions to prevent the spread of the disease. For example, some developed countries, such as South Korea and India, use GPS data to monitor the movements of infected or suspected individuals to detect any changes in the healthy person. The Indian government is using the Aarogya Setu system to detect the availability of COVID-19 patients in a nearby region, with the help of GPS and Bluetooth. This can also help other persons to maintain a proper six feet distance from an infected person. The use of Artificial Intelligence, Computer Vision, and Machine Learning, can help to achieve a combination of high-quality features. For example, it can enable us to understand and predict the behavior of pedestrians in street squares, sports, medical reasoning, or misdiagnosis, by analyzing local viewing data. - An in-depth learning algorithm using OpenCV, a Tensor flow library. For example, some developed countries, such as South Korea and India, use GPS data to monitor the movements of infected or suspected individuals to detect any manifestations of healthy individuals. The Indian government is using the Aarogya Setu system to detect the availability of COVID-19 patients in a nearby region, with the help of GPS and Bluetooth. This can also help other people to maintain a safe distance from an infected person. The use of Artificial Intelligence, Computer Vision, and Machine Learning, can help detect a combination of advanced features. For example, it may allow us to understand and predict pedestrian activity in street squares, sports activities, medical speculation, or misdiagnosis, by analyzing local viewing data, and an in-depth learning algorithm using OpenCV, a Tensor flow library.

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Approach Used

1. Firstly find people in the frame with Yolov3.
2. Next is find the distance between each person captured in the frame.
3. It indicates how many people are in High, Low and Not at Risk. The proposed system helps to provide the safety to the people in public places by automatically monitoring whether they are keeping a safe social distance, and also by determining whether a person is wearing a face mask or not. This section briefly describes the design of the solution and how the proposed system will work automatically to prevent the spread of coronavirus.

The proposed system uses a transfer learning method using an in-depth learning algorithm and computer vision to automatically monitor people in public places with a camera equipped with a raspberry pi4 and detect people with or without a mask. We also do good tuning, which is another way to learn to transfer, much more powerful than just the removal of a feature.

III. METHODOLOGY

The components required are Raspberry Pi, YOLOv3 and Imutils.

IMUTILS**RASPBERRY Pi 4**

. Imutils are used to perform important image processing tasks such as translating, rotating, enlarging bones, exposing bones and displaying matplotlib images easily with Open CV. Use object detection to find all people (and people only) in the video stream. We only need a RaspberryPi 4 with Open CV installed on it. Open CV is used for Digital Processing of the image which we captured through the CCTV. The most common applications for Digital Image Processing are object detection, face recognition and counter measures



Figure. 2. Raspberry Pi Module

YOLO

YOLO (Look Together) is a smart Convolution neural network (CNN) for Object Real-time. YOLOv3, the latest variant of the object acquisition algorithm, YOLO can detect up to 80 different objects in photos and videos, and is superfast and has excellent accuracy. The algorithm uses a single neural network throughout the image, then divides the image into regions and calculates the boundary boxes and possibilities for each location. The Base YOLO model can process real-time images at 45 frames per second. The YOLO model performs all other acquisition methods such as SSD and R-CNN. The discovery of a YOLO item with Open CV includes many lines of code for some simple models. It uses YOLO with Open CV requires a bit more output processing system than any other object detection types (such as **Single Shot Detectors** or Faster R-CNN).

The Raspberry Pi is a good choice for image processing. Here we need a Raspberry Pi 4 with Open CV embedded in it. First before installing Open CV we should include reliance on Raspberry Pi. Then insert an open CV into it to continue. Open CV is a library often used to view a computer and is an open source library. With the help of the Block diagram, follow these steps:

1. Calculate the range wise pair between all people found.
2. Based on these calculated distances, check if there are no two people who are at distance less than N pixels and if the distance is below N the red box is shown and if the distance is above N then the green box is shown as in Figure.3.

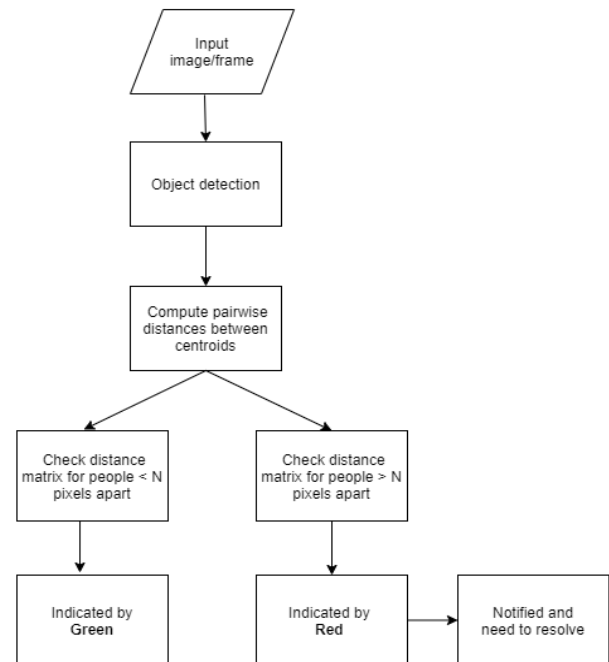


Figure. 3. Flowchart for obtaining distance violation and indication

IV. CONCLUSION

As we envision the world post COVID-19 pandemic the need of self-responsibility emerges irrefutable. The situation will focus on adopting and complying with the safety measures and rules that the WHO has clearly stated as human responsibility will be required. Social isolation will no doubt be a major factor as COVID 19 spreads through close communication with those infected. In order to guide large crowds, a practical solution is essential and this survey paper focuses on that. Using CCTV installed, authorities can keep track of human activities and control a large crowd to gather and prevent violations [6]. With the ability of people to maintain a safe distance they will be exposed to the green light, and as CCTV captures the mass gathering, a red light will come on the police assigned to the area to be notified and the situation could be under immediate control. Since controlling the great crowd is not easy but using this system, the situation can be controlled widely.

Therefore, applying this concept can reduce police efforts to a lesser extent and can focus entirely on the situation in those areas where conditions are not ideal and, as a result, can use time wisely and save energy in equitable environments.

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