Smart Monitoring System For Physical Distancing

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Abstract - **COVID19 has been a major factor In the global health sector. Prevention steps and especially confinement and detention in isolation were widely accepted responses even though there is a vaccine we must follow the preventive measures as the effects of the virus are long-lasting. Finding a trade between the monitoring processes and to revive the economy, the current paper proposes the human detection and intelligent physical movement testing program. The solution checks people's reference to physical separation as well, therefore, gives them an acceptable response. The system finds the number of people in the public place the most a certain waiting area and the gap between them is calculated. The program displays a message to notify that person it does not respect withdrawal. Other than that, it shows a delivery message of respect for regulations. The answer allows a smooth transition to the post-epidemic phase and is effective in places of worship, waiting rooms, airdrome boarding house, and hospital.**

Keywords – Covid 19, Economy, vaccine, response

I. Introduction

1. In public health, social distancing, also called physical distancing, is a set of non- pharmaceutical interventions or measures intended to prevent the spread of a contagious disease by maintaining a physical distance between people and reducing the number of times people come into close contact with each other.

While the novel coronavirus epidemic (Covid-19)was spreading rapidly the spread of the virus has left the community to keep worrying The World Health Organization (WHO) has declared Covid-19 as a pandemic due to an increase in the number of reported cases around the world [1]. To prevent this epidemic, many countries have applied complete lockdown for residents to stay home during this critical time to reduce their contact with other people. Public health bodies such as the Centers for Disease Control (CDC) have made it clear that the most effective way to slow down the spread of Covid-19 is by avoiding close contact with other people [2].

In Malaysia, the Malaysia Department of Health (MOHM), has recommended several ways to prevent sexually transmitted infections from

places like workplaces, individuals, and families at home, in schools, child care centers, and high-rise accommodation [3]. Social distancing measures are most effective when the infectious disease spreads via one or more of the following methods, droplet contact (coughing or sneezing), direct physical contact (including sexual contact), indirect physical contact (such as by touching a contaminated surface), and airborne transmission (if the microorganism can survive in the air for long periods). The measures are less effective when an infection is transmitted primarily via contaminated water or food or by vectors such as mosquitoes or other insects. [12] Authorities have encouraged and mandated social distancing during the COVID-19 pandemic as it is an important method of preventing transmission of COVID-19 Some approaches are using smart devices to track physical distancing [7]. This solution is debatable and provokes controversy because of personal privacy issues as many people don't want to be tracked and followed.

II. METHODOLOGY

This smart monitoring tool is designed to determine the level of safety between people in public places. An in-depth approach to computer viewing techniques is used in this project. At first, an open-source object detection based on the OpenCV [13] algorithm was used to find a person on video stand as shown in fig1.

Initially, an open-source discovery network was used based on the OpenCV algorithm to locate a person on a video frames. From the findings, the only people category was used and other categories of items are not considered in this application. Therefore, the binding box that fits best with individual people can be found in the image, and the people information obtained will be used to

measure distance.

With the camera setup, the camera is held at a constant angle as a video frame, and the video frame is treated as a viewing angle converted into two-dimensional views at the top for a more accurate measurement of distance range. In this approach, it is thought that people in the video frame travel on the same flat plane. Four designated flight points are selected from the frame and converted into a vertical view. Each people's area can be estimated based on the top-down view. The distance between people can be measured. Depending on the pre- determined distance, any distance below the acceptable distance between any two persons shall be indicated by red lines that serve as warning signs. The work is done using the Python programming language.
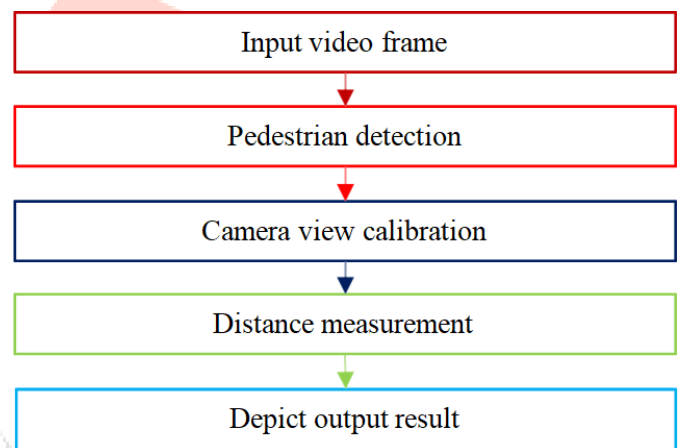
Pipeline for social distancing detection.

III. Related Work

This section highlights some of the related activities human discovery is based on deep learning. Lots of recent tasks in object classification and acquisition involve in-depth study it is also discussed. Recent reviews are very focused on current research applies to the acquisition of an object used in machine learning. Personal adoption can be considered as object detection in a

separate computer viewing function and localization of its composition in video images. In-depth reading is demonstrated the research process in the detection of a multi-level object and the acquisition of artificial intelligence has also been achieved outstanding performance on challenging data sets. Nguyen et al. presented

a comprehensive technical analysis of recent developments and adoption challenges [4]. Research focuses on human definitions, machine algorithms for learning, closure, and real-time acquisition. Because of visual perception, techniques that use deep learning has been shown to reach higher performance on multiple image recognition benchmarks [7]. OpenCV is an in-depth multilayer learning algorithm perceptron neural networks contain several convolutional layers, sample layers, and fully connected layers. Later, the weight of all the layers in networks trained to classify each item based on its database. With the discovery of an object in the image, the OpenCV model was one of the stages in in-depth guided reading powerful learning methods for finding something in various situations. OpenCV has made great strides in the wide range of image processing operations thanks to the latest high-end computer system and big data like ImageNet [6]. Various CNN types of object acquisition for its intended purpose the site was proposed interms of network design, algorithms, and new ideas. Recently for years, CNN models like AlexNet [5], VGG16 [7], InceptionV3 [8], and ResNet-50 [9] are trained to perform effects left on object perception. Deep success learning in object recognition is due to its neural network a self-contained structure Dictionary and reading

high-quality features are not available provided directly to the database. At the moment the technical aspects of the technology are deep learning has its pros and cons with precision as well speed. The item may have a variety of locations as well measurement scales within the image. So, real-time object acquisition techniques using a similar CNN model R-CNN [10], OpenCV, and YOLO [11] were then significantly improved in detection many classes in a different region in photography have always been improved. YOLO (You Just Look Once) is the highlight of CNN's deepest discovery process according to both speed and accuracy. Image of YOLO the model is shown in Figure 1

To change the idea from work [12], we introduce a computer visual detection system for camera detection installed on the side of the road or in the workplace. The camera view field covers people traveling in a certain space. The number of people in the photo and video with binding boxes can be found through these in-depth CNN channels there the YOLO method was used to obtain video streaming captured by the camera. By measuring the Euclidean distance among people, the app will highlight whether it exists is a sufficient public distance between the people in the video

Fig 1

Applications

1) openFrameworks running the OpenCV add-on example

2) OpenCV's application areas include:

3) 2D and 3D feature toolkits

4) Emotion estimation

5) Facial recognition system

6) Gesture recognition

7) Human-computer interaction (HCI)

8) Mobile robotics

9) Motion understanding

10) Object detection

11) Segmentation and recognition

12) Stereopsis stereo vision: depth perception from 2 cameras

13) Structure from motion (SFM)

14) Motion tracking

15) Augmented reality

16) To support some of the above areas, OpenCV includes a statistical machine learning library that contains:

60 frames per second (usually slower).

Boosting

1) Decision tree learning

2) Gradient boosting trees

3) Expectation-maximization algorithm

4) k-nearest neighbor algorithm

5) Naive Bayes classifier

6) Artificial neural networks

7) Random forest

8) Support vector machine (SVM)

9) Deep neural networks (DNN) [11]

Hardware

There are many types of computer viewing programs; however, they all contain the following basic elements: a power source, at least one image detection device (camera, CCD, etc.), a processor, and control and communication cables or some form of wireless connection. Also, an active vision system contains software, as well as a display to monitor the system. Internal space view systems, like most industries, contain a lighting system and can be placed in a controlled environment. Also, the finished system includes many accessories such as camera accessories, cables, and connectors Most computer viewing systems using light cameras simply view the area at an average frame rate of
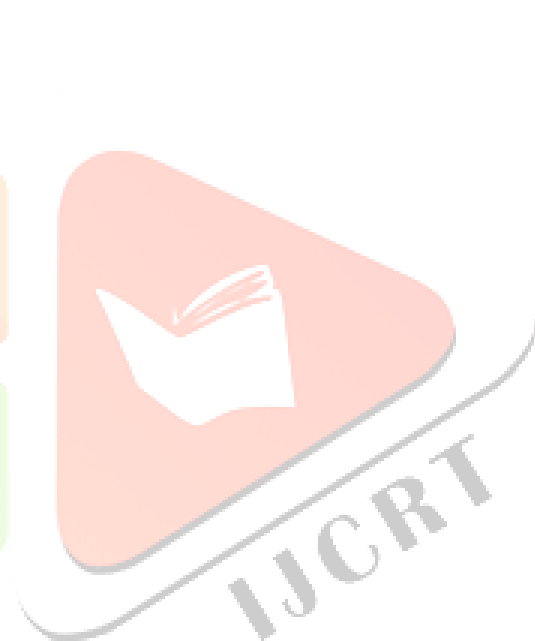
Few computer viewing systems use image capture hardware with active or another lighting without visible light or both, such as well-designed 3D scanners, thermographic cameras, hyperspectral actors, radar imaging, lidar scanners, magnetic resonance images, side sonar, synthetic aperture sonar, etc. Such computer systems capture "images" that are often used using the same computer viewing algorithms used to process transparent visual images.

IV. Implementation

OpenCV is an open-source library, which aims to see real-time computer computing. This library is made by Intel and is a shortcut organization – you can support Python, C ++, Java, etc. Computer Vision is a field on the edge of Computer Science that aims to enable computers to understand what is in the image. OpenCV is one of the most widely used libraries of Computer Vision functions such as face recognition, motion detection, object detection, etc.

We will build a basic Human Detector video using OpenCV. The discovery of people's is a very important area of research because it can improve the effectiveness of the people's protection program in recreational vehicles.

We can extract features such as the head, two arms, two legs, etc., from the image of the human body and transfer them to the training machine learning machine. After training, the model can be used to find and track people in photos and video streams. However, OpenCV has a built-in method for finding people. It has a pre-trained HOG (Histogram of Oriented Gradients) (Line) SVM model for people's in images and video streams.

Histogram Based Gradients

This algorithm tests the exact pixels of every single pixel. The goal is to look at how dark the current pixel is compared to the surrounding pixels. The algorithm draws arrows that indicate the direction of the image to darken. Repeats the process for each pixel in the image. Eventually, every pixel will be replaced by an arrow, these arrows are called Gradients. These gradients show the movement of light from light to dark. By using these gradients algorithms perform continuous analysis. To learn more about HOG, read Navneet Dalal and Bill Triggs' research paper in HOG for Human Detection.

Requirements

OpenCV-python 3.4.2

imutils 0.5.3

To install the above modules type the command below in the terminal.

install pip moudle_name

Distance range

At this point of the pipe, the endpoint individual box (x, y, w, h) in view is approx found and converted into a superficial view. For one thing, people's, positions in top and bottom views are limited based on the center point of the binding box. The distance between all people can be calculated from top views and distances are rated a limited feature from the camera view rating. Given the position of two people's in the image as (x1, y1) and (x2, y2) respectively, the distance between two people, d, can be

included in:

People have a minimum distance acceptable range, t is marked in red, and the rest is marked green. The red line also draws between pairs of people whose distance is less than previously described the limit. Operation of the binding box threshold, c, can be defined.

V. RESULTS AND DISCUSSION

This video shows people walking on a public street. In this function, the video frame is set in the specified corner of the file the road. Views of video frame ideas are we have turned it upside down to be more precise distance measurement. The figure shows the file for social deployment discovery and video effects and results in top view. Sequences are shown from top to bottom below. The points represent each social walker fraud detection. Red points represent people whose distance from other people's is less than the acceptable limit and green points represented people who keep a safe distance from other people. However, there are many detection errors shown in Figure. These errors may be due to people who walk very close to one another who walk until they see attached to the camera view.

flowchart of social distancing detection
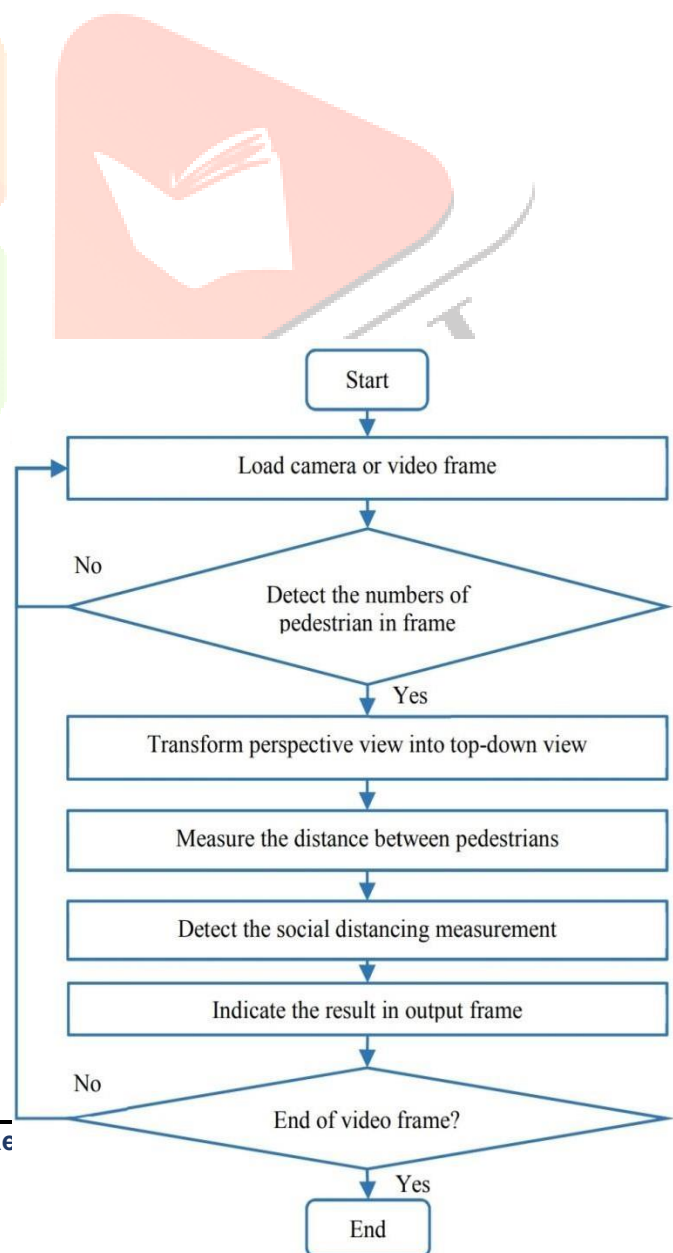
VI. CONCLUSION AND FUTURE ACTIVITIES

A tool for detecting social deviations using a deep learning model is proposed. Using computer vision, the distance between people can be measured and any people who do not obey the law will be shown in red Frames and red lines. The proposed approach was confirmed using a video showing peoples walking down the street. The visual results showed that the proposed approach is It can determine how society divides people who can be further developed for use elsewhere environments such as office, restaurant, and school. Also, the work can be improved by progress algorithm for finding peoples, includes other acquisitions techniques such as the discovery of a mask with the human body finding the temperature, improves the computer's power of the hardware, and measuring camera view views.

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