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COVID-19 Protocol Management and ViolationDetection

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Abstract: As the world recovers from the Covid-19 crisis, major steps are taken worldwide to boost the recovery process. The world is becoming more resilient as a result of vaccination campaigns. In such circumstances, we as citizens must ensure that we adhere to security protocols and norms established by the government. Social distancing and wearing a face mask are the rudimentary elements of this system. The proposed system makesa systematic effort to comply to this. The system keeps track of every person who enters and exits the area under surveillance.In addition to this, a person with high body temperature is blacklisted. This data is entered into a database, and daily logs are maintained. A headcount of people in the area is maintained and admits to the area are given accordingly. If any violations take place, alerts are issued and sent directly to the primary android device. The face mask detection model is trained on a comprehensive real-world dataset. The model uses Convolutional Neural Network (CNN). It will function by recognizing facialboundaries and predicting whether or not you are wearing aface mask in real time. YOLO Object detection algorithm is used to identify people and calculate the euclidean distance between them. This distance is used to keep track of social distancing. A heat map can be generated which later can be referred to sanitize the crowded locations..

Index Terms—Covid-19, Social distancing, Convolutional Neu-ral Network , YOLO, Face Mask Detection.

I. INTRODUCTION

THe best way to tackle COVID-19, reduce its spread and alleviate its effects is to follow the norms supplied by WHO. The main idea of this project revolves around the same concept. A well compiled system that tackles social distancing tracking, detects face masks and keeps track record of the same. Amalgamating several aspects of COVID-19 norms into a single entity is the root of the main idea.

A. Motivation Of The Project

According to WHO, vaccines are now authorized to pre- vent infection with SARS-CoV-2, the coronavirus that causes COVID-19. But, research suggests that new variants of COIVID-19 may be more transmissible and resistant to vac- cines. Until research uncovers more of it, precautionary mea- sures such as Social distancing and wearing a face mask must always be followed regardless the person's vaccination status. The primary motivation of the project is to promote thepractise of such precautionary measures which will ultimatelyhelp restrict the transmission of COVID-19..

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II. RELATED WORK

Krisha Bhambani and Tanmay Jain developed a system in 2020 This paper was published in 2020. While using this application, we get data of actual distance between people andprediction is made. If an individual is detected violating the social distancing norms, he/she is bound by a red bounding box and if not, in a green bounding box. For face mask detection, if a person is found wearing a mask his face is bound by a blue bounding box, if not, is bound by a pink box.[1]

Riya Chiragkumar Shah and Rutva jignesh shah develope application which only detects face mask using CNN This paper was published in 2020 in which, Application demon- strated a facemask detector using convolutional neural networkand move learning techniques in neural organizations. Thisapp only detects face mask. They have proposed a pre- trained MobileNet with a global pooling block for face mask detection.. [2]

Narinder Singh Punn, Sanjay Kumar Sonbhadra, Sonali Agarwal and Gaurav Rai "Monitoring COVID-19 Social Dis- tancing with the person detection and tracking via fine tuned YOLO v3 2021 This paper was published in 2021, The system proposes an efficient real-time deep-learning based framework to automate the process of monitoring social

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distancing. This system can only detect social distancing. The article proposes an efficient real-time deep learning based framework to auto- mate the process of monitoring the social distancing via object detection and tracking approaches, where each individual is identified in the real-time with the help of bounding boxes.[3]

III. METHODOLOGY AND IMPLEMENTATION

A. object detection model

In this, YOLO algorithm is used for object detection. YOLO algorithm is used for speedy detection of objects in the video.

B. Image Processing

OpenCV is a cross-platform library using which we can develop real time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection

C. TensorFlow and Keras

TensorFlow is a free and open-source software library for machine learning and artificial intelligence. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks. Keras is an open-source software library that provides a Python interface for artificial neural networks. Keras acts as an interface for the TensorFlow library.

D. MobileNetV2

MobileNetV2 is a convolutional neural network architecture that seeks to perform well on mobile devices. It is based on an inverted residual structure where the residual connections are between the bottleneck layers. The intermediate expansion layer uses lightweight depthwise convolutions to filter features as a source of non-linearity. As a whole, the architecture of MobileNetV2 contains the initial fully convolution layer with 32 filters, followed by 19 residual bottleneck layers.

E. YOLO Object Detection Algorithm

The YOLO algorithm works by dividing the image into N grids, each having an equal dimensional region of SxS. Each of these N grids is responsible for the detection and localization of the object it contains.These grids predict bounding box coordinates with probability of object present within that grid. If no object exists in that cell, the probability should be zero.

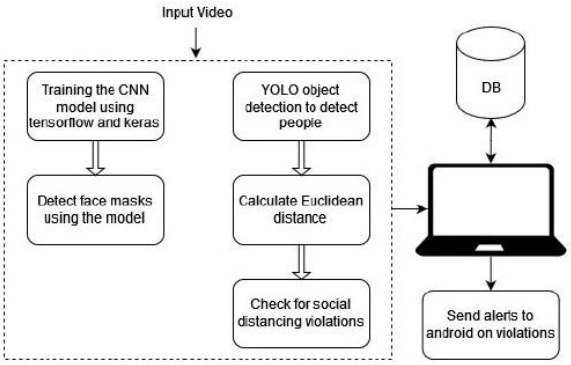

Fig. 1. Architectural Design

IV. EXPERIMENTAL SETUP

A. Data set

FaceData dataset consisting of 4000 images is used for face mask detection. The COCO dataset which contains a large number of classes ranging from Cat to Car to Person and so on is used for social distancing violation detection.

B. Efficiency Issues

High storage required as live video is captured and snap- shots are taken. Fast Network Speed is required as snapshots are sent immediately when alerts are received.

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V. RESULT

Test Case

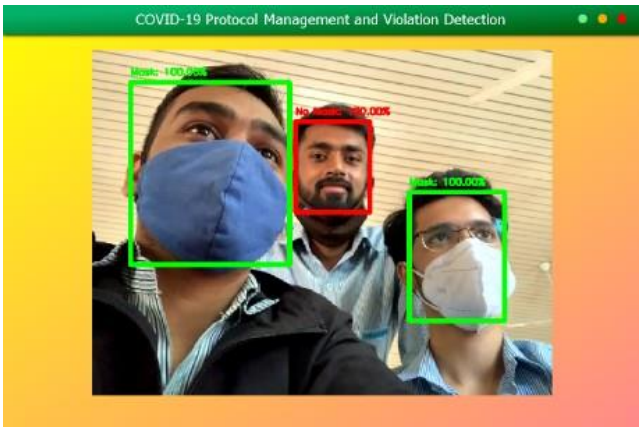

Fig. 2. Test case

Fig. 3. Test case-2

VI. CONCLUSION

The introduction of newer variants, as well as the highly erratic nature of case statistics, indicate that we must take precautionary measures more effectively than ever before. The goal of this project is to effectively manage overcrowding and COVID- 19 violations.The system focuses on two major factors influencing COVID-19 virus transmission: social dis- tancing and the use of a face mask.Distance between multiple objects (people) is calculated using the YOLO object detectionmodel through a live video feed. If a violation occurs, an alert is generated. The user is only permitted to enter the monitoredarea if he or she wears a face mask.

The system aims to reduce COVID-19 protocol violations incrowded places, thereby limiting the spread of the COVID-19 Virus.

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It gives us great pleasure to present the preliminary project report on '**COVID-19 PROTOCOL MANAGEMENT AND VIOLATION DETECTION**'. We express deep and sincere gratitude to **Prof. Jyoti Mankar**, whose guidance, encourage- ment, suggestions, and constructive criticism have contributed immensely to the evolution of ideas on our project. We are also grateful to **Prof. Dr. S. S. Sane**, Head of the Computer Engineering Department, K. K. Wagh Institute of Engineering Education and Research, Nashik, for his indispensable support, invaluable assistance, and suggestions.

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