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DETECTION OF FACE MASK USING RASPBERRY PI

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Abstract: In order to effectively prevent the spread of COVID19 virus, almost everyone wears a mask during corona virus epidemic. This almost makes conventional face recognition technology ineffective in many cases, like community access control, face access control, facial attendance, facial security checks at train stations, etc. Therefore, it's very urgent to enhance the popularity performance of the prevailing face recognition technology on the masked faces. Most current advanced face recognition approaches are designed supported deep learning, which depend upon an outsized number of face samples. Deep Learning has proven its effectiveness in recognition and classification through image processing.

However, at the present, there are not any publicly available masked face recognition datasets. To this end, this work proposes three kinds of masked face datasets, including Masked Face Detection Dataset (MFDD), Real- world Masked Face Recognition Dataset (RMFRD) and Simulated Masked Face Recognition Dataset (SMFRD). Among them, to the only of our knowledge, RMFRD is currently the world's largest real-world masked face dataset. These datasets are freely available to industry and academia, supported which various applications on masked faces are often developed. The multigranularity masked face recognition model we developed achieves 92% accuracy, exceeding the results reported by the industry.

Keywords: Deep Learning, Face Recognition Dataset,COVID19.

I.INTRODUCTION

Recently India along with almost all big and small countries stated emergency conditions for the novel corona virus (COVID-19). Practically, the whole population of the world is under lockdown and people are maintaining social distances as suggested by the World Health Organization (WHO). This deadly virus has infected crores individuals and continues to spread globally.

Almost everyone wears a mask during the COVID-19 corona virus epidemic. Face recognition techniques, the most important means of identification, have nearly failed, which has brought huge dilemmas to authentication applications that believe face recognition, like community entry and exit, face access control, face attendance, face gates at train stations, face authentication based mobile payment, face recognition based Social Security investigation, etc. In particular, within the peace check like railway stations, the gates supported traditional face recognition systems cannot effectively recognize the masked faces, but removing masks for passing authentication will increase the risk of virus infection. Because the COVID-19 virus is often spread through contact, the unlocking systems supported passwords or fingerprints are unsafe. It is much safer through face recognition without touching, but the prevailing face recognition solutions are not any longer reliable when wearing a mask. To solve above mentioned difficulties, it's necessary to enhance the prevailing face recognition approaches that heavily believe all facial feature points, in order that biometric identification can still be performed reliably within the case of incompletely exposed faces.

FIGURE 1: Detection of mask and No mask

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II.OBJECTIVES

- The main objective of this project is to avoid spreading of corona virus by detecting whether the person is wearing a mask ornot.
- In this project, deep learning techniques are applied to construct a classifier that will collect images of a person wearing a face mask and differentiate between these classes of facemask-wearing and not facemask-wearing.
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III.PROBLEMSTATEMENT

- People aren't looking straight to the camera, and thus the face angles vary from time totime.
- These real-world videos are entirely different from the videos captured by webcams or selfie cameras, making the mask detection problem much more difficult inpractice.
- We will first explore mask/ no mask classification in webcam videos, and next, shift to the mask/ no mask classification problem in real-world videos as our finalgoal.
- Our reported model can detect faces and classify masked faces from unmasked ones in webcam videos also as real-world videos where the faces are small and blurry and people are wearing masks in several shapes andcolors.

IV.BLOCK DIAGRAM ANDWORKING

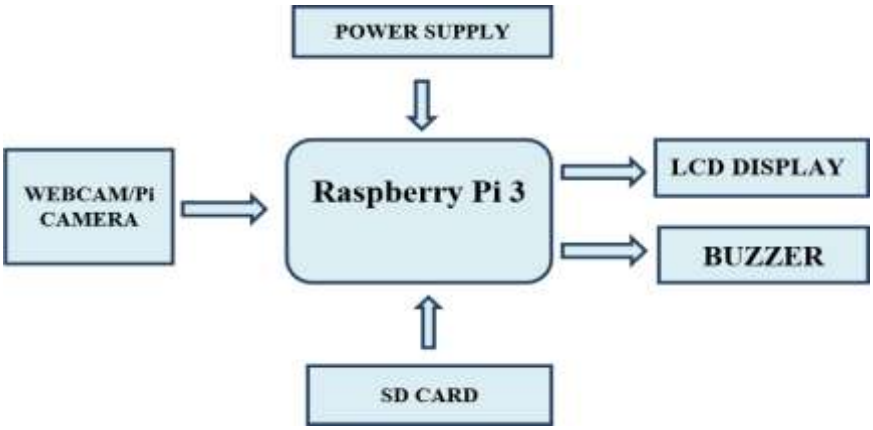

FIGURE 2: Block Diagram of Face Mask Detection System

The process of CNN is to identify and categorize images from learned features. It is very effective in a multi- layered structure when obtaining and assessing the necessary features of graphical images. This project proposes the use of a convolution neural network to design the facemask classifier and to include the effect of the number of the convolution neural layer on the prediction accuracy. This project is implemented in a Raspberry Pi using OpenCV, Tensor Flow and Python programming language.

V.COMPONENTSUSED

RASPBERRY PI BOARD: Raspberry Pi is a small single board computer. By connecting peripherals like Keyboard, mouse, display to the Raspberry Pi, it'll act as a mini pc. Raspberry Pi is popularly used for real time Image/Video Processing; IoT based applications and Robotics applications.

RASPBERRY PI CAMERA MODULE: This 5mp camera module is capable of 1080p video and still images and connects on to your Raspberry Pi.

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FIGURE 3: Raspberry Pi Camera

BUZZER: It consists of piezo crystals between two conductors. When a potential is applied across these crystals, they push on one conductor and pull on the other. This, push and pull action, results in a sound wave.

FIGURE 4: Buzzer

REGULATED POWER SUPPLY: A regulated power supply is an embedded circuit; it converts unregulated AC into a continuing DC. With the assistance of a rectifier, it converts AC supply into DC. Its function is to provide a stable voltage (or less often current), to a circuit or device that has got to be operated within certain power supply limits. The output from the regulated power supply could also be alternating or unidirectional, but is almost always DC. 16x2 LCD Display: By interfacing 16x2 LCD with Raspberry Pi, we can have a simple display option for our Raspberry-Pi which can display mask or No mask.

WORKFLOW

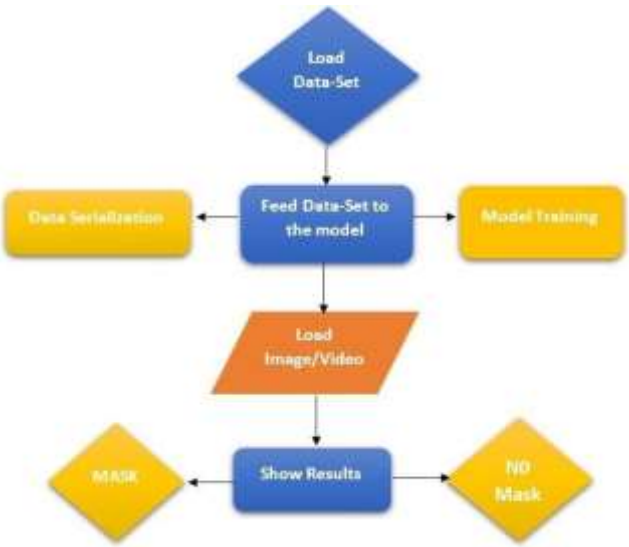

FIGURE 6: Work flow of Face Mask Detection

There is a need of well-defined and structured datasets that can be used for research with masked face images. Here we

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are having the 2 categories.

1. This category mainly serves as the source of images with correctly and incorrectly worn facemask.

Figure 7: Dataset With proper mask

Figure 8: Dataset With improper mask

2. This serves as the source of images of faces withoutmask.

Figure 9: Dataset Without mask

The list of the images included in the dataset is labeled which indicates the presence of face mask, placement of face mask (i.e correct or incorrect) and head pose. The aim of the dataset is to provide a predefined data with accompanying labels to train, test an compare face mask detection model.

FEED THE DATA SET TO THE MODEL: The data set consists of the images with different size, colors and orientation.HeretheimagesareresizedandPreprocessit.Preprocessingstepistoconvertallthepicturesintothe gray scale irrespective of thecolors.

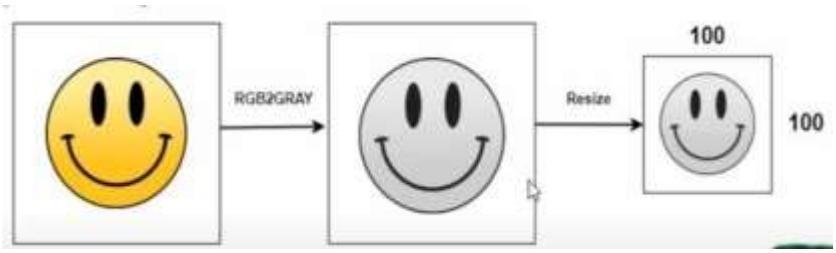

Figure 10: Feed the data set to the model

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TRAINING THE MODEL: Convolutional neural network is trained using the tensor flow on this data set.

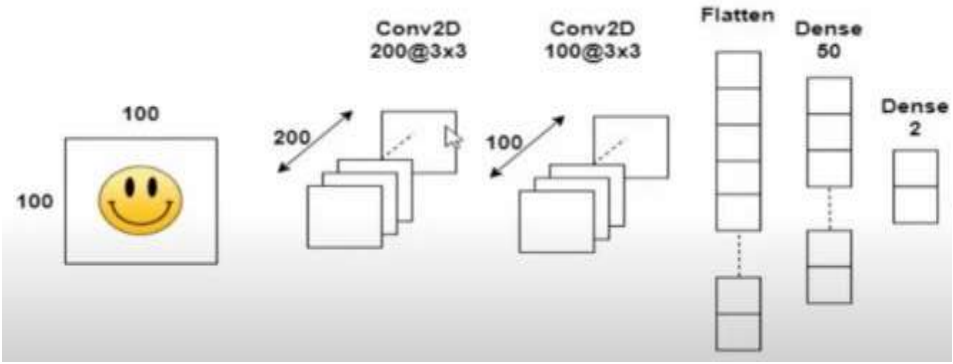

Figure 11: Training the model

VI.RESULT ANDDISCUSSION:

This project gives a particular and speedily results for facemask detection. The test results show a distinguished accuracy rate in detecting persons wearing a facemask and not wearing a facemask. Looking at figure, we will see there are little signs of overfitting, with the validation loss less than the training loss.

Figure 12: The result of the Accuracy/Loss performance test during model training.

	Precision	Recall	F1-Score	Support
NoMask	0.95	1.00	0.95	69
Mask	1.00	0.89	0.92	36
Accuracy			0.92	105
Macro avg	0.97	0.94	0.94	105
Weighted avg	0.96	0.96	0.94	105

Figure 13: Accuracy result of trained model

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Figure: Video Stream Display of a Person Wearing a Mask or Not

VII.CONCLUSION

In covid-19 situations, the current scenarios and the increase are an unsettling situation. The mandate of carrying a mask must be checked every time and every time out of home by all establishments/offices. The use of technology would not only automate the detection task but avoid the reversing of considerable work force by manually checking defaulters rather than manual checks.

VIII.FUTUREWORK

Future works include the integration of physical distancing, wherein the camera detects the person wearing a facemask or not and at the same time measures the distance between each person and creates an alarm if the physical distancing does not observe properly. The integration of several models of CNNs and compare each model with the highest performance accuracy during training to increase the performance in detecting and recognizing people wearing facemasks is suggested. Also, the researchers recommend a different optimizer, enhancedparametersettings,fine-tuning,andusingadaptivetransfer learningmodels.

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