Face Mask Detection Using Deep Learning For Safety Protocol

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Abstract- *The current COVID-19 scenario requires an efficient face mask detection application. The main goal of this project is to implement this system at the entrances of universities, airports, hospitals and offices where COVID-19 is very likely to be transmitted. Wearing a face mask at work has been reported to significantly reduce the risk of spreading infection. This is a matter of finding and classifying objects in two different classes (with_masked and without_mask). A CNN model is presented that uses MobileNet framework to detect face masks. A dataset is used to create this facemask detector using Python, OpenCV. While entering public establishments, everyone walks through the foyerwhere their faces are monitored by a camera integrated with this model to make sure they are wearing masks. If it is determined that someone does not have a face mask, a beep will sound prompting them to wear a mask before entering.*

Keywords- Face Mask, COVID-19, Mobile Net, CNN(Convolution Neural Network), Asymptomatic carriers.

I. INTRODUCTION

Since COVID-19 regulations have been relaxed and many people are going outside. Government and WHO are recommending people to wear a face mask to protect themselves and fellow citizens from this deadly virus. There has been a major outbreak of asymptomatic carriers during the last year pandemic situation. These are people who developed tolerance to the virus by their immune system. Due to constant exposure to the virus, their bodies produce antibodies which can fight against the virus successfully. The virus is still prevailing in their bodies but, it is just dormant. So, they have the ability to transmit the virus to other people who might have a fragile health condition or young children whose immune systems are still developing.

So, to protect these people who are susceptible to this virus we decide to build a very simple Face Mask Detecting model with CNN (Convolution Neural Network) Model using Mobile Net framework. For identifying people not wearing masks, this system can be installed in the entrance of public enterprises, educational institutes and offices. If the system detects a person's face with no mask, it will generate a beep sound alerting them to wear mask.

II. LITERATURE SURVEY

In [1] Creating a Face Mask Recognition System Traditional CNN (Convolution Neural Network) model is used. It is designed to help large establishments from the clutches of the COVID virus, to minimize its spread and to ensure the safety of clients and employees. This model requires human monitoring so that the people not wearing masks in the establishment could be detained or requested to wear a mask by the security personnel. It uses CNN model to ensure maximum accuracy.

In [2] Workplace Temperature Screening to detect people with body temperature above the normal range. This system uses an (IR) digital thermometer, (IR) Laser thermometer and thermal imaging camera are used to measure body temperature. This system requires an individual to monitor its activity. It could be installed almost anywhere in a public establishment.

III. EXISTING SYSTEM

There are many Detection systems for COVID-19 using deep learning algorithms. Existing face mask detection systems use traditional CNN algorithm which requires lot of training dataset. CNN algorithm is very accurate but it takes up a lot of memory and also requires a lot of time to train such models. Temperature Screening systems are also currently being used mainly in China. These system captures the body temperature of individuals thereby alerting officials to quarantine them.

IV. PROPOSED SYSTEM

We, propose a simple MobileNet CNN model that can detect face mask. If the individual entering a public establishment is not wearing a mask a beep sound is generated alerting him/her to wear a mask. This system is lightweight and has a faster training time period compared to CNN model.

Temperature screening systems cannot detect asymptomatic carriers since, it can only identify people who are already ill. This system can also help in limiting the spread of covid through asymptomatic carriers

SYSTEM ARCHITECHTURE:

A Dataset containing 3,754 images was separated into two class *with_mask* and *without_mask*. Then during preprocessing the images are resized and converted into arrays for building the mask detection model. After preprocess 80% of data is designated for training and the remaining data goes for testing. MobileNet model is built using these data. Then the model is tested and its accuracy is evaluated in the form of graphical representation using Matplotlib. Now the model is going to be successfully integrated with an I/O system which incase here is a webcam, using OpenCV. On the screen the person not wearing a mask is represented by a red square box and the person wearing a mask is represented by a green square box. A beep sound is made when a person is not wearing mask.

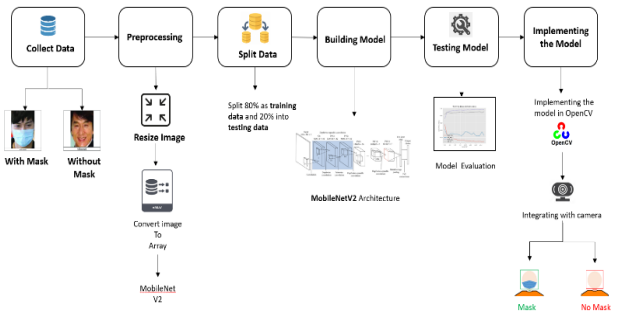

Figure 1: SYSTEM ARCHITECTURE

V. ALGORITHM USED

Convolution Neural Network is a deep learning algorithm which can be used to differentiate images without any human intervention. In previous algorithms the filtering process is hard coded into the algorithm CNN has the ability to learn filters and characteristics by itself.

MobileNetV2 is a Convolution Neural Network architecture that was open sourced by Google has the compatibility to perform well with mobile devices. It uses depth-wise convolution to filter different features of images. Depth-wise convolution is a type of convolution in which each input channel is convolved with a different kernel (called a depth-wise kernel). Hence it can create lightweight models that require less memory and lesser training dataset and hence, is easy to be integrated with mobile devices such as raspberry Pi, Banana Pi …etc.

VI. RESULT

The model was tested on a diverse set of images. We also tested the model from various live sources using both external and built-in web cams. It performs well in every possible model of camera. It also is capable of running in any OS such as Linux/Mac/Windows which has a python compiler. In these following images the green box represents person wearing a mask and the red box represents a person not wearing a mask**.**

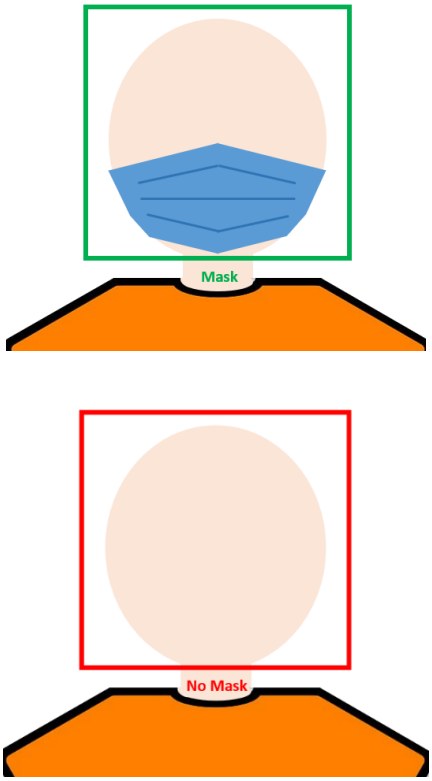

Figure 2: MASK AND NO MASK

VII. CONCLUSION

This model promotes and encourages the use of face mask among the general population. Thorough this system we can minimize the spread of COVID and maximize the workflow of organizations. We hope thought this model we can integrate future systems with add-on features such as cough & sneeze detection, temperature-detection and capture possibly infected people location through RFID. This might help in better containing the spread of virus by containing it withinthe certain highly-infectedzones. We could also in future integrate this model in other I/O systems such as raspberry pi.

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