# CNN based Face Mask Detection for COVID19 Saftey

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**ABSTRACT_** Coronavirus illness 2019 has struck the world significantly. One important safety approach for human beings is to put on masks in public locations. thus many public provider carriers require clients to utilise the carrier only if they put on masks correctly. However, there are simply a few lookup research about face masks recognition based entirely on photo analysis. In this we propose, MobileNet Mask, it is a deep learning-based multi-phase face masks detection model for halting human transmission of SARS-CoV-2. Two superb face masks datasets have been utilised to teach and take a look at the model for detecting with and barring a face masks from the snap photos and video stream. Experiment effects reveal that with 770 validation samples MobileNet Mask achieves an accuracy of ~ 93 percent whereas with 276 validation samples it attains an accuracy of about ~ 100 percent . The penalties revealed that our proposed technique is really precise.

## 1.INTRODUCTION

The development of COVID-19[1][2] Throughout history, disease has had a profound effect on humanity and the way we view our world and our lives on a daily basis. When SARS-CoV-2 (SARS-CoV-2), a new severe infectious respiratory illness, first appeared in Wuhan, China, in December of 2019, it infected 7,711 people and resulted in 170 reported deaths in China till now that coronavirus has been declared a global pandemic and is known as COVID-19 by the WHO. According to the World Health Organization (WHO as of July 12, 2020) file , the modern outbreak of COVID-19, has contaminated over 13,039,853 people and higher than 571,659 deaths in more than 200 international locations round the world, carrying a mortality of about 3·7 percent , in contrast with a mortality charge of a good deal much less than 1 percent from influenza. People-to-people transmission of a novel virus has occurred, but it can also be transmitted from an asymptomatic firm with no signs of the novel virus that causes the coronavirus illness 2019 (COVID-19). A clinically proven antiviral medication or vaccination that is particularly effective against COVID-19 has yet to be documented. Global health, economic, environmental, and societal problems have arisen as a result of this sudden and global occurrence. Face masks are

currently recommended by WHO to protect against viral transmission, as well as a social distance of at least 2m [2] between people, in order to avoid the spread of covid illness from one person to another. Masks and social separation are often required by many public issuer providers to use the issuer. As a result, the identification and monitoring of social distances and face masks using laptops has become a vital responsibility for the benefit of global civilization. To prevent the spread of the virus, we use real-time surveillance to see if somebody is avoiding close contact with others by donning face masks in public settings.

## 2.LITERATURE SURVEY

The adoption of extremely deep convolutional networks has enabled the most significant advancements in picture identification performance in the last few years. The Inception concept has been proven to be highly efficient at a low computational cost. This year's ILSVRC competition found that the usage of residual connections, along with a more traditional architecture, led in equivalent performance to the Inception-v3 networks. Are there any advantages to combining Inception architectures with residual connections? Training Inception networks with residual connections, as we demonstrate in this research, greatly increases training speed. According to the study, Inception networks with residual connections appear to outperform similarly priced Inception networks by a small percentage as well. Additionally, we demonstrate a variety of novel, more efficient Inception network topologies, both residual and non-residual, as an additional bonus. On the ILSVRC 2012 classification task, single-frame recognition is considerably improved. We go on to show that activation scaling stabilises the training of extremely large residual Inception networks. With an ensemble of three residual networks and one Inception-v4 network, we achieved a top-five error rate of 3.08 percent on the ImageNet classification (CLS) test set.

Our convolutional neural network was trained to classify the 1.2 million high-quality images in the ImageNet LSVRC-2010 contest into 1000 separate classes. Our top-1 and top-5 error rates of 37.5% and 17.0%, respectively, show that this is a significant improvement over the preceding state-of-the-art. The neural network is comprised of five convolutional layers, some of which are followed by max-pooling layers, and three fully-connected layers with a final 1000-way softmax. To speed up

training, we used non-saturating neurons and a GPU implementation of the convolution function. One of our new regularisation methods, called "dropout," proved to be particularly efficient at reducing overlays in the fully-connected layers. In the ILSVRC-2012 competition, a variant of this model came in first place with a top-5 test error rate of 15.3%, beating out the second-best entry's 26.23%.

At ImageNet, we demonstrated a deep convolutional neural network architecture dubbed Inception that is capable of achieving the new state of the art in classification and detection (ILSVRC14). The most noticeable characteristic of this design is its ability to make the best use of available network bandwidth. We were able to increase the network's breadth and depth while keeping the same computational budget thanks to meticulous planning. Architectural decisions were influenced by Hebbian principles and multi-scale processing intuition in order to achieve the highest possible level of quality. We used a 22-layer deep network called GoogLeNet in our application for ILSVRC14 to evaluate the quality of classification and detection.

We investigate how the depth of a convolutional network impacts the accuracy of the network in the setting of large-scale image recognition. A relatively small (3x3) convolution filter architecture was used to assess increasing network depth and discovered that extending the depth to 16-19 weight layers offered significant gains over prior-art settings. Based on these findings, our team took first and second place in the ImageNet Challenge 2014 classification and localization tracks, respectively. It is also possible to generalise the model to other datasets and obtain cutting-edge results on those datasets as well. Our best-performing ConvNet models have been made available to academics so that they can continue to investigate the use of deep visual representations in computer vision.

## 3.PROPOSED WORK

A two-phase face masks detection model has been proposed the location terrific datasets had been reviewed to train our customized face masks detector. Finally, with the aid of the utilization of the help of the library of Keras and TensorFlow we will highlight how we have developed a face masks detector model (github.com/chandrikadeb7/Face-Mask-Detection). Moreover, a two-fold method is moreover utilized for detecting face masks in pix as properly as from real-time video

streams. Following Fig. three highlights our proposed methodology of two part based totally definitely COVID-19 Face Mask Detector Model.

### 3.1 Face Mask Detector Training Phase

It has been proposed that a two-phase face masks detection model be used to train our proprietary face masks detector. Our face mask detector model (github.com/chandrikadeb7/Face-Mask-Detection) has been constructed using the help of the Keras and TensorFlow libraries. In addition, a two-step approach is used to recognise face masks in both still images and live video feeds. Following Fig. 3, we provide our suggested two-part COVID-19 Face Mask Detector Model technique.

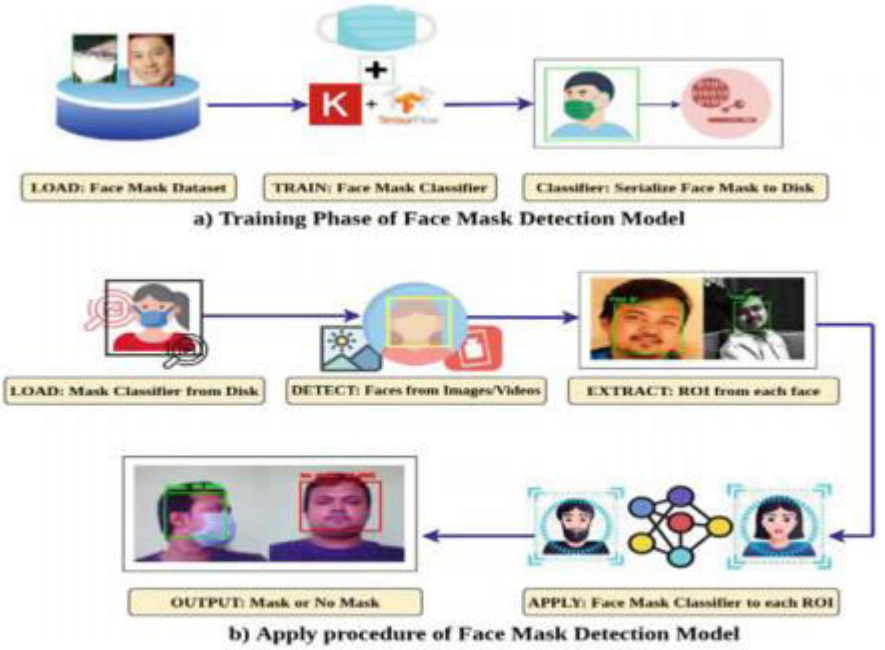


**Fig. 3** Multiple stages and detailed phases for the development of a face mask detector model (images by the authors) **a** represent the training phase of face detection model whereas **b** shows how the apply procedure works in face detection model

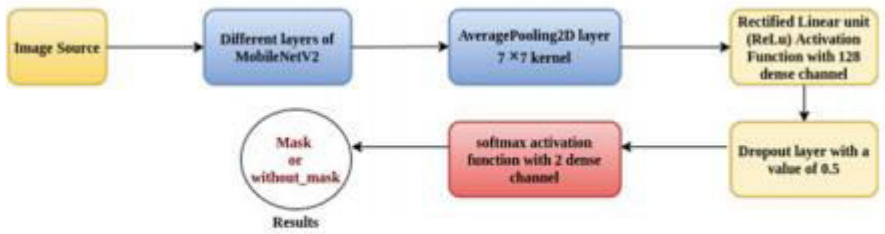


**Fig. 4** Working procedure of customized fully connected layer of MobileNetV2 architecture

detection and then categorised primarily based on with_mask and without_mask. This exploration has used a deep mastering device involving TensorFlow and Keras to

routinely classify face masks carrying situations. To gain this goal, a fantastic tuned mechanism on MobileNetV2 [11] structure has been conducted. Several applications of machine/deep studying processes and photo processing libraries have been used in this lookup which include OpenCV, scikit-learn, matplotlib, numpy, and many greater to educate the masks detector. To set up a baseline mannequin that saves a sizable quantity of time, a three-step manner of fine-tuning has additionally been performed to put together the MobilenetV2 architecture. As our mannequin is for binary classification (mask and without_mask) problem, consequently we have used binary cross-entropy, decay agenda of a studying rate, and Adam optimizer to assemble our model. After the completion of the education phase, we evaluated the ensuing mannequin on the check set and generated a classification document for inspection. Finally, we serialized the face masks classification mannequin to the disk.

### 3.2 Face Mask Detector for Webcam/Video Stream

A two-fold procedure of detecting masks from a webcam or video flow is additionally applied. In order to pick out faces in the webcam a pre-trained mannequin supplied through the OpenCV framework used to be employed. The pre-trained mannequin is primarily based on Single-Shot-Multibox Detector (SSD) and makes use of the spine of a ResNet-10 Architecture. Following Fig. 5 indicates the step by using step working technique of face masks detection strategy from video data

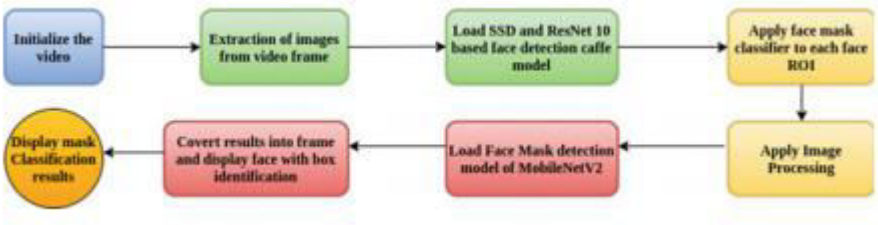


**Fig 5: Face Mask Detection Workflow For Webcam Or Video Stream**

## 4.RESULTS AND DISCUSSION


**Fig 5: without mask**


**Fig 6: with Mask**

Detecting face masks or without face mask in real-time from a video stream

## 5.CONCLUSION

To prevent the spread of the COVID-19 virus and aid law enforcement by reducing the amount of time they have to spend physically monitoring people in containment zones and public areas where surveillance is rife, we present in the current paper a method that makes use of laptop computer vision and the MobileNet V2 form factor. As a result, when the lockout is eased and the computerised song of public spaces except circumstance is eased, this recommended laptop will feature in an environment pleasant manner in today's country of affairs. Face masks that help to protect human health have been extensively discussed in our research.... Responding in real-time might significantly reduce violations, hence improving public safety by reducing the spread of coronavirus and saving time for other public-safety measures. It can be employed in places like temples, shopping malls, metro stations, and airports.

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