

# Face Mask Detection

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**Abstract:-** The World Health Organization (WHO) stated that the COVID-19 virus can be spread in two ways: droplet infection and physical contact, so we want to take some precautions to prevent the spread of the virus. In addition to wearing masks, they are also socially estranged. Wearing a mask is considered an important aspect of the spread of the COVID-19 virus, because droplets may fall on any surface between these two preventive measures. People who wear masks or not are more important. Here, we provide a mask with a detection system that can detect any type of mask and masks of various shapes through the film channel in accordance with the guidelines of the federal government. It uses deep learning algorithms, and the Python PyTorch library can be used to identify masks based on image/video sequences. The recommended system can detect mask-wearing people wearing masks.

## I. INTRODUCTION

The COVID19 pandemic started in December 2019, and this virus will definitely start in China. Then the virus began to spread all over the world, actually in this world country Atlanta [1]. Staying at home, relaxing alone, avoiding traffic, and not polluting the city, these measures can prevent the spread of Covid 19 disease [2]. The WHO usually cited the two main reasons for the spread of this virus, because the inhalation and contact of droplets must be physical [3]. When a person is infected or coughs, human respiratory droplets can reach many other contacts (within 1 m), these droplets can spread into the atmosphere, and even bring many surfaces closer together. This virus is still present in almost all areas, which may also lead to contact transmission. The preventive measures formulated by the national regulatory agencies in each country are usually equivalent to social distancing, which is why masks are used [4]. People usually use many types of masks, such as medical masks, Procedural masks, and masks of various shapes (glass shapes) of some fashion designers [5]. These masks are used to prevent the spread of respiratory droplets from infected persons. This mask can also provide sufficient air permeability, liquid permeability and a high degree of purification. Social distance is a trend in which the distance between objects and people is at least 2 meters. It should be noted that the role of the Internet of Things, synthetic intelligence, blockchain, drones, etc. in the detection of Covid19 disease is likely to be extremely important [6]. Therefore, in our recommended strategy, we will create a mask. This recognition method can of course recognize many different masks and different designs. Our strategy allows you to use the computer view to identify the mask of the person used for this deep learning algorithm, possibly not through image and video sources. Use the Python library

PyTorch for implementation. This method first teaches deep learning, which must be MobileNetV2, and then uses it to detect image/video channel masks.

## II. LITERATURE REVIEW

The facial recognition system is effective in a variety of areas. One of several specific areas is Presentation Attack Detection for recognizing this face, which was featured by the authors in this report. They used silicon, which is 3D masks for real people. You will have used the database, it is certainly 8 new and custom 3D silicone masks with the real presentation. Here in this report, the authors have proposed a mask detection system for continuous health workers in the operating room. Wellness care requires a mask to be used privately in the operating room, and the recommended system warns almost anyone who is not wearing the mask. There are two detection systems for the face and the mask, which is health. His system got practically 90% recovery and less than 5% false rate, which is good. You have generally worked for the mask, which is certainly healthy for images taken by digital cameras from a distance of 5 m [8]. The writers have worked on this report since the film's masked face recognition. Anyone who is masked will be recognized in this presented method and there are mainly 4 steps to recognition, namely estimating the length between the camera and the person, recognizing the attention area, recognizing part of the face and recognizing attention. Various video surveillance systems and achieved good reliability [9]. It presents a design based on the paper for masked face detection when it comes to protection. Three layers of CNN for masked face detection. In addition, the authors worked on the data set FACE ENMÁSCARA, which they developed themselves, since the existing face is certainly masked, it is not enough to evaluate the algorithms much more precisely. It worked well and masked face detection is also performed accurately [10]. Another operation in this industry is in relation to masked face detection and then detection in conjunction with the initial face. The proposed work will be carried out in two phases, the first is to identify the masks that address a larger part of the face than necessary and the second to obtain the real face that is not present in the teaching record. They received a used GAN-based algorithm and a used data set, which is a CelebA training and has achieved higher precision [11]. Here, the authors continue to work continuously on the subject of masks. We worked on face recognition through faces that can be covered with the help of masks. The authors found out that the photos are covered with masks from the film, then the original photos of this surely masked face are recognized. That is why they suggested CNN multitasking, this is certainly cascading, as well as in the category The recommended system has the capacity. to

recognize faces masked from the original faces of people [12]. The authors here have proposed a facial recognition system that is certainly based on a complete system, this is certainly a convolution. The authors worked on generating the face segmentation from any image measurements. FCN acts here as an instruction form for the feature extraction and the descent, this is certainly a gradient with which one can work with binomial cross entropy reduction work. With the proposed approach, you have achieved an average pixel accuracy of 93.884% [13]. This is exactly where the authors worked on facial area detection, which is very fast and reliable b and viola, this algorithm uses the skin mask for face detection and leads to a result 4 times faster. Here we train to model the system with 2 eyes or 1 attention and 1 nose in order to lower the detection rate that is wrong. They received 2.4 ls negative instead of 10% [14].

### III. IMPLEMENTATION

It shows how to use the recommended methods, various techniques, and the data used to implement it. In addition, this area also specifies the selection of collections, structures, algorithms, and data sets.

#### Data at Source

Here, we load the natural image in this article on PyImageSearch for our experiment, and the task of enhancing this image is done by OpenCV. "Mask" and "No Mask" are the tags that pictures initially liked. The size and resolution of the photos you take will vary because they are taken by various devices with different settings.

#### Data Preprocessing

The pre-processing techniques to make the image free and visible for recognition have been outlined here, and the

pre-processed image can be provided as the input of neural points.

1. Resizing the feedback image (256 x 256)
2. Applying the color filtering (RGB) throughout the channels (Our model MobileNetV2 aids 2D 3 channel picture)
3. Scaling / Normalizing images using the mean that is standard of build in weights
4. Center cropping the picture with the pixel price of 224x224x3
5. Finally changing all of them into tensors (comparable to array that is numPy)

### IV. PROPOSED APPROACH

The recommended mask recognition method and the implementation involved in the method are listed here. The following is a flowchart describing the general flow of the method. The model starts with the entire set load. Mask recognition data In addition, the preprocessing of the information is done by Torch Vision PyTorch. Then, after the assembly is completed, the MobileNetV2 model training is completed. Then perform the serialization associated with the actual mask classifier. The model described in the above statement and the training process of the MobileNetV2 classifier are completed using the deep learning framework PyTorch. Now that we have the mask serialization, we load the mask classifier, and then load the face from the available image and video stream. This is the step after PyTorch and Python OPENCV transformation preprocessing. Only in the end, the mask detector can identify the person wearing a mask or not wearing a mask. End in Figure 1.

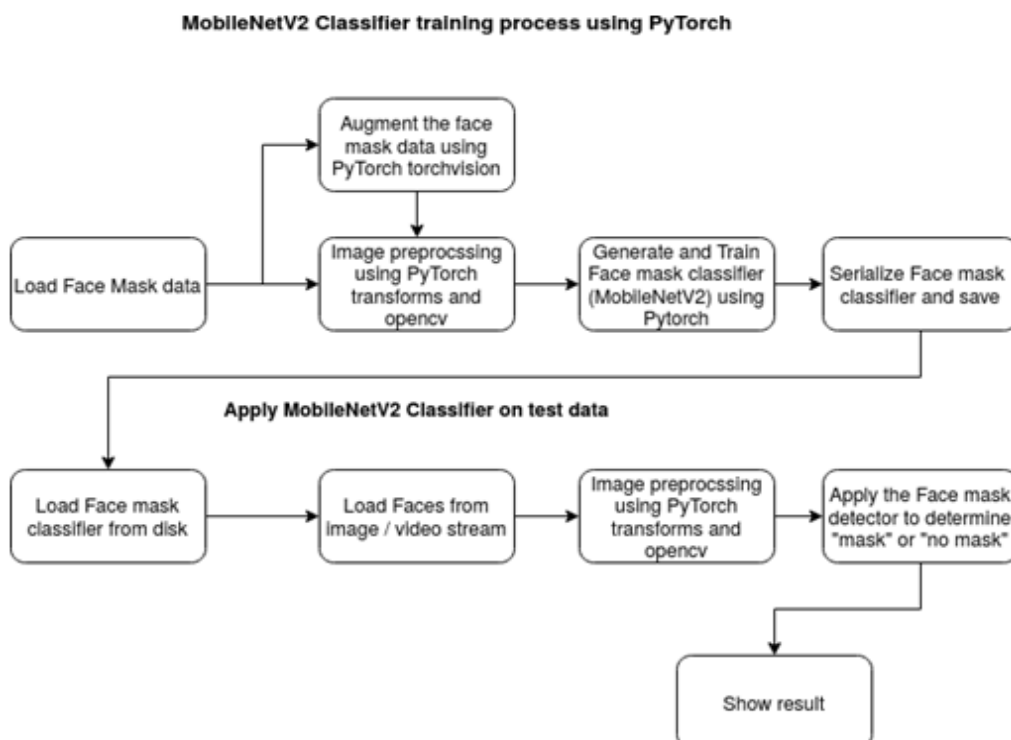


Figure 1. Flowchart for the Proposed Mask Detection

**Deep Learning Frameworks**

Depending on the availability of implementing such deep learning networks, the following options can be seen.

1. TensorFlow
2. Keras
3. PyTorch
4. Caffee
5. MxNet
6. Microsoft toolKit this is certainly intellectual

We have now used PyTorch with ordinary Python knowledge, and it will use it to create our own deep learning projects. In addition, you will see several advantages that can be quickly implemented from the Python system, namely:

- 1.Data Parallelism
- 2.Framework like design

**Algorithm development using PyTorch is completed through the following modules**

- PyTorch DataLoader: Load information from the image folder.
- PyTorch DataSets ImageFolder-Hosts image sources and provides ready-made modules for marking target variables.
- Pytorch conversion-integrated help for image preprocessing steps provided when reading from the source folder.
- PyTorch device: used to identify related device capacity, such as processor and GPU performance to train this model. It can be used to change the way the functional system is used.
- Pytorch TorchVision-With it, you can load libraries that have already been created. For example, pre-trained models, image sources, etc. In PyTorch, it is provided as corePyTorch nn-it is considered the main module. This is mainly used to build neural models of deep systems.Libraries are provided because they may need to build models. As a linear layer, 1D convolution plane, conv2d, conv3d, consistency, cross entropy loss (target loss), Softmax, ReLu, etc.
- PyTorch Optim-This defines the layout of the optimizer. This module ensures correct identification of data such as ADAM and SDg.
- Pytorch PIL: Load images through resources in this way. In this component. Just like the signal line. The gradient calculation can be performed with the inverse function ().This is considered very useful when doing feedforward in DNSA. The image category algorithm used by PyTorchCNN provides different architectures, such as ResNet, Inception, AlexNet, MobileNet, etc. We focus on the MobileNetV2 architecture because it is lightweight. It's really effective.

**MobileNetV2:-**

The model builds on the previous version of MobileNetV1 and uses the building block split level. MobileNetV2 provides us with some additional functions, such as: a) linear bottlenecks between layers, b) between bottlenecks, providing connections as shortcuts. Figure 2 below shows the structure of MobileNetV2.

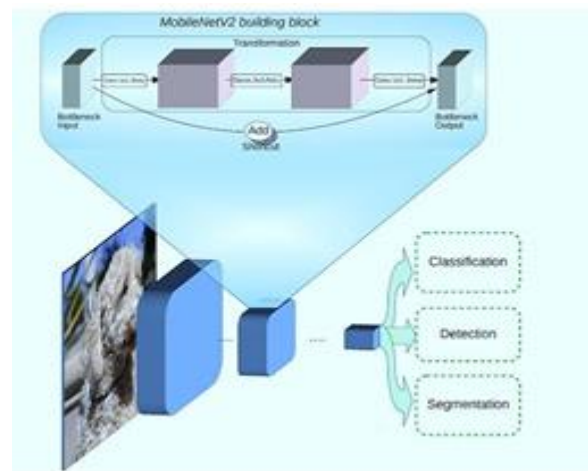


Figure 2. MobileNetV2 Architecture

**Face Mask Detector:-**

In mask training, we use a smaller data set, that is, extended data, as we have already mentioned here. Using PyTorch transformation, PIL and dataset, the original image is preprocessed first. The training file mask is shown in Figure 3.



Figure 3: Example for Training Set

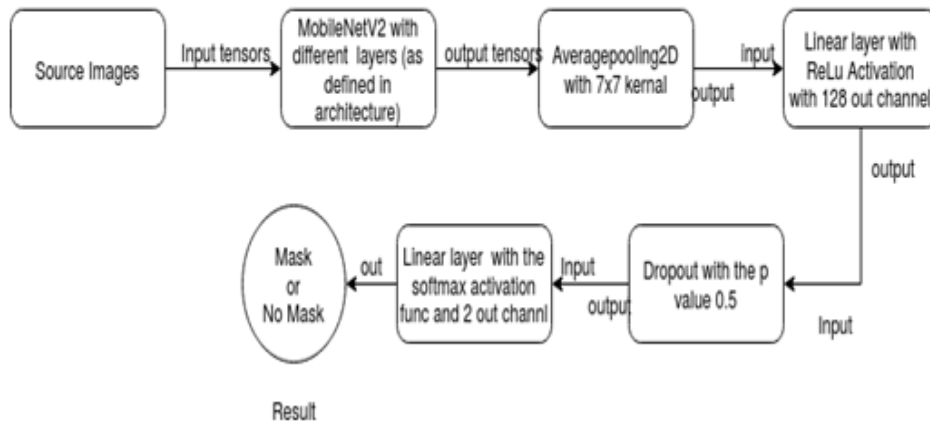
**Model Overwritten:-**

We use the MobileNetV2 development model to ensure that it can be deployed on any mobile device. These 4 fully connected layers are built on MobileNetV2, as 4 layers, they are consistent throughout the development process of the model shown in Figure 4. The layer is

1. typical Pooling layer with 7x7 weights
2. Linear layer with ReLu activation function
3. Dropout Layer
4. Linear layer with Softmax activation function using the total result of 2 values.

This level, the last Softmax level, provides the final result according to two categories: "mask" or "no mask".

**Final Network Model Architecture / Flow**



**Figure 4.** Final NetworkModel Architecture/Flow

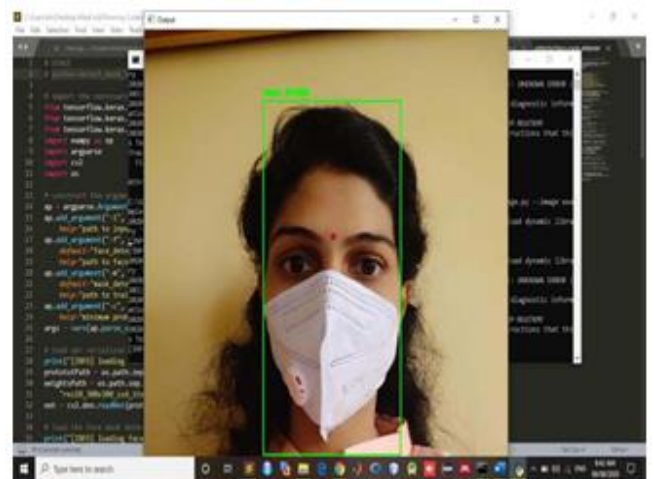
**V. RESULTS**

The accuracy is within the range of the proposed mask recognition method. The data set is divided into two data sets: training and validation. The following figure shows the accuracy of the image classification used for training and the verification rate. The training set here contains 4000 masked images and 3000 unmasked images, as shown in Figure 5.



**Fig 5:- Training vs Validation Accuracy**

Next, we show some embodiments related to the image mask detection in Figure 6, expressing the result of the video channel in Figure 7.



**Figure 6.** Mask recognition by image



**Figure 7.** Find live video masks

## VI. CONCLUSION

The COVID19 pandemic has brought various challenges to the global world, and the spread of this virus needs to be controlled because the virus has been infected and there are still millions of people in the world. The infected person should stop inhaling droplets when coughing or sneezing, and healthy people should wear a mask. So here we are going to introduce a way to use deep learning and use the MOBILENetV2 framework to run it. Combining Python PyTorch and OPENCV, the results show that the proposed model can detect masked or unmasked people based on the images in each movie stream, and the accuracy of comparison and detection verification and training is 80.28%.

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