



FACE MASK DETECTION USING AI

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Abstract—COVID-19 pandemic has rapidly affected our day- to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to available of their services. Therefore, face mask detection has become a crucial task to help global society. This paper presents a simplified approach to achieve this purpose using some basic Covid-19 Face Mask Detection with OpenCV Keras/ TensorFlow, Deep . if it has a mask on it or not. As a surveillance task performer, it can also detect a face along with a mask in motion. The method attains accuracy up to 95.77% and 94.58% respectively on two different datasets. We explore optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.

Keywords—Corona virus, Covid-19, Face Mask Detection, Convolutional Neural Network, TensorFlow

1. INTRODUCTION

.Covid was started in Wuhan, China toward the finish of 2019. From that point forward, it has been spreading out of control in a woods. Millions have been influenced and around 1,799,505[10] have sadly died as on 30th of December 2020, nearly 12 months since this infection came to presence. Individuals who have this sickness can require as long as about fourteen days to fix, with the danger of experiencing extra clinical issues brought about by it. Youngsters and elderly individuals have ended up being at the most elevated danger to get the sickness, which might even bring about death. Henceforth, it has been focused on to contain the infection than to fix it. The infection spreads through the air, sent by one individual to another by contact, yet additionally by talking and hacking. The worry was advanced to WHO(World Health Organization) which recommended that face covers and social removing is the response to it, until a fix is created. Putting a face cover on can decrease the danger of getting contaminated by an incredible degree, not exclusively to the one wearing it yet in addition to the others that he interacts with. Wearing veils each time we go out is something we can do with little exertion that can successfully save lives, and that is definitively why it is in such a lot of interest now of time.

In this paper, we propose a Face Mask Detection project that comprises of 2 stages, in particular preparing and sending. The primary stage distinguishes human countenances, while the subsequent stage utilizes profound figuring out how to right off the bat, recognize the ROI(Region Of Interest) being the individual's face and

also distinguish the appearances identified in the principal stage as either 'With Mask' or 'Without Mask'

2. BACKGROUND OF THE STUDY

Deep Learning

Deep learning strategies expect to learn include pecking orders with an undeniable level chain of importance which is organized by the development of lower-level provisions. Mechanized learning at numerous degrees of extraction permits a framework to learn complex errands to do enter planning straightforwardly from information to yield, without depending altogether on man-made elements. Profound learning calculations catch undefined design inside the info dispersion to discover better portrayal oftentimes at various levels, with undeniable level learning highlights with regards to low-even out highlights

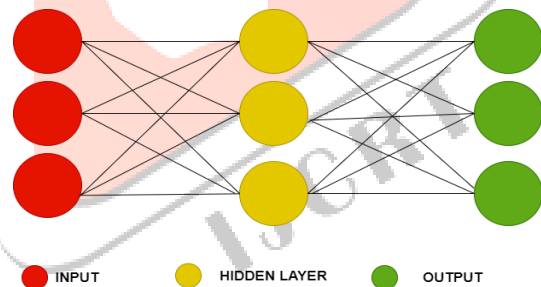


Fig. 1 – Deep Learning

OpenCV

OpenCV is a library which is use to foster PC based constant applications. It significantly centers around investigation including highlights like picture preparing, video

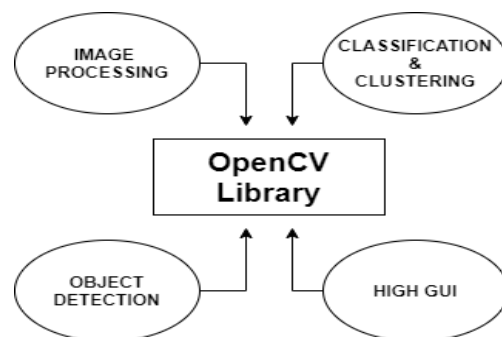


Fig-2- OpenCV

We utilize the OpenCV library to execute boundless circles utilizing our webcam, which recognizes faces utilizing course groupings. The library has more than 2000 upgraded and advance calculations for PC vision based AI. These calculations can be utilized for face discovery and acknowledgment, object identification, grouping human developments in video, following camera activities, following articles, taking 3D

objects, versatile thresholding and gathering into one spot to create high goal picture. It can likewise be helpful in discovering comparable pictures from the information base, expulsion of red eyes from photographs taken with streak, follow the facial developments, and add labels to progress with cutting edge reality. It is ceaselessly adding new modules to the most recent calculations from AI.

Tensorflow

Tensor Flow is an independent and open-source programming library for Dataflow for an assortment of assignments and a wide assortment of programming. It is additionally utilized for AI applications like the Symbolic Mathematics Library, and Neural Networks. TensorFlow is an extraordinary framework for dealing with all parts of an AI framework. Not with standing, this class centers around utilizing the novel Tensor Flow API to prepare and convey AI models. We utilized TensorFlow and Keras to prepare the classifier to naturally recognize if an individual is wearing a veil. Since reference execution runs on single gadgets, TensorFlow can runs on various Processing Units and GPUs having expansions in regards to general use.

Keras

Keras is an API for significant level neural systems administration. It follows best practices to decrease the significant weight and gives reliable and adaptable APIs that lessen the quantity of client activities needed for ordinary utilization circumstances and give clear and noteworthy blunder messages. It is written in Python programming language and has an enormous engineer local area and backing.

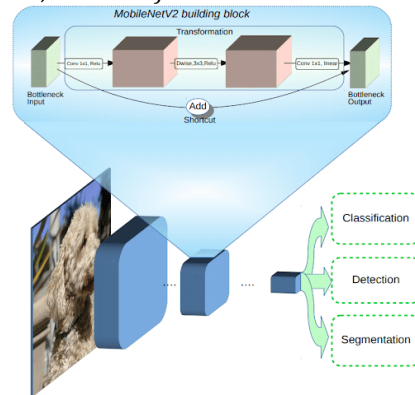
Keras incorporates a few executions of ordinarily utilized neural-network design, for example, facilitating gadgets to improve on the coding needed to compose layers, targets, analyzers, actuation assignments, and a concentrated neural organization. It make simple to work with picture and text information. The Keras models are effectively deployable among different stages.

MobileNet V2

MobileNet is a Convolution Neural Network engineering model for different unmitigated characterization and item identification work. This engineering is effectively executable on cell phones with a high pace of exactness when contrast with other light weighted CNN structures. Likewise, great for cell phones don't have GPUs and exceptionally inserted computational productivity. It is fundamentally quicker and precise on outcomes. It is

likewise appropriate for web or programs as the program has constraints on figuring, realistic preparing and capacity.

We have utilized the MobileNetV2 engineering, for it computational proficiency, making it simple to set up models for installed frameworks (Raspberry Pi, Google Corel, Jetson, Nano, and so on)

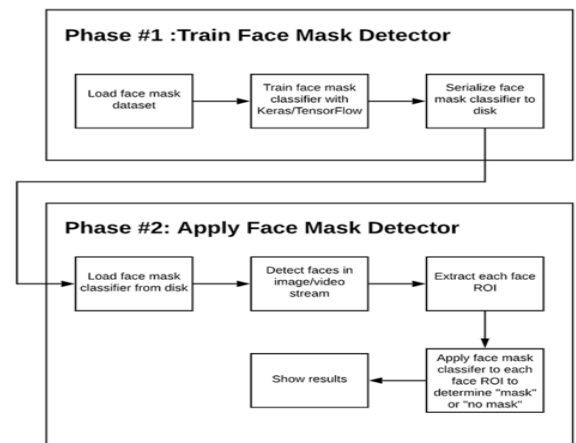


Overview of MobileNetV2 Architecture. Blue blocks represent composite convolutional building blocks as shown above.

Fig:3 MobileNet V2 architecture

3.METHODOLOGY

- In order to train a custom face mask detector, we need to break our project into two distinct phases, each with its own respective sub-steps (as shown by **Figure**)
- **Training:** Here we'll focus on loading our face mask detection dataset from disk, training a model (using Keras/TensorFlow) on this dataset, and then serializing the face mask detector to disk
- **Deployment:** Once the face mask detector is trained, we can then move on to loading the mask detector, performing face detection, and then classifying each face 1. with_mask 2. without_mask



4. Industrial used

The System is easy to operate and it can be used in crowded areas. it also ensures the compliance for wearing mask and the system provides accurate assessment of the individual in public areas weather the person is wearing a mask or not.

1. Manual Monitoring is very difficult for officers to check whether the peoples are wearing mask or not. So in our technique, We are using web cam to detect peoples

2. faces and to prevent from virus transmission.

3.It has fast and high accuracy This system can be implemented in ATMs, Banks etc

We can keep peoples safe from our technique.

4. It provides buzzer sound to wear mask

5. RESULTS

We have taken a total of 1,376 images in our Face Mask Detection Dataset belonging to two labels i.e. with mask: 690 images and without mask: 686 images

Fig 4: Some images of with mask dataset



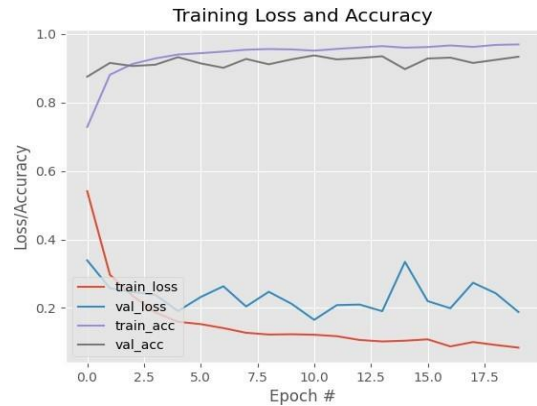
Fig 5: Some images of without mask dataset

Evaluation Table for trained model

	Precision	Recall	F1-Score	Support
With mask	0.99	0.93	0.94	134
Without mask	0.99	0.96	0.94	134

Accuracy			0.98	274
Macro Avg.	0.98	0.98	0.98	274
Weighted Avg	0.98	0.08	0.98	274

As we can see the accuracy obtained by our trained face mask detector model is ~98%.



6. CONCLUSIONS

We made a face cover finder utilizing Deep Learning, Keras, Tensorflow and OpenCV. We prepared it to recognize individuals wearing cover and individuals not wearing a veil. We have utilized MobileNet V2 classifier with the ADAM analyzer for the best outcome. The model is tried with photographs and continuous video transfers. It recognized the face from the pictures/recordings and concentrates every individual's face and apply the face veil classifier to it.

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