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# Covid-19 Face Mask Detection System

Ashwith Alban Fernandes[1] Anvesh Hegde[2], Shamshu[3], Ayusha[4], Veekshitha V Shetty[5], Mr.AshwinShenoy M[6]
*Deptof IS&E,YIT,Moodbidri Dept of IS&E,YIT,Moodbidri Mangalore,India*

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**ABSTRACT—** this paper gives instructions for authors preparing papers for publication in the IEEEconference. The authors must follow the instructions given in the document for the papers to be published. You can use this paper as both an instruction set and as a template into which you can type your own text.

**Keywords**— Machine Learning, Tensor Flow, OpenCV, Computer Vision, Deep Learning.

## I. INTRODUCTION

The importance of wearing face masks is rising due to the COVID- 19 corona virus in all over the world. Before Covid-19, People used to wear masks to protect their health from air pollution. In 2020, the rapid spreading of COVID-19 has forced the World Health Organization to declare COVID-19 as a global pandemic. More cases were infected by COVID-19 across many countries. Therefore we introduce a mask face detection model that is based on computer vision and deep learning. The proposed model have surveillance cameras to control the COVID-19 transmission by allowing the detection of people who are wearing masks not wearing face masks.

## II. LITERATURE SURVEY

A. COVID-19 FACE MASK DETECTION WITH COMPUTER VISION AND DEEP LEARNING.

In this system it introduces a mask face detection model that is based on and deep learning and computer vision. The proposed system have surveillance cameras to control the COVID-19 transmission by allowing the detection of people who are wearing masks not wearing face masks. The system is integration between deep learning and machine learning techniques with OpenCv, TensorFlow and Keras. The system uses deep learning for image extractions and combined it with machine learning algorithms. The prosposed work introduces comparison between them to find the most suitable algorithm that achieved the highest accuracy and consumed the least time in the process of training and detection.

B. Identifying facemask-wearing condition using image super resolution with classification network to prevent covid-19.

Our study presented a novel algorithm to identify facemask-wearing condition, which involved four main steps: Image pre-processing, facial detection and cropping, SR, and face mask wearing condition identification. The proposed work SRCNet with a refined SR network to improve system performance on low-quality images. The output indicate that, by using SR before classification, CNNs can get highest accuracy. This experiment shows that deep learning methods can be used to identify facemask-wearing conditions, thus having applications in prevention involving COVID-19. The study was mainly based on facial image datasets and the Masks Dataset.

## III. IMPROVEMENTS

Improvements in the activation functions and the density of skip connections and new network architecture are made for SR network in the proposed work. These innovations led to considerable performance gains in detail enhancement and image restoration, compared to previous state-of-the-art methods, as evaluated by PSNR and SSIM. The performance of the SR network was also visualized using images with different resolutions, where the proposed SR network restored more information and contributed to the identifying facemask wearing condition. For facemask-wearing condition, personidentification, the proposed SRCNet innovatively combined the SR network with a facial identification CNN for improvement of the performance. Image pre-processing was used in SRCNet for high performance, deleting the unrelated variables in images such as background, different cameras, exposures, and contrast. In addition, superior detection of the facial could be achieved with pre-processed images.

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## IV. SYSTEM REQUIREMENTS

System requirement specification also known as software requirement specification is a document or set of documentation that describes the features and behaviour of a system or software application.it includes a variety of element that attempts to define the intended functionality

A. Hardware Requirements

- Web Cam • Processor – 2.5GHz and above • RAM – 8GB and above • HDD 20 GB Hard Disk Space and above

B. Software Requiremnts

- PhyCharm 3.5.4 •TensorFlow 2.0 • KERAS • Open cv •PyTorch

1) Approach:

1. Train Deep learning model. 2. Apply mask detector over live video stream.

2) Data at Source:

The majority of the images are augmented by OpenCV. The set of images are already labelled “mask” and “no mask”. The images that present can be of different sizes and resolutions, may be extracted from different sources or from machines (cameras) of different resolutions.

3) Data Pre-processing:

Pre-processing steps as mentioned below was applied to all the input images to convert them into clean versions, which could be fed to a neural network machine learning model.

1. Resizing the input image.
2. Applying the colour filtering (RGB).
3. Scaling or normalizing images with the standard mean of PyTorch build in weights
4. Centre cropping the image with the specified pixel value.
5. Finally converting them into tensors.

## V. METHODOLOGY

In this proposed system will detect the face on image or video streaming using deep learning and computer vision, most of the images are augmented by openCv. First resize the image and then use RGB filters and centre cropping the images finally converting them into tensors. The proposed system shows how to identify the person on video stream wearing face mask with the help of computer vision and deep learning algorithm by using the OpenCV, Tensor flow, Keras and PyTorch library.

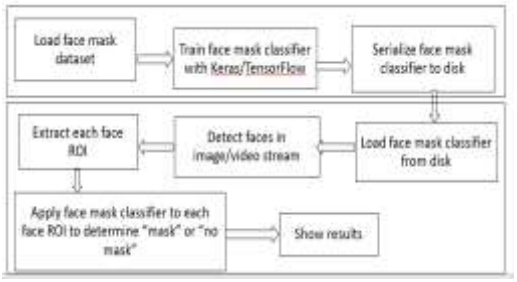


Fig. 1 Flow

A. Machine Learning

Machine learning is the study of computer algorithms that improve machines automatically to work. It is a subset of artificial intelligence. Machine learning algorithms build a mathematical model based on training data, in order to make decisions or predictions. Machine learning algorithms are used in a many applications, such as email filtering and computer vision, where it is difficult to develop conventional algorithms to perform the needed tasks. Machine learning is closely related to computational statistics, which focuses on making decisions using computers. The mathematical optimization gives methods, theory and application domains to the field of machine learning. Data mining is a related field of study, focusing on exploratory data analysis through unsupervised learning. Because of application across business problems, machine learning is also referred to as predictive analytics. Fig 2.


Fig. 2Training model

Fig. 2 Deep learning methods focuses on learning feature hierarchies with features from higher levels of the hierarchy which is developed by the composition of lower level features. Learning features at multiple levels of abstraction allow a system to learn complex functions mapping the input to the output directly from data, without depending completely on human-crafted features. Deep learning algorithms seek to delete the

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unknown structure in the input distribution in order to discover good representations, at multiple levels, with higher-level learned features defined in terms of lower-level features.

B. Computer Vision

Computer vision is a field of science that deals with how computers can gain high-level knowledge from digital images or videos. It seeks to understand and automate tasks similar to that the human visual system can do, Computer vision tasks include methods for acquiring, processing,and understanding, analyzing digital images, andextraction of high dimensional data from the real world in order to produce numerical or symbolic information. e.g. in the forms of decisions, Understanding in this context means the transformation of visual images into descriptions of the world that make sense to thought processes and can elicit appropriate action. This image understanding can be seen as the disentangling of symbolic information from image data using models constructed with the aid of geometry, physics, statistics, and learning theory.

C. Neural Networks

It is inspired by the visual system's structure, and in particular by the models. The first computational models based on these local connectivities between neurons and on hierarchically organized transformations of the image are found in Neocognitron which describes that when neurons with the same parameters are applied on patches of the previous layer at different locations, a form of translational invariance is acquired.


Fig. 2 Result

## VI. CONCLUSIONS

As the technology are developing with new trends the availability increases so we have face mask detector which can contribute to public healthcare. The architecture have MobileNet so it can be used for high and low computation scenarios. In order to extract more features, we utilize transfer learning to adopt weights from a similar task face detection, which is trained on a very large dataset. In this prosposed system it uses PyTorch,OpenCV, TensorFlow, keras,and CNN to detect whether people were wearing face masks or not. The models were tested withdifferent images andvideo streams. The accuracy of the model is achieved and, the optimization of the model is a continuous process and building a highly accurate solution by tuning the hyper parameters.

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