IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# Mask Detection Using Deep Learning (CNN)

Radha Gandhi[1]
Lecturer, Department of computer Engineering, Parul Polytechnic Institute, Vadodara, Gujarat, India

Chandni Shah[2]
Lecturer, Department of computer Engineering, Parul Polytechnic Institute, Vadodara, Gujarat, India

Nidhi Soni[3]
Lecturer, Department of computer Engineering, Parul Polytechnic Institute, Vadodara, Gujarat, India

**Abstract: COVID-19 has severely affected the globe. According to the World Health Organization (WHO), the major form of safety for people is wearing masks in public spaces or congested areas. This paper provides a two-class classification model for face mask identification, such as "mask detected" and "no mask detected". We got an accuracy of 98.89 percent using deep learning. With static images and even with a live video stream, the model will work. It is also possible to provide mass screening and can also be used in congested or crowded areas such as stores, malls, colleges, etc.**

**Keywords: COVID-19, mask-detection, deep learning**

## 1. INTRODUCTION

It is suspected that the COVID-19 originated, from bats in Wuhan, China on November 17, 2019, and spread in no time from one nation to another. The signs of COVID-19 include fever, tiredness, dry cough, anosmia, sore throat, headache, etc. Its arrival has halted the planet because of its severity and adverse impact on humanity. It takes a fortnight for a person with moderate symptoms to recover. The treatment time for those with serious symptoms depends on the severity of the illness. A person should remain quarantined or self-isolated if infected by COVID-19.

The practice of wearing face masks in public is increasing as a result of this pandemic, since wearing a mask in public will minimize the spread of the virus. Through doing so, an entity maintains his or her protection, the protection of another human, and thereby helps to minimize the spread of the disease. The World Health Organization (WHO) has recommended the use of face masks to limit the transmission of the infection.

Our mask detector model is designed to detect whether or not a human is wearing a mask. Also, poorly worn mask observed. The outcomes are checked using a live video stream or when the image has been passed as an input to the mask detector as shown in fig1.

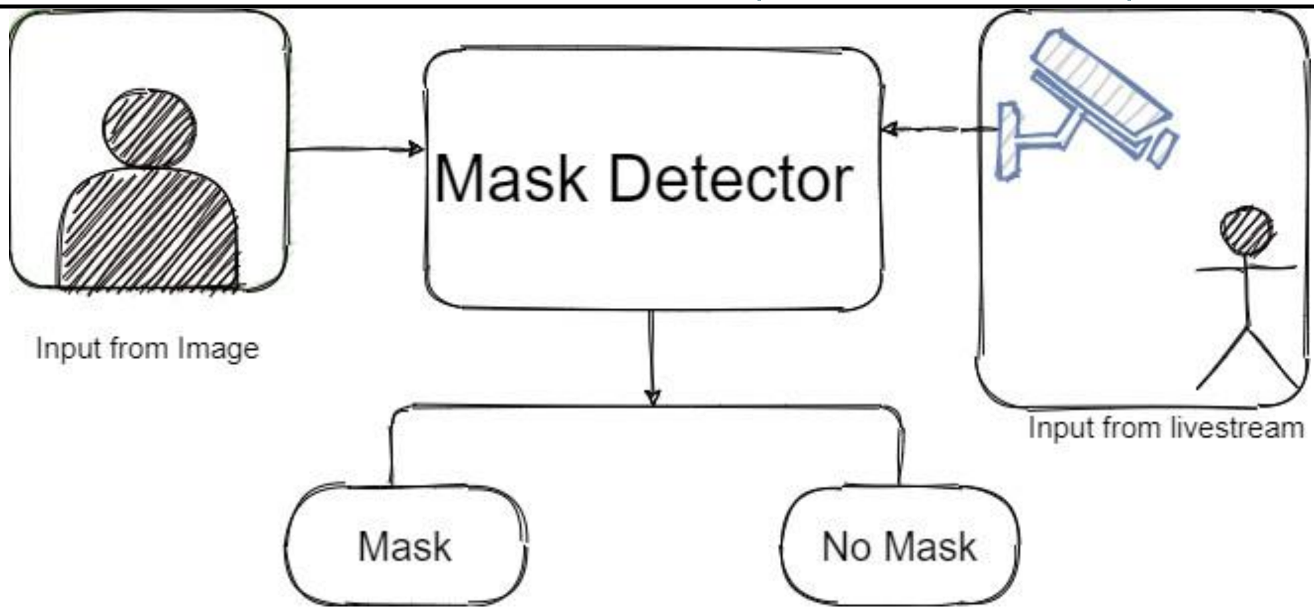


**Fig-1:** Live video stream and the image is given as input to the model and as with a "Mask" and "NoMask", the recognition of an image takes place

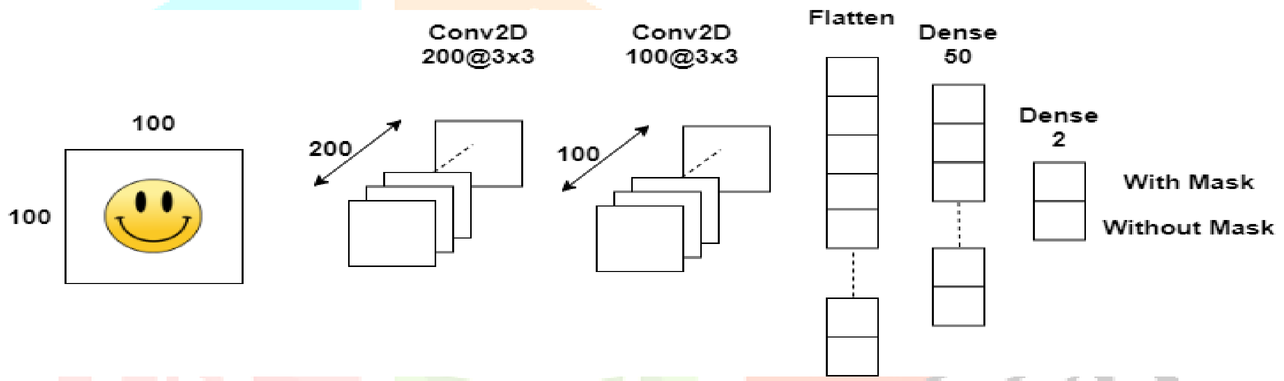


**Fig-2: CNN architecture of mask detection model**

The data is then categorized as with a mask and without a mask. Mass scanning is possible and can also be used in a busy area such as bus stations, markets, highways, shopping centers, schools, universities, etc by tracking the location of the face mask on the face, we will make sure that the human wears it in the correct way which helps to minimize the risk of the virus.

## 2. DATA PREPROCESSING

The data set comprises, images of various sizes, colors, different orientations. So, in pre-processing of data, all images in the dataset are transformed to grayscale, since color images are not that critical feature for mask detection. Since all images have different sizes so we resize all images to

100 x 100 as shown in fig-3, before 1 $N$

$l(\hat{y}y) = -\frac{1}{N}\sum_i [y_i \log\hat{y} + (1 - y_i)\log(1 - \hat{y})]$

applying them to the CNN neural network as shown in fig-2.

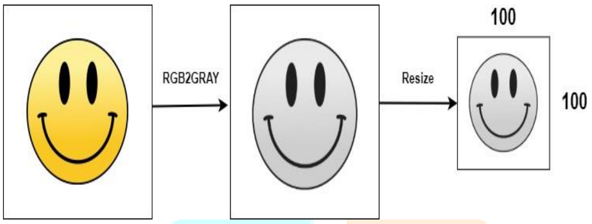


**Fig-3:** Pre-processing of images of dataset

## 3. METHODOLOGY

Fig-2 displays the neural network architecture of the proposed mask detector model. The architecture has two convolutional layers, the first layer contains 200@3x3 kernels and the second layer contains 100@3x3 kernels, each convolutional layer is followed by Relu function and pooling layer of size 2x2. After having convolution from the second layer, we flatten the convolution in the next layer and the flattened layer is connected to the dense layer of 50 neurons and the output layer has 2 neurons and also add dropout layer after flattening layer to avoid overfitting. And we use “catergoical_crossentropy” as loss function since we have two categories “MASK” and “NO MASK”. Total 20 epochs are trained and we save the best model for each epoch. So, if validation

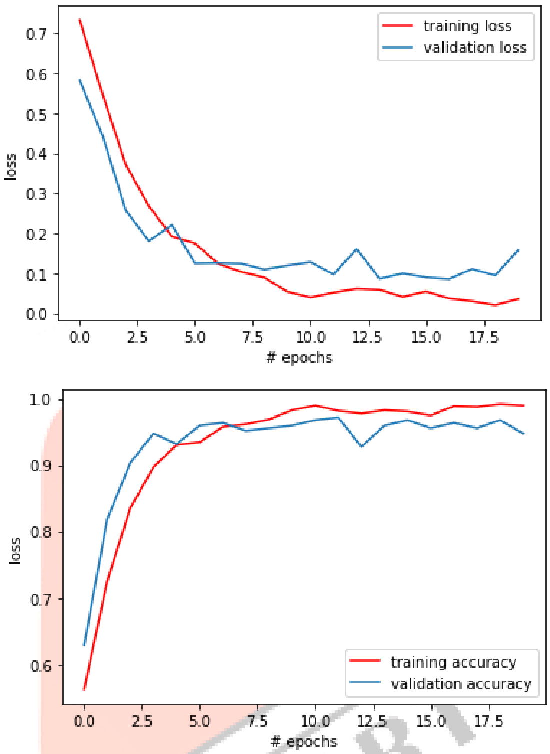


**Fig-4:** Graph of training and validation loss gets increased after epoch it will not be saved.

To detect faces and extract ROI (Region of Interest) here, we use the "haar-cascade frontalface.xml" cascade classifier as shown in fig-4

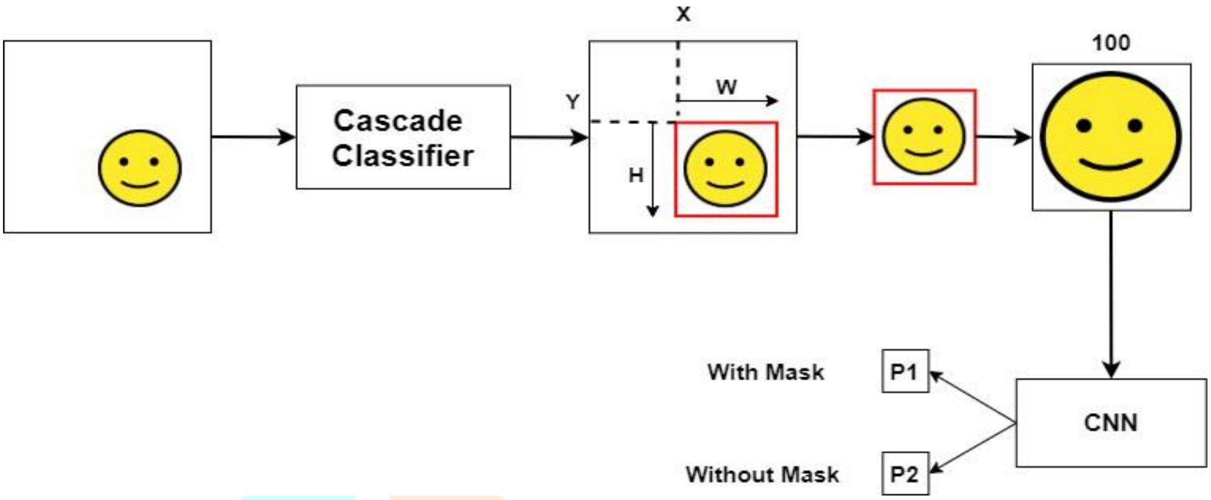


**Fig-4: Extracting ROI and classify images.**

## 4. RESULTS


**Fig-5:** Result of mask detector

## 5. CONCLUSION

COVID-19 has severely affected the globe. According to the World Health Organization (WHO), the major form of safety for people is wearing masks in public spaces or congested areas. In this paper, we have proposed a deep learning mask detector model, which can be used by the government or public healthcare. The architecture of mask detector consists of CNN (Convolutional Neural Network). We got an accuracy of 98.8%. This model then applied to images and live video stream and the required results are achieved.

Mass scanning is possible and can also be used in a busy area such as bus stations, markets, highways, shopping centers, schools, universities, etc. By tracking the location of the face mask on the face, we will make sure that the human wears it in the correct way which helps to minimize the risk of the virus.

## 6. REFERENCES

1. B. QIN, D. LI, Identifying facemask-wearing condition using image super-resolution with classification network to prevent covid-19 (2020)

2. M. Inamdar and N. Mehendale, Real-time face mask identification using Facemasknet deep learning network.

3. Mohamed Loey, G. Manogaran b, c, Mohamed Hamed N. Taha and Nour Eldeen M. Khalifa, A hybrid deep transfer learning model with machine learning methods for face mask detection in the era ofthe COVID-19 pandemic.

4. M. Jiang, X. Fan, Retinamask: A face mask detector, arXiv preprint arXiv:2005.03950 (2020)

5. W. Liu, Z. Wang, X. Liu, N. Zeng, Y. Liu, F.E.Alsaadi, A survey of deep neural network architectures and their applications, Neurocomputing 234, 11 (2017)

6. S. Feng, C. Shen, N. Xia, W. Song, M. Fan, and B. J. Cowling, "Rational use of face masks in the covid-19pandemic," The Lancet Respiratory Medicine, 2020.

S. Feng, C. Shen, N. Xia, W. Song, M. Fan, and B. J. Cowling, "Rational use of face masks in the covid-19pandemic," The Lancet Respiratory Medicine, 2020.

7. T. Dasun, Face Mask detection using CNN

8. D. Chiang., "Detect faces and determine whether people are wearing mask," https://github.com/AIZOOTech/FaceMaskDetection, 2020

9. P. Bhandary , Dataset for mask detection. https://github.com/prajnasb/observations,

10. Information Retrieved from https://www.piedmont.org/pulmonology/conditions - diseases/acute-respiratory-failure