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# Covid-19 Face Mask Detection using Image Processing

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**Abstract:** *In this paper we are detecting people's face if they are wearing face mask or not by using Face mask detection method which is very efficient and simple. First we do feature extraction followed by a supervised learning. The features are formed of color information by considering red, green and blue channels for an RGB color image. Ratio of color channels is considered to differentiate between mask and non-mask images. This method is tested on set of 1211 facial images which is extracted from group of people wearing a mask and people who are not wearing mask, by a 2-class problem , in where mask class is represented by positive examples whereas people not wearing a mask are negative examples. Some part of image dataset is used for training support vector machines for learning discriminant features of each class, followed by a prediction for each test sample. The image set has different types of images i.e, it varies from simple and common colored masks to challenging complex patterned masks. Success rate of this method is 97.25 using cross validation approach.*

**Keywords:** Mask detection, COVID - 19, color information, support vector machines, CNN.

## I. INTRODUCTION

### 1.1 What is COVID-19?

Coronavirus disease, i.e., COVID-19, is an infectious disease which is caused by the SARS-CoV-2 virus in December 2019. People infected with mild symptoms like colds, coughs, fevers, and headaches get recovered with basic medical care. Meanwhile, people having difficulty breathing, joint pains, or high temperatures need special treatment. Aged people and people with medical conditions like high blood pressure, diabetes, cardiovascular problems, and chronic respiratory diseases are at high risk when infected with this virus. To prevent and slow down transmission of this virus, the best we can do is to follow guidelines provided by WHO, which are wearing masks, following social distancing and sanitizing. A vaccine is now available to prevent this virus, so get vaccinated and stay safe.

### 1.2 Vaccination in India

Vaccines available are Covaxin, Covishield, and Sputnik. The total doses given in India are 187 crore. Fully vaccinated in India are 84.8 crores, which is 61.4% of India's

| No | Title | Author | Description |
|---|---|---|---|
| 1 | IoT and Deep Learning Based Approach for Rapid Screening and Face Mask Detection for Infection Spread Control of COVID-19. | Shabir Hussain ,Yang Yu Muhammad Ayoub Akmal Khan | The spread of coronavirus was a pandemic and spread over 200 countries. The extra use of the self-purifying system It has also become a source of infection. That's why this paper aims to design and develop a low-cost, rapid, and effective virus spread control and screening system to minimize the risk of COVID-19. |
| 2 | Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV | Arjya Das, Mohammad Wasif Ansari, Rohini Basa | This paper provides a simplified approach to achieve this purpose using some basic machine learning packages like TensorFlow, Keras, OpenCV, and Scikit-Learn. This algorithm detects faces from the image and identifies if they have a mask on them or not. |

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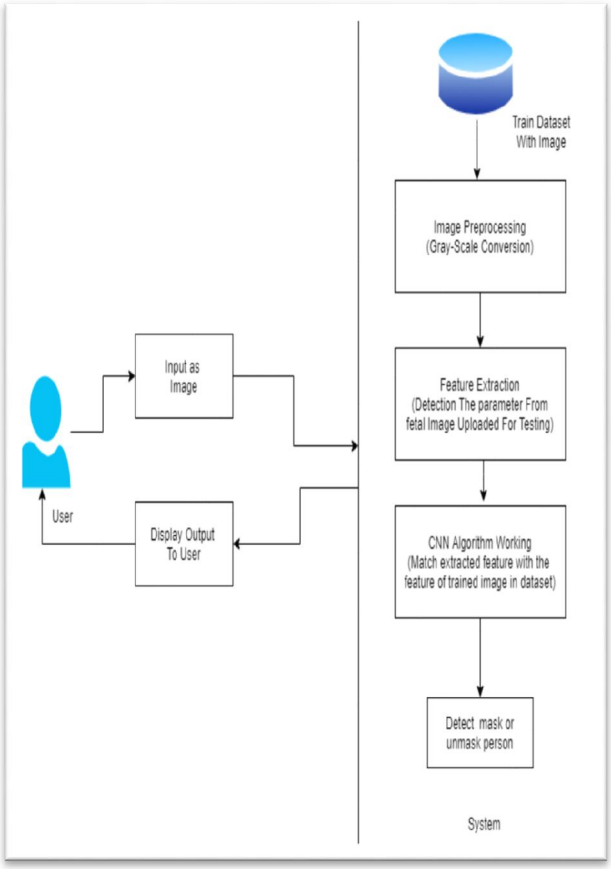
| 3 | COVID-19 Face Mask Detection | Parul Maurya, Sejal Nayak, Samarth Vijayvargiya,Megha Patidar | This paper provides a simplified approach to achieve this purpose using some basic machine learning packages like TensorFlow, Keras, OpenCV, and Scikit-Learn. This algorithm detects faces from the image and identifies if they have a mask on them or not. |
| 4 | Application Development for Mask Detection and Social Distancing Violation Detection using Convolutional Neural Networks" | Gokul Sudheesh Kumar and Sujala D. Shetty | This project aims to detect face masks and social distancing using machine learning and object detection based on a video feed. It uses TensorFlow and Keras to build a CNN model to detect face masks, and it was trained on a dataset of 3800 images. The object detection method used here is YOLO to detect people in a frame, and social distancing is calculated using the Euclidean distance between the centroids of the detected boxes. |

## II. System Architecture




In this paper, we proposed the above system architecture. To access our portal, first the system needs to be setup at the location. The owner who is setting up the system must register on our portal. After successfully registering on the portal, the credentials are stored in a database that is hosted on a database browser. If the credentials of the user are matched during login, they will be redirected to the home page as logged-in users. Also, if credentials do not match with our database, the user will get an invalid popup.

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After successfully logging in, the camera will open and begin detecting. Messages will be displayed in the image. according to detection whether the person is wearing a mask or not. The message is "mask: (percentage accuracy)" or "no mask: (percentage accuracy)".

## III. CNN ALGORITHM

The CNN algorithm we proposed for this project is the CNN algorithm. This algorithm is taken into consideration because it gives a more accurate result. In deep learning, a convolutional neural network (CNN) is a neural network used to analyse images. When we hear about neural networks, we think it's all about matrix multiplication, but in CNN that's not the case. CNN works with a special technique called convolution. According to mathematics, convolution is an operation on two functions that gives us a third output function. But we don't need to go that deep to understand CNN.

A convolutional neural network is a multiple-layer of artificial neurons. When an image is passed through CNN, each layer generates activation functions that are passed to the next layer. In short, when an image is captured, its features are in multiple layers. In CNN, we extract the features and compress the multiple-layered data. After the convolutional layer, we have the pooling layer. Similar to convolution, pooling reduces the spatial size. Pooling decreases the computational power by reducing the dimensions. An image goes through these two layers repeatedly until we get a particular matrix form of image where no more compression can be performed.

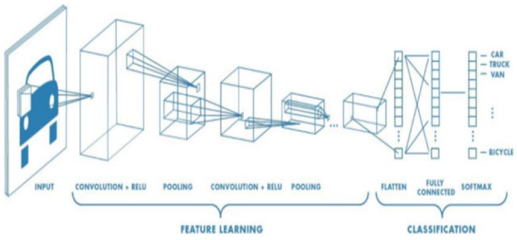


**Figure 2:** CNN Algorithm

## IV. CONCLUSION

In this paper, the CNN algorithm is used for image processing. As it is a Mask R-CNN based model, the detection results achieve better edge enhancement. Better detection results can be obtained by the additional inclusion of the edge detection results. It provides an idea for the application of object detection with prominent texture features, thus proving that, under the condition of limited training samples, the combination of traditional methods and deep learning methods can often achieve better detection performance.

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