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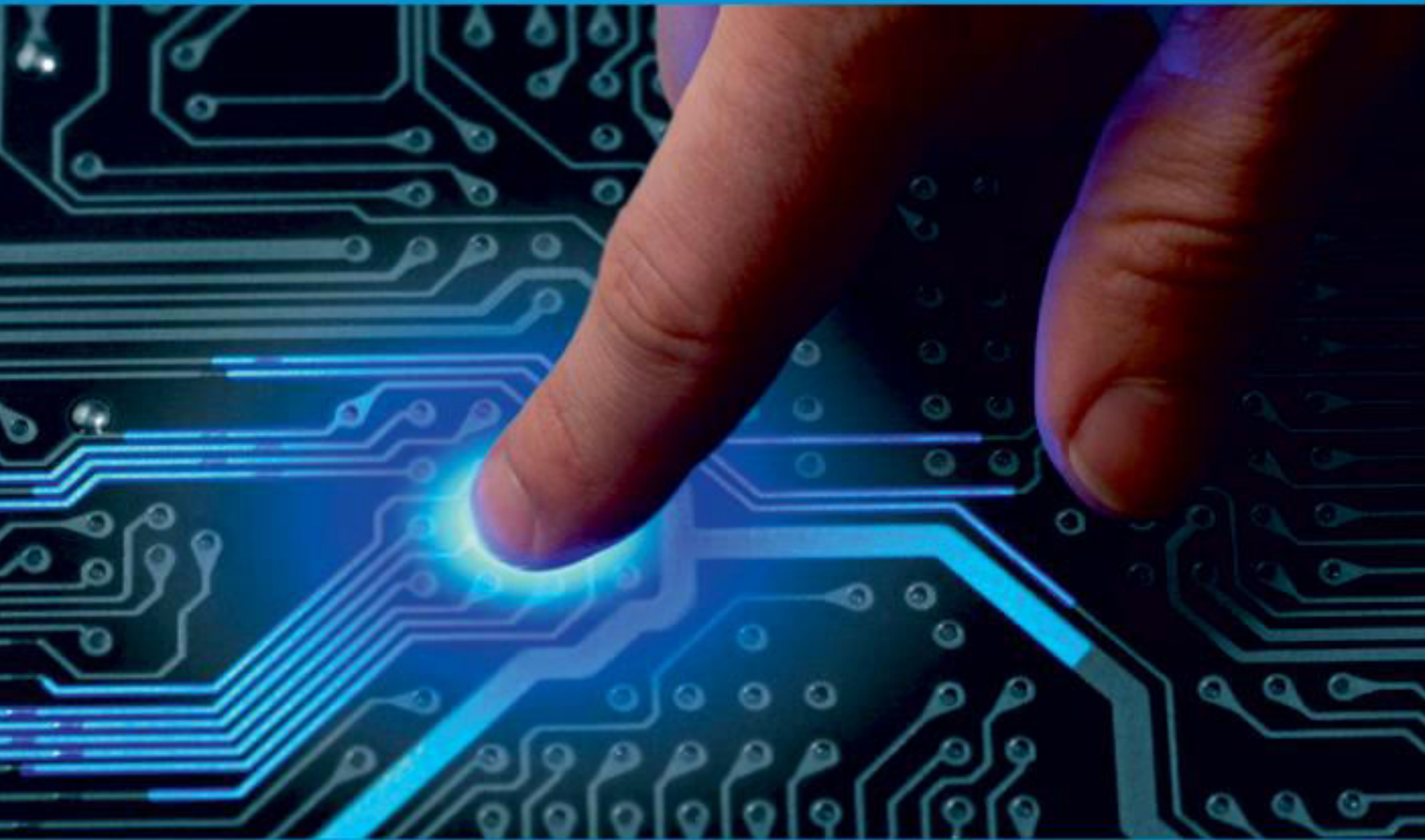

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# Face Mask Detection using Machine Learning Classifiers

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**ABSTRACT:** Coronavirus (COVID-19) has affected the lives of people around the world. To prevent the spread of COVID-19, the World Health Organization recommends that people wear masks in public places. Examining a book of people wearing masks in public places is a difficult task. In addition, the use of facial shields affects the facial recognition process, which is usually designed for the naked face. It is necessary to act quickly to improve physical fitness that can catch people who do not wear masks and identify different people when they wear masks. In this research work, we have created a new face to see system. We will discuss two-stage masks, explaining how to use a computer vision / deep learning. From there, we will analyze the data that we will use to train the mask program. Use will be achieved on Python to train the mask of files using Keras and TensorFlow..

**KEYWORDS**: Covid-19, Machine Learning, Deep Leaning, ROI, Face Mask Detector

## I. INTRODUCTION

Given the current COVID-19 pandemic, it is essential to enable contactless and smooth running operations, especially in contact sensitive facilities like airports. Face recognition have been been praised as such an accurate and contactless mean of verifying identities. Wearing masks is essential to prevent the spread of contagious diseases and have been currently forced in public places in many countries. However, the performance, and thus the trust, of contactless identity verification through face recognition can be affected by wearing a mask.

As part of the coronavirus (COVID-19) epidemic, the World Health Organization (WHO) has recommended that countries make their citizens wear masks in the area. public. Before COVID-19, only a few people used masks to protect their health from bad weather, and doctors used masks while on the job. in the hospital. With the rapid spread of COVID-19, the World Health Organization has declared it a pandemic worldwide. According to the World Health Organization [1], the number of cases worldwide has risen to 22 million. Most good things happen in crowded and overcrowded areas. Therefore, scientists have suggested that wearing masks in public places can prevent the spread of infection [2].

Machine learning (ML) and deep learning (DL) techniques of artificial intelligence (AI) are used in a variety of ways for prevention of transmission for COVID-19 [3]. Deep learning and machine learning procedures can be used for the prediction of transmission for COVID-19 and help develop early prognosis procedures that can help monitor further transmission. For predicting and diagnosing complex viruses, new technologies such as Internet of Things (IoT), intelligence, big data, deep learning and machine learning have been used to quickly test COVID-19 [4,5,6,7,8].

The main purpose of this research paper is to improve the machine learning model to screen non-wearers. The prototype uses several machine learning algorithms to find the people without wearing mask in public places by integrating them with surveillance cameras. Image augmentation techniques are used to enrich the diversity of training materials to improve the performance of the prototype. The research paper is divided into 6 segments as follows. Segment 2 discussed about related work. Segment 3 discussed the analysis of dataset. Segment 4 describes the proposed model. Segment 5 describes the results of proposed model and Segment 6 describes the conclusion.

## II. RELATED WORK

In the meantime, in-depth studies have been successful in product research and acceptance in a wide range of applications [9, 10]. In general, most of the work focuses on the development of face recognition system. The aim of this research paper is to find people without wearing mask in public places to control the further spread of COVID-19 disease.

Rodriguez et al. [11] Requested a system to detect the presence of facial surgery required in the office. The purpose of the system is to provide an alert when the state is not wearing a mask. The system has obtained 95% accuracy.

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Bosheng Qin and Dongxiao Li [12] developed a way of recognizing masks using the SRCNet distribution network, which divided the image into three categories: wearing the wrong mask, wearing the wrong mask correct, and do not wear a mask, with an accuracy of 98.7%.

Hussain and Balushi [13] used the VGG16 architecture to identify and classify facelifts. Their model VGG16 was studied in the database and obtained accuracy of 88%.

Md. Sabir Ejaz et al. [14] applied the Superintendent Research (PCA) algorithm for face and face masks. It is worth noting that PCA is effective in recognizing face without masks with an accuracy of 96.25%, but the accuracy drops to 68.75% when seeing face to face.

Li et al. [15] describe YOLOv3 technique for finding the face which does not wear the mask. Author used deep network architecture using WIDER FACE. FDDB database was analyzed using darknet-19 method and obtained accuracy of 93.9%.

In a similar study, Nizam et al. [16] Introduced GAN-based network architecture for mask removal and redevelopment of masked areas.

Javed et al. [17] proposed MRGAN an interactive model which removes devices such as microphones from facial images and reconstructs the removal area using a generative adversarial network.

In a similar facial recognition application, Park et al. [18] has devised a way to remove contact lenses from the human face and re-establish removable areas using the money recovery.

From the above, it is clear that, especially for face detection, the number of studies reported so far is very small, and the process that already needs further improvement. Thus, in order to further develop the mask in the COVID-19 challenge, a change in learning-based approach, using the V3 training model.

## III. Dataset Analysis

This dataset was taken from the class students and teachers. The images used in the data sets are categorized in two classes:

- With Mask
: 190
- Without Mask
: 186

Sample of images are illustrated in Fig. 1.

Fig. 1: A Preview of Dataset.

## IV. Proposed Methodology

It is evident from the data explaining that large standards are restricted due to federal laws regarding personal safety and privacy. And machine learning standards are difficult to learn when the number of standards is limited. Thus, oversampling may be the key to solving the challenge of limited data. Therefore, the plan is divided into two stages. The structure of the detection mask is divided into two different stages, each with steps as shown in Fig. 2.

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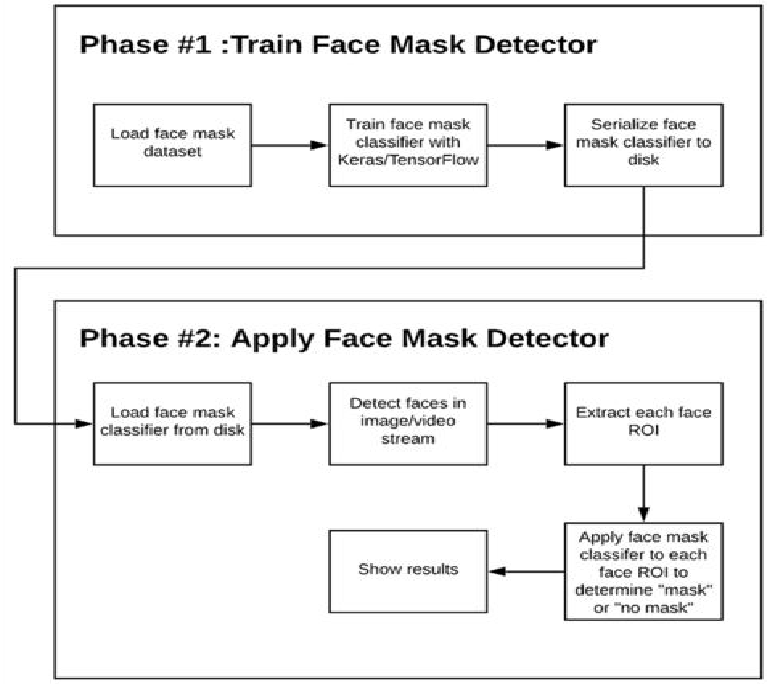


Fig. 2: Steps involved in two phases face masks detector.

## V. RESULTS

After finding the image of face we calculate face reason of interest.

- finding of eye region and eye-brow region
- finding of eye-brow region
- finding of mouth region
- finding of nose region

Fig. 3: Evaluating of ROI of face.

After finding the ROI we use facial landmarks to find the eyes, eye-brow, mouth and nose as shown in Fig. 4.

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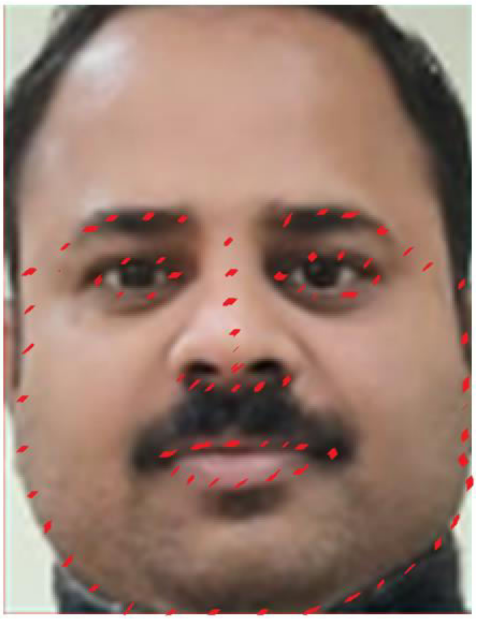

Fig. 4: Finding facial landmark.

Now we take image of mask as shown in Fig. 5.

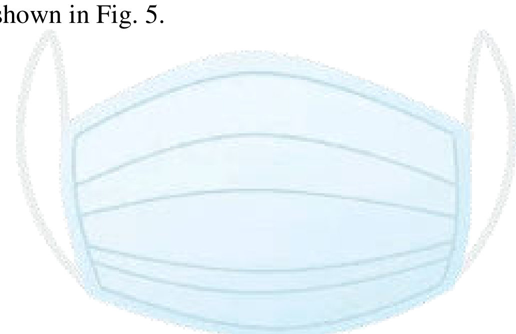

Fig. 5: Face mask.

This facial recognition knows the geographical area of the face, so it automatically overlays the ROI of the original face. This mask has been applied to face using facial areas (i.e., points along the chin and nose) to calculate where mask will be applied. Then change the mask, turn it on and put it on your face:

Fig. 6: Original image with face mask.

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We can't tell only by seeing that face masks are used artificially on images. we can repeat this process for every image entry, so you can create a masking profile.

This process becomes part of the "masked" "unmasked" data for facing computer vision and machine learning. If you use graphic design to create a fake image of the wearer, you cannot "reuse" the image unmask in training. We need to print an un-faced mask image that is not used in the artifact generation process.

Inclusion of old images used to create mask designs based on non-face masks makes the design inaccurate and inefficient. To absolutely avoid it by taking the time to write a new faceless face design. The next step is to train face mask detector system.

Now we train face mask detector system by applying the use of python language. The results shown in table 1 were obtained after training the face mask detector system.

Table. 1: Results obtained from training data set

| | precision | recall | f1-score | support |
|---|---|---|---|---|
| with_mask | 0.99 | 1.00 | 0.99 | 138 |
| without_mask | 1.00 | 0.99 | 0.99 | 138 |
| accuracy | | | 0.99 | 276 |
| Macro avg | 0.99 | 0.99 | 0.99 | 276 |
| weighted avg | 0.99 | 0.99 | 0.99 | 276 |

Fig. 7 shows the accuracy of mask and without mask.

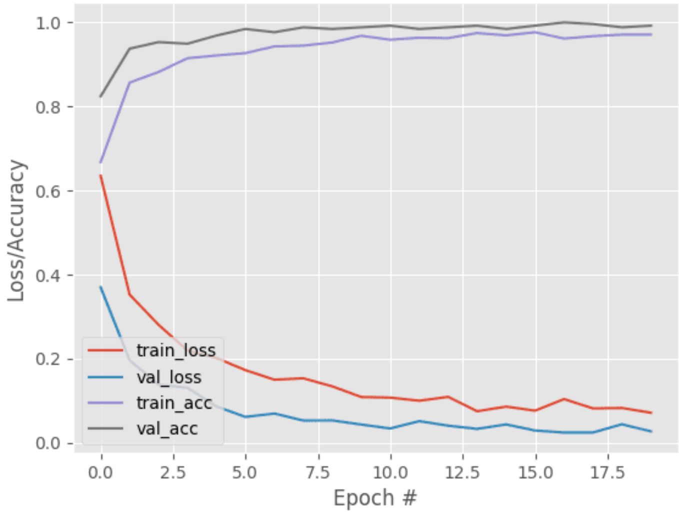


Fig. 7: Graphical representation of loss and accuracy.

## VI. CONCLUSION AND FUTURE WORK

The world is facing serious health problems due to the worldwide spread of COVID-19. Governments of various countries are implementing lockdown, night curfew, home isolation etc. to prevent the spreading of this COVID-19 disease. The number of patients due to COVID-19 disease after statistical analysis it was found that more COVID-19 cases are found in densely populated areas and to prevent the spread of COVID-19 mask is necessary. That is why governments all over the world are demanding that masks be worn in public places and in crowded places. It is very difficult to take care of the crowds in these places. Therefore, in this paper, we prepare a machine learning model that will catch people who are not wearing masks. This proposed technology training model is designed to implement a data mining process. In this work, image augmentation techniques are used to improve performance models as they diversify the training data. The model changes are intended to be 99% accurate and unique, 99% during training, 99%, 99% during dataset testing. The same process can be further improved through the use of multiple data sets, and can

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also be extended to the distribution of face types and the use of face recognition, referred to multiple agencies to support identify people when wearing a face mask.

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