# Face Mask Detection and Face Recognition using Machine Learning

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**Abstract -** This Research establishes a „Safety system for mask detection during this COVID-19 pandemic". Face mask detection has seen an overwhelming growth in the realm of Computer vision and deep learning, since the unprecedented COVID-19 global pandemic that has mandated wearing masks in public places. To tackle the situation, We have come up with system which uses several algorithms and techniques to identify unmasked individuals using various mask detection models and such peoples will be charged by fines for violating rules. The proposed approach in this project adopts frameworks of deep learning, TensorFlow, Keras, and OpenCV libraries to detect face masks in real-time. To detect masks, initially, the model is trained using the Multi- Task Cascade Convolutional Neural Network (MTCNN) algorithm with the database of faces provided. The face is first detected using OpenCV (Open-Source Computer Vision) and those image frames are stored and passed to the mask detection classifier for classification. For facial detection, the Viola-Jones algorithm is used which is also known as the Haar Cascade algorithm..

***Key Words***: Mask Detection, face recognition, CNN, machine learning, Tensorflow, OpenCV, Python, etc.

## 1.INTRODUCTION

In the today"s scenario, where the whole world has been under lockdown for more than period of 1 and half year due to the worldwide spread of deadly COVID-19 virus. All the institute and organizations (Educational as well as Corporates) have been working remotely for this whole period from safety of their home. The only weapon we had against this virus was Hand-Sanitizers and Mask using these we have survived through these time. Now as the Antivirus Vaccines have been produced we can see decrease in number of infectants gradually and also the peoples have started to come into the organizations physically. But still we know that even after taking shots of vaccine it is mandatory to follow the Covid norms of social distancing and wearing of masks. The organizations have these responsibility to check whether the employees or students in case of educational organization are following these rules while entering into the premises of organization. Manually checking whether the person is wearing mask or not is a hectic task and require a manpower.

Here comes the use of our system of face mask detection and imposing fine on the person whoever will violate the rules of proper mask wearing. Such system can be installed on the entrance of the gate of the organization. Computer vision is one of the emerging frameworks in the field of object detection and is widely being used in various aspects of research in artificial intelligence. There have been both supervised and unsupervised approaches of machine learning in the past for object detection in an image. An enhanced supervised machine learning technique of object detection has been deployed in this project. In order to detect masks, initially a model is trained using CNN algorithms with datasets of faces provided. Face mask is first detected using openCV (Open-Source Computer Vision) and those image frames are stored and passed to mask detection classifier for classification. For facial detection, Viola Jones algorithm is used which is also known as Haar-Cascade algorithm. We have used a mask classifier model to differentiate faces with masks and without masks. If a person without mask is detected its face is recognized using face-recognition models and compared with existing database and corresponding fine is imposed on that person.

## 2. Proposed System

In the proposed system we are going to build a Face Recognition and Face-Mask detection ML model integrated with UI. detected without a mask, the name/id of that person is identified using face recognition and a corresponding fine will be charged towards that person by concerned authority. Using suitable UI the information of registered user and their corresponding fine can be seen. This data will help to control the misbehaviour"s of people regarding wearing of mask. The system is divided into following parts:

i. Face Mask Detection
ii. Face Recognition
iii. Fine Calculation
iv. Graphical User Interface (GUI)

The System consists of various steps that are Image Capture, Face Mask Detection, Face Recognition, Comparison of Image and Fine Implementation these can be achieved by ML techniques . The Peoples in the organizations after being registered on the system their face images data is collected and stored into the database. At the entrance of organizations people entering in will be monitored using any suitable camera and if people without mask are detected by face mask detection model such people will be recognized by face recognition model by matching their faces with already available database and fine will be charged for them by face identification Proposed model involves two stage process for detecting person wearing face mask or not using webcam

i) Identifying faces from the input frame.
ii) Detecting mask on the recognized face region and classifying accordingly

Dataset has been divided as the training and the testing datasets. To train efficiently and effectively, we have considered 80% of total images as training dataset and the 20% of total images as testing data set to test the prediction accuracy. For simplicity, the images in our training data collection are classified into two categories as "with mask" and

"without mask". used a lightweight image classifier, MobileNetV2, which gives high accuracy and is well suited for mobile devices. In pre-processing steps, resized image to 224 × 224 pixels to maintain consistency. Trained model is deployed using OpenCV .Model is applied on the real time video frames captured using webcam to detect people in the frame wearing mask or not. 8 APCOER, Department of Computer Engineering 2021-22

For the face recognition following processes are involved :

i) Face Detection
ii) Facial Feature Extraction from captured images.
iii) Classification & matching of images based on database of face images

Transferred learning using pre-trained convolution neural network as feature extractor has been applied to face recognition. Two public well-known face databases will be used for face recognition of faces in this system. CNNs are supervised machine learning techniques that can extract deep knowledge from a dataset through rigorous example based training. This machine learning approach mimics the human brain when learning. CNNs have been successfully applied to feature extraction, face recognition, classification, and segmentation,

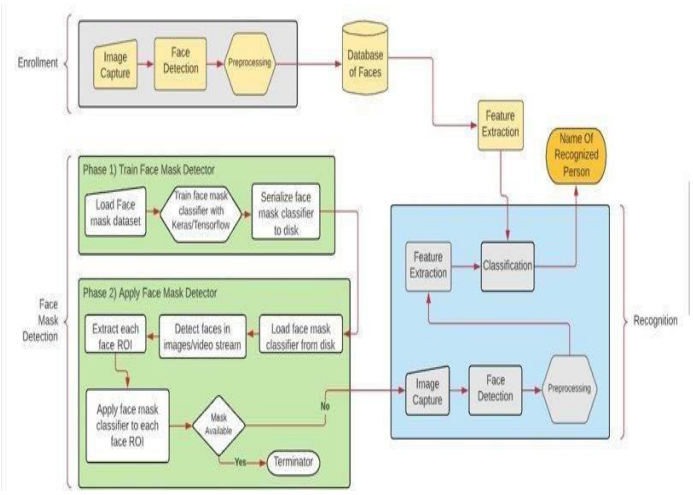


**Fig -1**: Proposed System

## 3. CONCLUSIONS

The project is focused on providing a better solution for regulating the use of mask by the people using face mask detection and imposing fine on the particular person whoever will violate the rule by their face recognition. This system will automate the hectic task of checking the mask manually thus reducing the efforts and increasing the time efficiency and accuracy. The system can work very efficiently using the power of Machine Learning techniques and algorithms like tensorflow, keras, CNN, OpenCV etc. The Compute Vision library founds to be pioneer in the field of Image and Video Processing with the help of this this system can be made very useful and robust in features.

This embedded vision-based application can be used in any working environment such as public place, station, corporate environment, streets, shopping malls, and examination centers, where accuracy and precision are highly desired to serve the purpose. It can be used in smart city innovation, and it would boost up the development process in many developing countries. Our framework presents a chance to be more ready for the next crisis or to evaluate the effects of huge scope social change in respecting sanitary protection rules.

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## REFERENCES

1. Face Mask Detection System, Joby K. J.1, Priyanga K K2 | International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET) | ‖Volume 10, Issue 6, June 2021‖ DOI:10.15680/IJIRSET.2021.1006071

2. Face MaskRecognition usingTensorFlow a Deep Learning Framework | Bhagyashree Kulkarni1, Dr. Suma.V2 PG Scholar1, Professor2 Department of Information Science Dayananda Sagar College of Engineering, Bangalore, India | ISSN 2321 3361 © 2021 IJESC | Volume 11 Issue No.05

3. CNN-BASED MASK DETECTION SYSTEM USING OPENCV AND MOBILENETV2 | Harriat Christa.G , Anisha.K , Jessica J, K Martin | 2021 3rd International Conference on Signal Processing and Communication (ICPSC) | 13 – 14 May 2021 | Coimbatore

4. Face Recognition using Transferred Deep Learning for Feature Extraction | Amornpan Phornchaicharoen , Praisan Padungweang | The 4th International Conference on Digital Arts, Media and Technology and 2nd ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering

5. Deep Convolutional Neural Network-Based Approaches for Face Recognition | Soad Almabdy 1,* and Lamiaa Elrefaei 1,2 | Appl. Sci. 2019, 9(20), 4397; https://doi.org/10.3390/app9204397

6. Deep face recognition using imperfect facial data | Ali Elmahmudi, Hassan Ugail ∗ | Future Generation Computer Systems Volume 99, October 2019, Pages 213-225

7. Real Time Detection and Recognition of Human Faces | Agnihotram Venkata Sripriya , Mungi Geethika , Vaddi Radhesyam| Proceedings of the International Conference on Intelligent Computing and Control Systems (ICICCS 2020) IEEE Xplore Part Number:CFP20K74- ART; ISBN: 978-1-7281-4876-2

8. Image processing effects on the deep face recognition system | Jinhua Zeng1,*, Xiulian Qiu2 and Shaopei Shi1 | Mathematical Biosciences and Engineering Volume 18, Issue 2, 1187–1200 | 13 January 2021