

# Face Mask Detection Using CNN Techniques and Machine Learning

<sup>1</sup>Miss. Date Mayuri S, <sup>2</sup>Miss.Thoke Sarika K, <sup>3</sup>Miss.Chatur Snehal A, <sup>4</sup>Miss.Kothmire Prathama R, <sup>5</sup>Prof. Dhankane Vikas

<sup>1,2,3,4</sup>UG Students, <sup>5</sup>Assistant Professor  
Department of Computer Engineering  
SNDCOE & Rc Yeola

**Abstract:** After the breakout of the worldwide andemic COVID-19, there arises a severe need of protection mechanisms, face mask being the primary one. The basic aim of the project is to detect the presence of a face mask on human faces on live streaming video as well as on images. We have used deep learning to develop our face detector model. The architecture used for the object detection purpose is Single Shot Detector (SSD) because of its good performance accuracy and high speed. Alongside this, we have used basic concepts of transfer learning in neural networks to finally output presence or absence of a face mask in an image or a video stream. Experimental results show that our model performs well on the test data with 100 percent and 99 percent precision and recall, respectively. We are making a savvy framework which will identify the whether the specific user has wear the mask or not and further more observing the social distancing of two user. Our framework will be python and AI based which will be the safe and quick for delivering the yields. At the point when the client is recognize without mask or dodging social distancing framework offers caution to control room, Control room in control make a declaration of wearing mask or follow social distancing , in the event that still user maintain a strategic distance from it , at that point the specific user will face police.

**Keywords:** centralized system, Data, Transparency, access control mask Detection, Social Distancing.

## INTRODUCTION

This chapter describes the term Block Chain and introduces the concept of Block chain Framework. It also gives the overview of the Block Chain Framework which describes the deliverable of the project. The year 2020 has shown mankind some mind-boggling series of events amongst which the COVID-19 pandemic is the most life-changing event which has startled the world since the year began. Affecting the health and lives of masses, COVID-19 has called for strict measures to be followed in order to prevent the spread of disease. From the very basic hygiene standards to the treatments in the hospitals, people are doing all they can for their own and the society's safety; face masks are one of the personal protective equipment. People wear face masks once they step out of their homes and authorities strictly ensure that people are wearing face masks while they are in groups and public places. In this project, we will be developing a face mask detector that is able to distinguish between faces with masks and faces with no masks. In this report, we have proposed a detector which employs SSD for face detection and a neural network to detect presence of a face mask. The implementation of the algorithm is on images, videos and live video streams.

## MOTIVATION

This project to implement an application using machine learning aims at monitoring mask and social distance in peoples, who have lost the mask and have crossed the distance limit. so we are creating a system to easily identify the without mask peoples, and social distance in peoples.

## PROBLEM DEFINATION

We are creating an application detection mask and social distancing. Face mask detection feature uses visible stream from the camera combined with AI techniques to detect and generate an alert for people not wearing face masks. A user-friendly interface allows monitoring and review of alerts generated by the system. Social distancing is a method used to control the spread of contagious diseases. Social distancing implies that people should physically distance themselves from one another, reducing close contact, and thereby reducing the spread of a contagious disease (such as coronavirus).

## LITERATURE SURVEY

This chapter contains the existing and established theory and research in this report range. This will give a context for work which is to be done. This will explain the depth of the system. Review of literature gives a clearness and better understanding of the exploration/venture. A literature survey represents a study of previously existing material on the topic of the report. This literature survey will logically explain this system.

An Efficient Moving Object Detection Algorithm Using Multi-mask Chunlian Yao; Wei Li; Yi Chen; Lihua Gao is a author of this paper, this paper published in 2009. Advantage of his project is, Motion object detection is the basis of video surveillance, and background subtraction is commonly used to detect motion object, but how to build and maintain background model is very critical, and what's more, one background model can't solve all complex background problems.

This paper present the Mask Motion Object Detection (MMOD) algorithm, which synthesize the thoughts of background subtraction and frame difference, frame difference mask and background difference mask are generated and utilized to detect motion object. Morphological post processing method is introduced to reduce noise and improve detection precision. It is proved by testing with standard sequence provided by MPEG organization and outdoor/indoor sequence captured by us that MMOD algorithm achieves

good detection result[1].

Block-based masking region relocation and detection method for image privacy masking is paper of Sohee Park; Geonwoo Kim , 2020 The widespread use of CCTV and various image devices has become a primary cause of privacy invasion, because these are possible to record, share and leak privacy images without owners' consent. The image privacy masking is one of technology for privacy prevention, and its necessity has been increased owing to need of personal information protection and social safety in these days [1]. In this paper, we propose a blockbased masking region relocation and detection method to overcome the shortage of the meta-data typed privacy region information sharing method of restorable image masking service. This method is based on the histogram difference between the original image and the masked image. It analyzes the histogram feature of images, and relocates the masking region information from the coordinate system to the block system. Therefore, it set and detect the masking region without additional information such as meta-data and the original image. For demonstration the feasibility of our approach, we used the real-world database and the experimental results show the applicability of the real privacy masking service[2].

Color quotient based mask detection Ioan Buciu in this paper described The paper deals with mask detection in the age of COVID - 19, by proposing a simple and efficient method to detect people not wearing mask. The approach includes a feature extraction step followed by a supervised learning model built with support vector machines. The features are formed of color information by considering red, green and blue channels for an RGB color image. Ratio of color channels is taken into account to discriminate between mask and non mask images. The approach has been tested on a set of 1211 facial images extracted from group of people wearing or not wearing a mask, by considering a 2 - class problem, where the mask class represents the positive examples, where the non-masked faces are negative examples. Part of the image data set is used to train the support vector machines for learning discriminant features for each class, followed by a prediction for each test sample. The image set for the mask class ranges from simple and common one-colored surgical masks to complex and challenging patterned masks. Cross-validation approach is adopted to test the approach, leading to 97.25 percent as recognition rate[3].

Study of masked face detection approach in video analytics Gayatri Deore; Ramakrishna Bodhula; Vishwas Udpikar, Security being of utmost importance, video surveillance has become an active research topic. Video analytics enhance video surveillance systems by performing tasks of real time event detection and postevent analysis. This can save human resources, cost and increase the effectiveness of the surveillance system operation. One of the common requirements of Video Analytics for security is to detect presence of a masked person automatically. In this paper, we propose a technique for masked face detection using four different steps of estimating distance from camera, eye line detection, facial part detection and eye detection. The paper outlines the principles used in each of these steps and the use of commonly available algorithms of people detection and face detection. This unique approach for the problem has created a method simpler in complexity thereby making real time implementation feasible. Analysis of the algorithm's performance on test video sequences gives useful insights to further improvements in the masked face detection performance[4].

**PROPOSED SYSTEM**

The proposed model is based on the object recognition benchmark given in . According to this benchmark, all the tasks related to an object recognition problem can be ensembled under three main components: Backbone, Neck and Head as depicted in Here, the backbone corresponds to a baseline convolutional neural network capable of extracting information from images and converting them to a feature map. In the proposed architecture, the concept of transfer learning is applied on the backbone to utilize already learned attributes of a powerful pre-trained convolutional neural network in extracting new features for the model.

The item acknowledgment benchmark surrendered. As indicated by this benchmark, every one of the undertakings connected with an article acknowledgment issue can be ensemble under three fundamental parts: Backbone, Neck and Head as portrayed in Here, the spine relates to a pattern convolutional neural organization equipped for extricating data from pictures and changing them over to an element map. In the proposed design, the idea of move learning is applied on the spine to use previously educated qualities of a strong pre-prepared convolutional neural organization in separating new elements for the model.

**SYSTEM ARCHITECTURE**

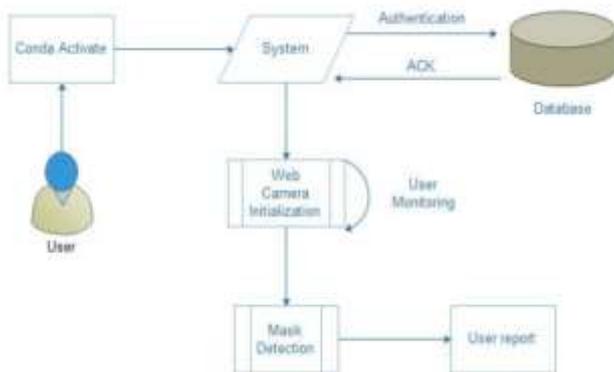


Fig -1: System Architecture Diagram

## ADVANTAGES

- Secure:

Data Privacy at the point of need.

- Ability to access Data Privacy (almost) everywhere:

This means down time can be leveraged for learning.

- Potential to be secure more data:

Video, powerpoint, podcasts, and quizzes are all potential outputs to devices. This provides a great deal of flexibility for mobile development.

- Potential for location based learning:

This means the phone can alert the person when they are near a potential Data Privacy experience based in the context in which the Data Privacy will be used—which potentially can help retention and return on investment..

## LIMITATIONS

- Internet Connection necessary
- Proper Dataset

## APPLICATIONS

- Easy to use
- Monitoring controlling user distance and mask detection.

## CONCLUSION

To mitigate the spread of COVID-19 pandemic, measures must be taken. We have modeled a facemask detector using SSD architecture and transfer learning methods in neural networks. To train, validate and test the model, we used the dataset that consisted of 1916 masked faces images and 1919 unmasked faces images. These images were taken from various resources like Kaggle and RMFD datasets. The model was inferred on images and live video streams. To select a base model, we evaluated the metrics like accuracy, precision and recall and selected MobileNetV2 architecture with the best performance having 100 precision and 99 recall. It is also computationally efficient using MobileNetV2 which makes it easier to install the model to embedded systems. This face mask detector can be deployed in many areas like shopping malls, airports and other heavy traffic places to monitor the public and to avoid the spread of the disease by checking who is following basic rules and who is not.

## FUTURE WORK:

More than fifty countries around the world have recently initiated wearing face masks compulsory. People have to cover their faces in public, supermarkets, public transports, offices, and stores. Retail companies often use software to count the number of people entering their stores. They may also like to measure impressions on digital displays and promotional screens. We are planning to improve our Face Mask Detection tool and release it as an open-source project. Our software can be equated to any existing USB, IP cameras, and CCTV cameras to detect people without a mask. This detection live video feed can be implemented in web and desktop applications so that the operator can see notice messages. Software operators can also get an image in case someone is not wearing a mask. Furthermore, an alarm system can also be implemented to sound a beep when someone without a mask enters the area. This software can also be connected to the entrance gates and only people wearing face masks can come in.

## REFERENCES

- [1] Conference: 2019 International Seminar on Research of Information Technology and Intelligent Systems (ISRITI), "Recommender System for e-Learning based on Personal Learning Style", Nunung Nurul Qomariyah, December 2019
- [2] 2018 4th International Conference on Optimization and Applications (ICOA), "A syntactic and semantic multi-agent based question answering system for collaborative e-learning", Abderrazzak Samadi; El Fazazi Hanaa; 2018
- [3] 2009 International Conference on Intelligent Agent Multi-Agent Systems, "A survey on service-oriented architecture for E-learning system", Rani S Jamuna; Marie Stanislas Ashok, 2009
- [4] Conference: 2015 Fifth International Conference on e-Learning (econf)" ELearning Supporting System (ELS) in Nahda University in Upper Egypt: Case Study", Samia Mostafa Elazab, 2015
- [5] 2019 13th Iranian and 7th National Conference on e-Learning and e-Teaching (ICeLeT), "Deep E-School-Nurse for Personalized Health-Centered E-Learning Administration:", Tannaz Karimi; Babak Majidi; Mohammad Taghi Manzuri, 2019.