

A Novel Detection Model and Analysis of Face Mask Detection by Using Machine Learning

Ms. Karishma B. Shambharkar¹, Dr. Sudhir W. Mohod², A. D. Gotmare³

¹PG Scholar, Department of Computer Science and Engineering, Bapurao Deshmukh College of Engineering, Sevagram, Wardha, Maharashtra, India

²Professor and HOD Department of Computer Science and Engineering, Amravati, Maharashtra, India

³Assistant Professor Department of Computer Science and Engineering, Bapurao Deshmukh College of Engineering, Sevagram Wardha, Maharashtra, India

ABSTRACT

Since March 2020 Coronavirus (COVID-19) has affected the world very badly. As this Coronavirus disease spread mainly from person-to-person. Between people who are in close contact with one another through respiratory droplets produced when an infected person coughs, sneezes, or talks. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. Studies of this disease proved that wearing a face mask is one of the precautions to reduce the risk of viral infection of this disease. As it can help to prevent from viral transmission, at many public places as well as private places it is compulsory to wear a mask and correctly. Many public service providers are there where customers come to use that services. So, it is not possible to check manually whether customer has worn a mask or not. This technology can overcome this problem. In this paper we propose face mask detection using machine learning which is one of the efficient face mask detectors. The proposed system mainly consists of three steps that are. 1. Image pre-processing 2. Face detection and reading Dimensions 3. Face mask classifier. Our system is capable of detecting face with mask and without mask and it is integrated with webcam or cameras. This system will help to avoid the safety violation and will help to keep the track on safety.

Keywords : COVID-19, Machine learning, OpenCV, Face Masks, Face mask detection, Image processing, Safety improvement

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I. INTRODUCTION

Today the whole world, is facing the COVID-19 pandemic. People are taking various precautions to control the spread of corona virus to keep ourself safe from Coronavirus. There are many precautions which

can take to avoid coronavirus transmission and one of such most important is face mask. Researchers are doing research and studies on COVID-19 and that Studies have also proved that wearing a face mask can decrease the chances of the viral transmission. Also, a person wearing a face mask recognises a sense of

protection. At our homes, we take care of each and everything but when it comes to public places like railway stations, offices, malls, colleges, etc., it becomes somewhat challenging to maintain the safety of people. However, it is not feasible to manually check whether a person is wearing a face mask or not.

Machine Learning and Image Processing

consist of various technologies which provide effective solutions to complex problems in different areas. In order to prevent the spread of Corona virus, we have made an attempt to develop a face mask recognition or detection system using machine learning. This is an effective system to detect a face mask. It is capable of recognising masked and unmasked faces. By the development of this system, one can detect if a person is wearing a face mask or not. If the person is not wearing a face mask, then system will show some message like 'No Mask' otherwise it will show 'Mask detected' message or it will buzzer when the person without mask will come in front of camera. Also, allowing the entry of those who are wearing a face mask, will be of great help towards maintaining the safety in public places. Ultimately, we are trying to contribute some effective system to detect a face mask with the help of technology for the battle against COVID-19.

II. BACKGROUND AND RELATED WORK

For image processing and for image extraction the Face mask detection model can divide into two components i.e. deep transferring learning as feature extractor and the second component is a classical machine learning which works as a decision trees, which is the model used in training, validation and testing phase. [1] By using the new technology like Deep learning, Machine learning, Computer vision, Tensorflow, OpenCV, system focuses only on the objects which get matched with the object which stored in dataset. For face mask detection technique, the data pre-processing is done for masked faces and

for unmasked faces. Once the person comes on image or video stream it applies mask detector over image. The majority of the images were augmented by OpenCV. The Names are already given to images i. e. "mask" for faces with mask and "no mask" for faces without mask [3]. For this face mask detection techniques, in image processing or in computer vision we capture an image through webcam to detect person's face. Then we extract images from frames. After that face mask detector will be loaded. And operation on images will be performed for detection by Image pre-processing. Respective results will be converted into image frames. Like if person is wearing mask properly then system will display message like "Thank u for wearing mask" with green signal. And if the person is not wearing mask or not wearing in proper way, then system will display message like "please wear mask" with red signal.[6] In image processing and in computer vision object detection plays an important role. In which objects are detected with its location as well as with background. In face mask detection technique, there is need to detect the face object. The dataset which can be used in this system consists collection of images of faces with mask and faces without mask. All the images will be extracted from search engine. This dataset is categorized in three datasets, i. e. training dataset, test dataset and validation dataset. The purpose of dividing data is to avoid over fitting which is paying attention to minor details/noise which is not necessary and only optimizes the training dataset accuracy. We need a model that performs well on a dataset that it has never seen [5].

III. OBJECTIVES

The main objective of "A Novel Detection Model and Analysis of Face Mask Detection by using Machine Learning" project is to provide some effective technology for preventing the spread of Corona virus. Primary objectives behind the development of this system are as follows:

- Prevent the spread of Corona virus by promoting the use of face masks with the help of effective technology to detect the face mask
- Help to take necessary precautions for the safety of society by predicting the future outbreaks of COVID-19.
- Ensure a safe working environment and Save the lives of people.
- To identify the real time datasets of facemask detection
- To design model for facemask detection system.
- Performance analysis of the facemask detection using machine learning

IV. PROPOSED METHODOLOGY

The proposed system focuses on how to identify the person on image stream wearing face mask with the help of computer vision and Machine learning algorithm. In order to design an effective network for face mask detection, we adopt the object detector framework proposed in, which suggests a detection network with a mouth area.



Fig. 2: One person with mask and another person without mask

V. SYSTEM REQUIREMENT

Software

- System Installer: Anaconda.
- Operating System:
Windows 64 Bit - 457MB/



Fig. 1: Implementation steps

The introduced model includes two main components, the first component is deep transferring learning as feature extractor and the second component is a classical machine learning like decision trees. Here we will install the dependencies and will using the datasets. Thousand images of face with mask and without mask will store in system. After data processing model will trained with these images. Then we will run and view the accuracy. As software get start webcam or camera will see the person and it will check the dimension of mouth area. According to classical machine learning it will make a decision that the face is with mask or without mask. If the face is with mask it will show “Mask detected” and if the face is without mask the system will beep a sound and will give the message that “No Mask”

Windows 32 Bit - 403MB/

Linux 64 Bit -529MB.

- Packages: tensor flow, keras, imutils, numpy, opencv- python, matplotlib, scipy. [Approximately 130MB].

Hardware

- Pc/Laptop (windows/Linux)
(Min. 4GB Ram, 1GB Disk space).
- Webcam/Inbuilt camera of Laptop.

VI. CONCLUSION

In this COVID-19 pandemic, this system will play effective role in monitoring the use of face masks at workplaces. By the development of this system, we can detect the mask on one’s face and allow his entry

in the workplace as well as any service provider places. This system also contributes to public healthcare, Institutions as it helps in keeping environment healthy. This system can be used in public areas with embedded systems for application in airports, railway stations, offices, schools, and public places to ensure that public safety protocols are followed. This “Novel Detection model and analysis of face mask detection by using machine learning” will help to do the analysis of how many people uses the mask and are aware about the safe environment. In future the increment can be done in this system as if the penalty has to apply on the person who is not using the face mask on there workplace, they can get alert on there mobile phone with respect to there ID.

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