

To provide a safe environment by identifying the people without masks and alerting the necessary authorities

Achyuth K P¹ Jayanth H S² Manoj A³ Dr. Dinesha L⁴

^{1,2,3} B.E., Student, Department of CSE, Sri Siddhartha Institute of Technology, Tumakuru

⁴ Assistant Professor, Department of CSE Sri Siddhartha Institute of Technology, Tumakuru

Abstract: After the breakout of the worldwide pandemic 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 whether a person is wearing mask or not in video(live) and image. We use deep learning a Convolution Neural Network model to develop our face detector. The model used for the object detection purpose is OpenCV because of its precision performance and high speed. Apart from this, we have used basic concepts of transfer learning to neural networks to ultimately get the output of face mask presence or absence in an image or live video. Plenty of Precautions have been taken to reduce the spread of this virus like using face mask, hand sanitizer and maintaining social distancing. We have researched about this and proposed a program that inhibits the spread of COVID-19 virus. This program will find persons who are not wearing a face mask through CCTV cameras and alert them to wear mask for safer their own safety. When the Deep learning model finds any person not wearing a mask, the model will send an alert message to security guard. The model will send the coordinates(or camera number) of the person not wearing the mask, so that security guard can notify or inform the person to wear mask. Deep learning model is trained before deploying to real world. The model is trained with two types of images: people face with mask and people face without mask. Test results show that our model works well with 100% and 99% accuracy test and memory, respectively. The prediction of face mask will be more accurate. We hope that our research will be a helpful program in reducing the spread of COVID-19 virus in all countries and provide a safe environment.

I. INTRODUCTION

The year 2020 has marked mankind with a series of mind-boggling events including the COVID19 epidemic, a life-changing event that has shocked the world since the beginning of the year. COVID-19 has been affecting the health and took lives of people, so we called for stronger measures to prevent the spread of virus. From basic hygiene standards to hospital treatment, people are doing all they can for themselves and for public safety; face masks are one of the most effective personal protective equipment. People wear face masks when they leave their homes and the authorities strongly ensure that people wear masks while in groups and in public places.

To stay safe from COVID-19 we should wash hands frequently (using sanitizer), maintaining social distance, wearing a face mask, avoiding eye contact, nose and mouth are main ones, best thing is to wear a face mask and it is easier.

The transmission of coronavirus can be controlled through genuine use of face mask. The spread of Coronavirus can be stopped if people maintain strong social isolation, social

exclusion and wearing a face mask. Sorrowfully, people won't pay much attention to these laws which accelerate the spread of the virus. Finding people who disobey to wear face mask and notifying about this to officers who takes action will be a solution to reduce the transmission of COVID-19. Plenty of programs and models are present for object detection. Deep learning strategies like OpenCV, YOLO are the best way to detect face mask. Deep learning models plays a big role in medical applications today [4]. Deep learning models have shown an amazing role in object detection [7] so usage of these models has been increased in many fields. If we deploy the face mask detection model into real world, it will be a very helpful thing. This model will detect person without mask and sends alert to necessary authorities.

All the details about a person will be stored in database. This can be implemented into the Deep learning model and identify those who are not wearing the face mask. Identifying those who are wearing the mask and send the details of that person to relevant officer and they can take necessary actions. The best way to prevent the transmission of coronavirus is to alert everyone to use face mask. Our main goal is to design a Deep learning model to determine if a person is wearing a mask or not and send alert to necessary authorities if a person found not wearing a mask.

After deploying the Deep learning model into real world. We allow cameras to capture and through this video the model will extract human faces as images. From these captured images the model will detect and categories these faces to Mask and No Mask. We use CNN model to detect faces with mask and without mask. If this CNN model finds anyone without a mask an alert message will be sent to necessary authority to take action. The accuracy of detection will be more as we use OpenCV where rate of output prediction is more. In this project, we will create a face mask finder that can distinguish between face masked and face without mask. In this report, we have suggested a detector using OpenCV to detect facial detection and a neural network to detect the presence of a facial mask. Algorithm implementation is done for images and live video.

II. LITERATURE SURVEY

Deep learning plays an important role in object detection. Object detection is used for computer vision and digital image processing [5]. Ranging from small scale personal applications to large scale industrial applications, object detection and recognition is employed in a wide range of industries. Some examples include image retrieval, security and intelligence, OCR, medical imaging and agricultural monitoring. In object detection, an image is read and one or more objects in that image are categorized. The location of those objects is also specified by a boundary called the bounding box. Traditionally, researchers used pattern recognition to predict faces based on prior face models. A breakthrough face detection technology then was developed named as Viola Jones [1] detector that was an optimized technique of using Haar [6], digital image features used in object recognition. However, it failed because it did not perform well on faces in dark areas and non-frontal faces. Since then, researchers are eager to develop new algorithms based on deep learning to improve the models. Deep learning allows us to learn the features completely and removes the need to use previous knowledge to create feature extractors. In Deep learning there are two types of object detection: single stage and two stage object detection model.

1) Coronavirus is a person-to-person spreading disease that can be controlled from spreading by using face mask. Deep learning model uses facial detection as a way to identify if a person is using a face mask or not. And the view is expressed by Mohammad Marufur Rahman, Saifuddin Mahmud, Md. Motaleb Hossen, Jong-Hoon Kim and Md. Milon [4].

2) The face detection method uses a widely used head partition to process previews for problems with multiple angles, as algorithms such as face recognition require the video to capture the front face.

- Masks cover many areas of the face, which makes some common algorithms unable to be used to separate categories into a new state.

- The statement was made at the 2020 international conference on high performance of big data and intelligence programs.

3) Sensor is used to detect the temperature of the human body which is the symptom of COVID19 that is raise in human temperature.

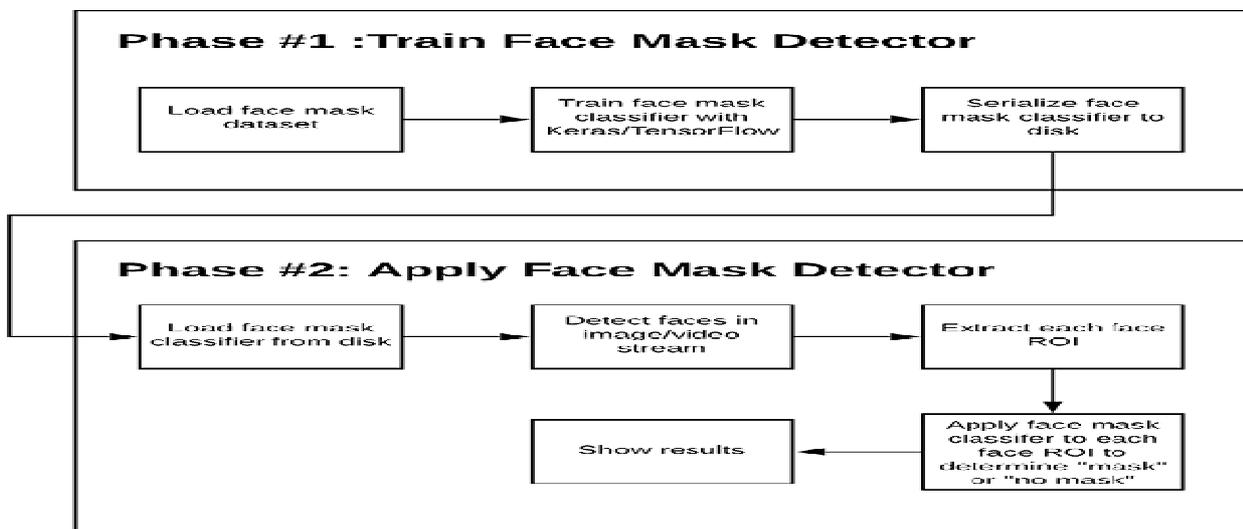
4) PCA (Principle Component Analysis) is a very efficient and widely used mathematical process. For this reason, this PCA algorithm has been selected. Finally, a comparative study was conducted here for better understanding.

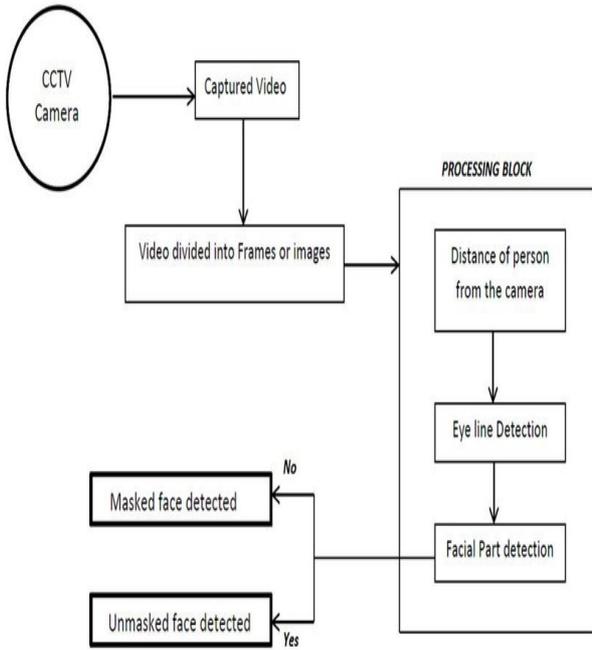
5) There are two types of techniques for face recognition pattern, Fisherface method and Eigenface method. The Eigenface method uses Principal Component Analysis to decrease space of between facials. The area mentioned in this paper uses digital image processing to improve the visual system [3].

Object detection techniques that use deep learning models can be much more powerful in handling complex tasks and gaining incredible advances in computer vision [2].

Training: Here we will focus on loading our data set to get a face mask from storage, model training (using Keras / TensorFlow) on each image in data set, and making serial face detectors on storage.

Deployment: Once the face mask detector is trained, then we can continue to load the mask detector, make facial detection, and then distinguish as a face mask without or without a mask





The data set contains approximately 640 images of two categories:

Masks: 325 images

Without Masks: 315 images

A face detector acts as the first stage of our system. A raw RGB image is passed as the input to this stage. The face detector extracts and outputs all the faces detected in the image with their bounding box coordinates.

The second stage of our system is a face mask classifier. This stage takes the processed ROI from the Intermediate processing block and classifies it as either as Mask or No Mask.

III. APPLICATION

- It can be used in college entry gate
- Office entry gate
- Used in hospitals
- In temples
- Used in Airports, Bustand, Railway Station

IV. CONCLUSION

To reduce the spread of the COVID-19 pandemic, steps must be taken. We mimicked a face mask detector using OpenCV and transmitted learning methods to neural networks. To train, validate and test the model, we used the dataset that consisted of 365 masked faces images and 319 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 OpenCV with the best performance having 100% precision and 99% recall. 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.

V. 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.

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