A Deep Learning Model for Face Mask Detection

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Abstract:

Corona Virus is a big and dynamic threat to us humans. Now, the whole world is trying to lessen the spread of Covid-19. Wearing masks in a proper way is one of the practices that helps to control the transmission of the virus according to the notable World Health Organization. However, to ensure that all people wear a facemask is a very gigantic task. To prevent the spread of illness, face masks must be used, and cells should be killed or eliminated utilising available therapies such as surgery, radiotherapy, chemotherapy, and others. 30,000 people die each year, according to estimates. Early detection procedures are critical in lowering the mortality rate. X-rays, MRIs, CT scans, ultrasounds, and other imaging techniques are utilised for this.

In this research paper, we propose a very simple and effective model for real-time monitoring through the convolution neural of networks to detect if an individual wears a face mask or not. This model is trained, validated, tested upon two datasets. Corresponding to dataset the accuracy of the model was 95.77% and, it was 94.58% for dataset.

Key words:

Face mask, Convolution neural network, deep learning, TensorFlow.

1. Introduction

COVID-19 or Corona virus is responsible for producing an atmosphere of terror as it can transmit through the respiratory system. Currently, there is neither medicine nor vaccine to fight against this virus. Therefore, the only options people have to maintain are the social distancing, wash hands regularly, and wear a mask.

According to the World Health Organization (WHO)'s, official Situation Report – 205, Corona virus disease 2019 (COVID-19) has globally infected over 20 million people causing over 0.7 million deaths. Individuals with COVID-19 have had a wide scope of symptoms reported like shortness of breath or difficulty in breathing. Elder people having lung disease are at higher risk of getting corona virus than most.

Face mask detection is the process of determining if or not people in public are wearing a mask. In reality, the issue is decrypting of face detection, in which the face is identified using various machine learning techniques for security, authentication, and surveillance purposes. In the discipline of Computational Vision and Pattern Recognition, face detection is a crucial component. In the past, a lot of research has developed powerful face detection algorithms. Face detection research began in 2001, with the use of standard machine learning methods and the construction of handicraft features to train successful models for detection and recognition.

Despite the fact that several academics have worked hard to develop efficient algorithms for face detection and recognition, there is a significant difference between 'detection of the face beneath mask' and 'detection of mask over face.' According to the current literature, relatively little study has been done to identify masks over faces. As a result, our research intends to create a technology that can reliably identify masks over the face in public places (such as airports, train stations, overcrowded markets, bus stops, and so on) in order to prevent the transmission of Coronavirus and so contribute to public health. Furthermore, recognising faces with and without a mask in open is difficult due to the little datasets available for identifying masks on human faces, making the model difficult to train.

The positive outlook of wearing masks is in decreasing vulnerability of risks from the noxious individuals during the "pre-symptomatic" period to restrain from spreading of the virus.

METHODOLOGY:

The major thing required for implementing the project using the python programming language along with Deep learning, Machine learning, Computer vision and also with python's libraries. The architecture includes of Mobile Net as the backbone, it can be used for highest and lowest computation scenarios. We are using the algorithms of CNN in our proposed system.
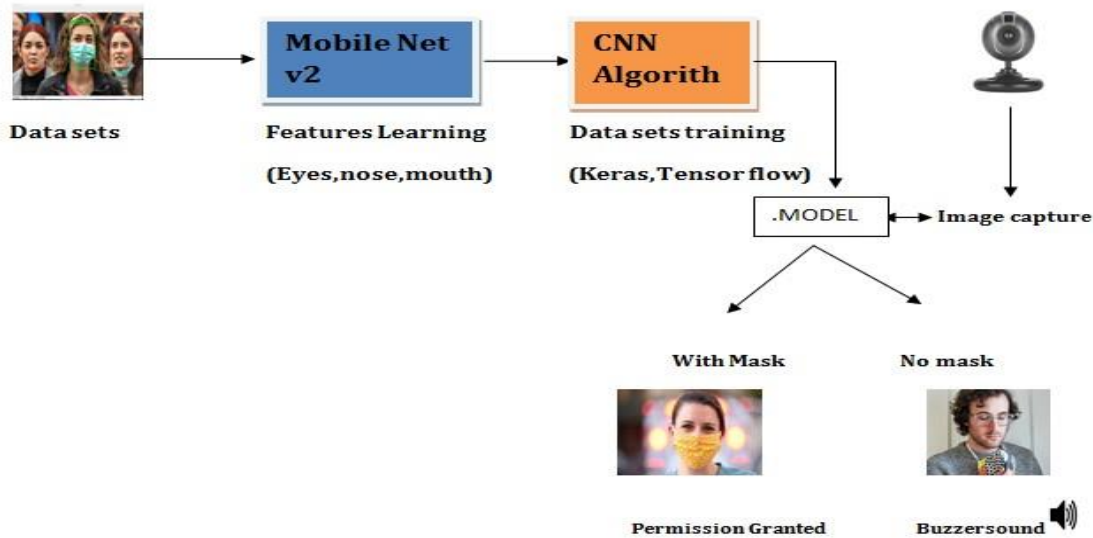
LITERATURE REVIEW:

In this paper, a deep learning-based algorithm for identifying masks on faces in public places is provided in order to reduce Coronavirus community spread. Using an ensemble of single - phase and two-phase detectors, the suggested model efficiently manages various types of occlusions in crowded situations. The ensemble technique not only aids in reaching high accuracy, but it also significantly increases detection speed.

TITLE: "Face Mask Detector"

Single Shot Detector architecture of programming is used for the image detection purpose. In the system face mask detectors can or should be deployed in several areas like malls, airports and other heavily traffic places so that public can be monitored easily monitor the public and to avert the spread of the covid disease by checking who are following rules or basic rules and who is not following. It takes more time for data to load in Google Collab Notebook. It did not allow the access of the camera which was a hurdle in testing the images and a video streams. We have modelled a facemask detector using Deep learning of science. We have processed a system of computationally efficiency using MobileNetV2 which makes it so much easier to extract the sets of data available. Machine learning is a subfield of AI that allows systems to learn on their own without having to be explicitly programmed. To find patterns in a dataset, machine learning can use supervised learning, unsupervised learning, or hybrid learning. Machine learning algorithms under supervision use labelled data to forecast future events. Unmonitored machine learning uses unsupervised learning, and the methodology tries to make sense of it by extracting its own features and labels from the data. A hybrid deep transfer learning model for recognising face masks has been presented that incorporates many machines learning algorithm such as support vector machines (SVM), decision trees, and ensemble approaches.

We used CNN architectures for the better performance. We can try to fix it in any kind of cameras easily available. We humans have not tremendous type of ability for identifying different faces for rather than machines, so automatic face detection system developed by machine learning plays a pivotal role in the face recognitions, and also head pose estimation etc. It has few problems such as face occlusion, and an uniform type of illumination. We use Neural Network to detect the face in the Live and playback video stream. Tensor flow mentioned earlier is also

used in this type of system. In past they use Adaboost algorithm, we used mob type of net CNN Architecture model in the proposed system of ours. We will try to overcome all the hurdles in the paper.

Face mask detection is a process of determining if or not someone is wearing a mask. In reality, the issue is decrypting of face detection, in which the face is identified using various machine learning techniques for security, authentication, and surveillance purposes. In the discipline of Computer Vision and Pattern Recognition, face detection is a crucial component. In the past, a great deal of research has developed powerful face detection algorithms. Face detection was first studied in 2001, using the use of typical machine learning methods and the construction of handicraft features to train successful models for recognition and detection.

BENEFITS

- Manual Monitoring is tedious task for the officers on duty to check whether the crowd are wearing masks or not. So, in our technique, we are using a developed web cam to detect the people's faces and try to prevent them from virus transmission.
- It has a very fast and high degree of accuracy.
- This system can easily be implemented in the ATMs, Banks etc
- We can try to keep peoples safe from this technique.
- It also provides a buzzer sound which acts as an alert to wear mask.

Implementation:

We have four modules

1.Datasets Collecting: We collect number of data sets with some face masks and without no face masks. We try to get high accuracy which depends on the collecting the numbers of images.

2.Datasets Extracting: We try to extract the features of using a mobile net v2 of mask and no mask sets all.

3.Models Training: We will train a model using the open cv, karas (python library).

4.Facemask Detection: We can detect a Pre-processing image.

CONCLUSION

By the development and arrival of a face mask detection, we can and will detect if the person is wearing a face mask properly and allow the people their entry and this would be of a great helper society. The accuracy of our model will only be achieved and the optimization of our model is a continuous process which goes on and so we are trying to build a highly accurate solution for this. We can prevent a lot of people from Virus Transmission covid through this System.

Despite the success of AI models in other areas of computer vision systems, its use in identifying COVID-19 face masks in the actual world is still in its early stages. Face mask detection was a difficult task in the area of image processing, particularly during the COVID-19 pandemic, due to a variety of mask types, camera angles pixels, various degrees of obstacles, various variations balancing different model detection accuracy or mistakes and real-time requirements and deployment of classification algorithm on computers with limited computational resources. The suggested method uses a convolution neural network to categorise face mask detection in photos and videos using COVID-19 precaution. Extensive dataset testing and performance assessment of the offered methodologies are shown. We also used a symbolic technique to successfully retain inter and intra class variability of face mask detection. We looked at several classifiers such as the Support Vector Machine and the Symbolic Classifier. The idea is being created as just a prototype to track temperature measurements and recognise persons wearing masks. The goal of the project is to create a safety mechanism for people to prevent contracting COVID-19. By using Deep learning idea, we proposed constant monitoring of people's circumstances and storing their data on the server.

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