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Face Mask Detection Model

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FACE MASK DETECTION MODEL

By

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Your Professor **Date**

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ABSTRACT:

Coronavirus or COVID-19 is considered the most infectious and deadly disease developed by the virus called SARS-CoV-2 and they have reported different variants like 2019-nCoV and MERS-CoV. According to the World health organization (WHO), more than 583,235,205 cases have been registered among them 6,420,220 has been dead this is the reason they have called it a global health crisis and they mainly spread through the infected droplets. The only way to prevent this virus from spreading from an infected person is by wearing a mask.

The virus can be easily spread when people gather in huge numbers and in confined small areas with poor ventilation systems and monitoring them manually to check whether the individual is wearing a mask is not possible to resolve this issue face detection method has been proposed which uses OpenCV to check whether the people are wearing the mask or not wearing the mask. For performing this analysis a webcam is needed to track the human faces. This project uses an image dataset that has human faces with and without masks the model is trained on the image dataset and the prediction is done in real-time.

INTRODUCTION:

By wearing a clinical mask many diseases can be tackled, such as covid-19. Awareness about the use of the face mask should be created among the common public for safety concerns and people should know when to wear and when not to wear the face mask. One of the advantages of using a facemask is that the chances of getting infected will be reduced even if we come in contact with the infected patient person and this step will be affecting the spread of viruses. Because of the severity of covid, many companies and institutions have a mandatory rule to wear the mask to their clients, representatives, and students to continue providing their services. Therefore detection of face masks has become a major issue and to resolve this issue a python program based on OpenCV has been developed**.**

In this proposed method to identify the face masks, algorithms like Machine learning and Deep Learning algorithms are used with different packages like Tensorflow, OpenCV, Facenet, Keras, etc. Firstly it detects faces from the input and predicts whether the person is wearing the mask using the bounding box this is only possible when the model has been trained with the dataset containing the images. Another important algorithm *is Haarcascade_frontalface_default.xml* which identifies the face from any kind of video or image. This algorithm has been used by most researchers prior to Deep learning algorithms.

DATASET: The dataset which is used in this model has a total of 3835 images of which 1916 images have human faces with masks and 1919 human faces without masks since this model is trained on CNN it has an accuracy of 95%.

EXAMPLES OF DATASET:

DEVELOPMENT OF SYSTEM:

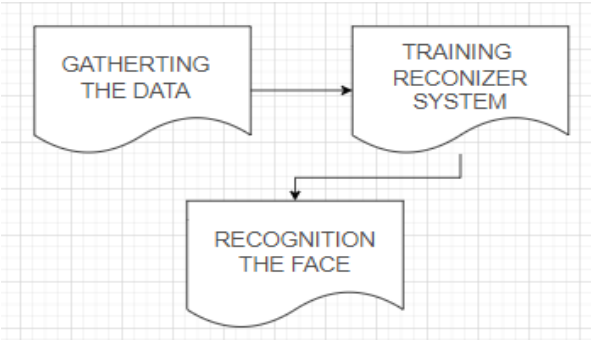
TENSOR FLOW: Tensor Flow is considered the renowned machine and deep learning algorithm used for creating several applications with its libraries and tools. It is primarily known for its applications like recognizing images, information retrieving, and Voice recognition. It is also used by Facebook for its face recognition system and leading mobile companies Apple for its voice recognition system. Tensor flow with CNN (Convolutional Neural Networks**)** as its architecture has made the above system applications possible.

KERAS:

Keras is also considered a renowned Deep Learning and Machine Learning algorithm. It is user-friendly making it easy to understand and to work with. It uses the Tensorflow functionalities like scalability which makes it work with higher speed. It also uses the CNN Convolutional Neural Networks**)** architecture for this model to organize the binary classes with their respective vectors.

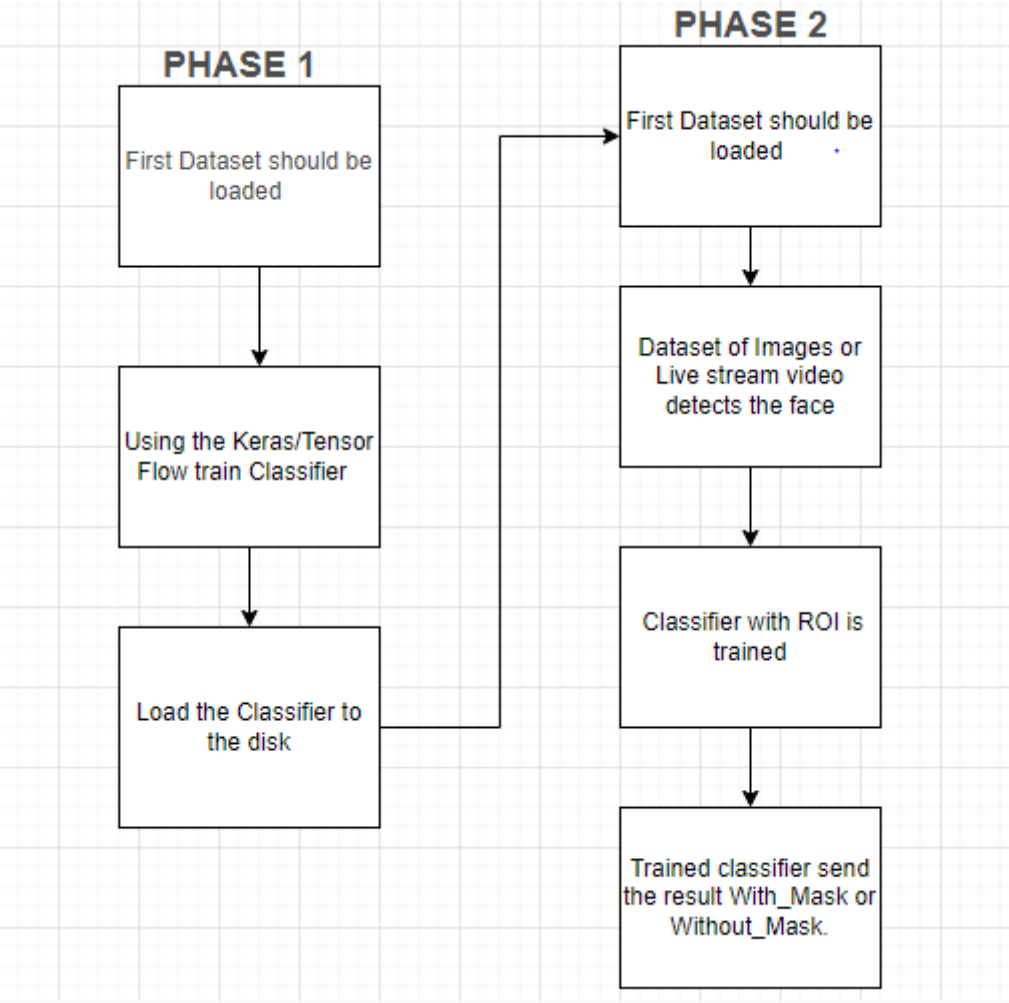
OPEN CV:

Open CV explains the details what are the methods in which data is being stored and how exactly the data can be retrieved when needed. Open CV is predominantly used in identifying the faces, and certain objects in the image recognition system. It is also used in face recognition and differentiating the faces and their features.



IMPLEMENTATION:

In order to develop a successful model, it needs to have two different datasets where the first dataset has pictures of human faces with masks and faces without masks and this dataset is used to train the classifier. The Second dataset is mainly used by the facial detection model for system training where the Mobile Net architecture is used. The project can be explained in two different phases.



Phase1: In this phase, the dataset which contains the people's faces with masks and without a mask is loaded first then the classifier will be thoroughly trained with Keras and then it sends the classifier to the disk.

Phase 2:

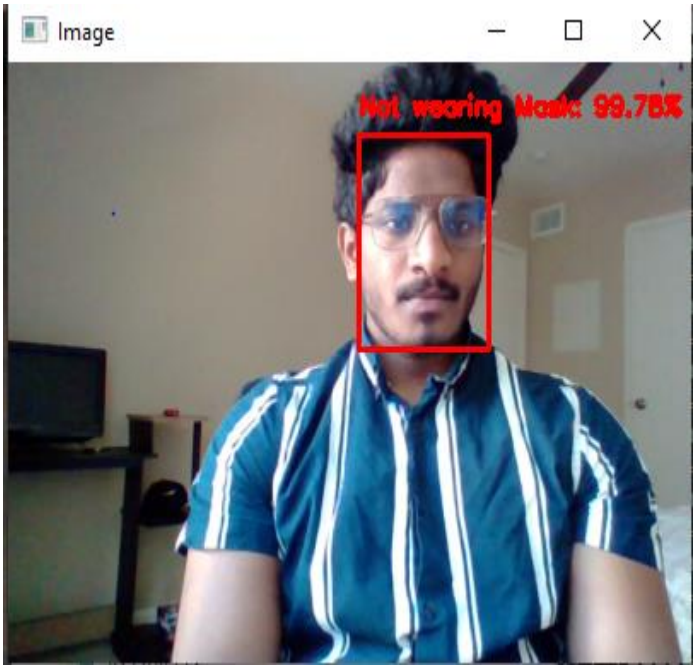
In this phase, the classifier from the disk identifies the input images from the dataset and then Region of Interest (ROI) is attained which has data like human faces height and dimension. Once the classifier is applied to the ROI it shows the results whether the person's face is covered With Mask or without Mask.

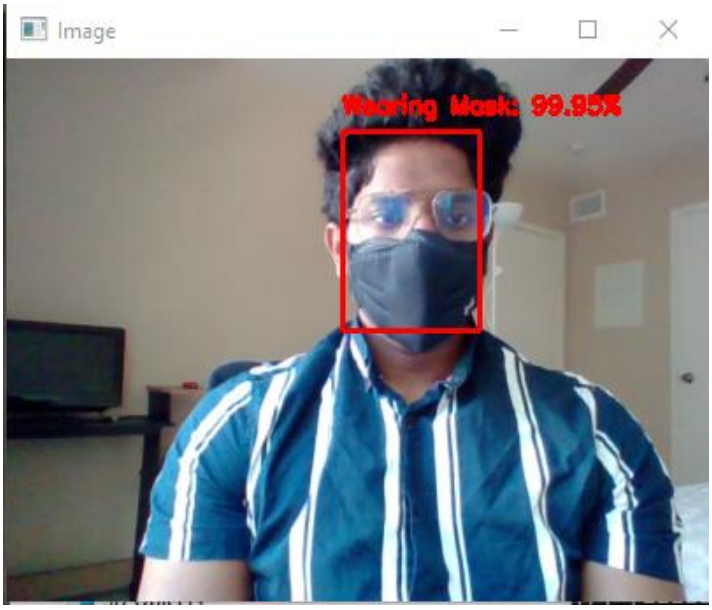
In this trained model firstly the input will be filled this could be a dataset containing the images of a person's face or a live stream these images are carried to the face recognition module where it first detects the blob which is primarily used to focus the face by removing the surroundings and only focusing on the face. The trained model upon receiving the following inputs runs them and determines whether the person is wearing the mask or not. The proposed model has been trained with the dataset 70-75% of the pictures will be used for the purpose of training whereas the remaining 20-25% of pictures will be utilized for the accuracy test.

In spite of using a large number of images in the dataset the problem of overfitting has been eradicated because of the feature Multilayering in CNN where work will be reduced by distributing it in many layers. In order to recognize the face and to regulate the results whether a person is wearing the mask Open CV, FaceNet, and ResNet is used. The model has a predominant accuracy of 95% and using it several times can increase it to 100%.

RESULTS:

First, it reads the facial structures of the face like Eyes, Nose, and Mouth and looks for the mask if the individual is not wearing any will generate the results as NOT WEARING MASK with the percentage ranging from 0-99% and if the individual is wearing the mask it generates large results as WEARING MASK with the similar percentage range.





CONCLUSION AND FUTURE WORK:

The model has been trained with the datasets and it uses Machine Learning and Deep Learning algorithms which results in greater accuracy. In the past, it was Corona Virus and now there are new viruses like Monkey Pox, and Langya which are been mutated and spread at a greater rate, and for now wearing a mask is only the prevention. Above proposed model should be made implemented in all public places like Hospitals, Industrial and Information Companies, and Educational institutions to identify the person without a biosecurity measure and send the alert to a representative. In the near future the implementation of the additional dataset which contains the Employee's details like Email addresses, and phone numbers will send the alert to their respective person if they fail to wear a mask.

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[4] Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV Arjya Das Department of Information Technology Jadavpur University Kolkata, India arjyadas1999@gmail.com Mohammad Wasif Ansari Department of Information Technology Jadavpur University Kolkata, India razamoeezraza@gmail.com Rohini Basak Department of Information Technology Jadavpur University Kolkata, India visitrohinihere@gmail.com 2020 IEEE 17th India Council International Conference (INDICON) | 978-1-7281-6916-3/20/$31.00 ©2020 IEEE | DOI: 10.1109/INDICON49873.2020.9342585

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