Project Proposal

Mask Detection Software

Project Members:

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Abstract:

With the current pandemic of Covid-19, many governing authorities and/or corporate institutions have made the wearing of face masks mandatory on their premises. Face masks can help in reducing the spread of the novel virus, from something as normal as a person speaking to a person coughing. However, some people have refused to adhere to mask policies in stores and other public places or simply forget to carry one with them from time to time. That is why, we have come up with a project idea to develop a real-time system which detects if the person is wearing a face mask or not. This can help automate the detection of face masks in stores like Walmart, Target who are advocating the policy of mandatory face covering to enter their premises. For the purpose of this project, we will be using the camera sensor in web-cameras coupled with machine learning algorithms to detect the Face Masks in real time. This algorithm can then be extended to be used in CCTV cameras or mobile cameras, for real time face mask detection in the institutions previously mentioned.

We plan to display live statistics on the face of the person being tested. A red frame around the face will be displayed if the person is not wearing a mask, and a green frame will be displayed if the mask is detected. The frames will be supplemented by their accuracy percentages, right next to it, which will give us an indicator of how confident our app is of detecting the face masks. This will serve as the basic functionality for our application.

System Overview:

For this project, we will try to utilize the webcam that is already present in our phones or computers and using various python libraries, we will train neural network to detect if a person is wearing a face mask or not or if they are wearing it wrong. We will use Kaggle dataset as our training data to train our Convolution Neural Network. We will use this dataset

and use tensorflow's advanced object detection feature to isolate face images and then gather all such images and then train our network on them.

The following diagram demonstrates the workflow and basic components that will be used in the project. As mentioned previously, the algorithm will be a two phase process, first, having to train the model to detect face masks using the dataset, and then applying this training to analyse further new images - to load the detector, to detect the face, and then to detect the mask as shown in Figure 1 below.

Figure 1: System Overview of our Project
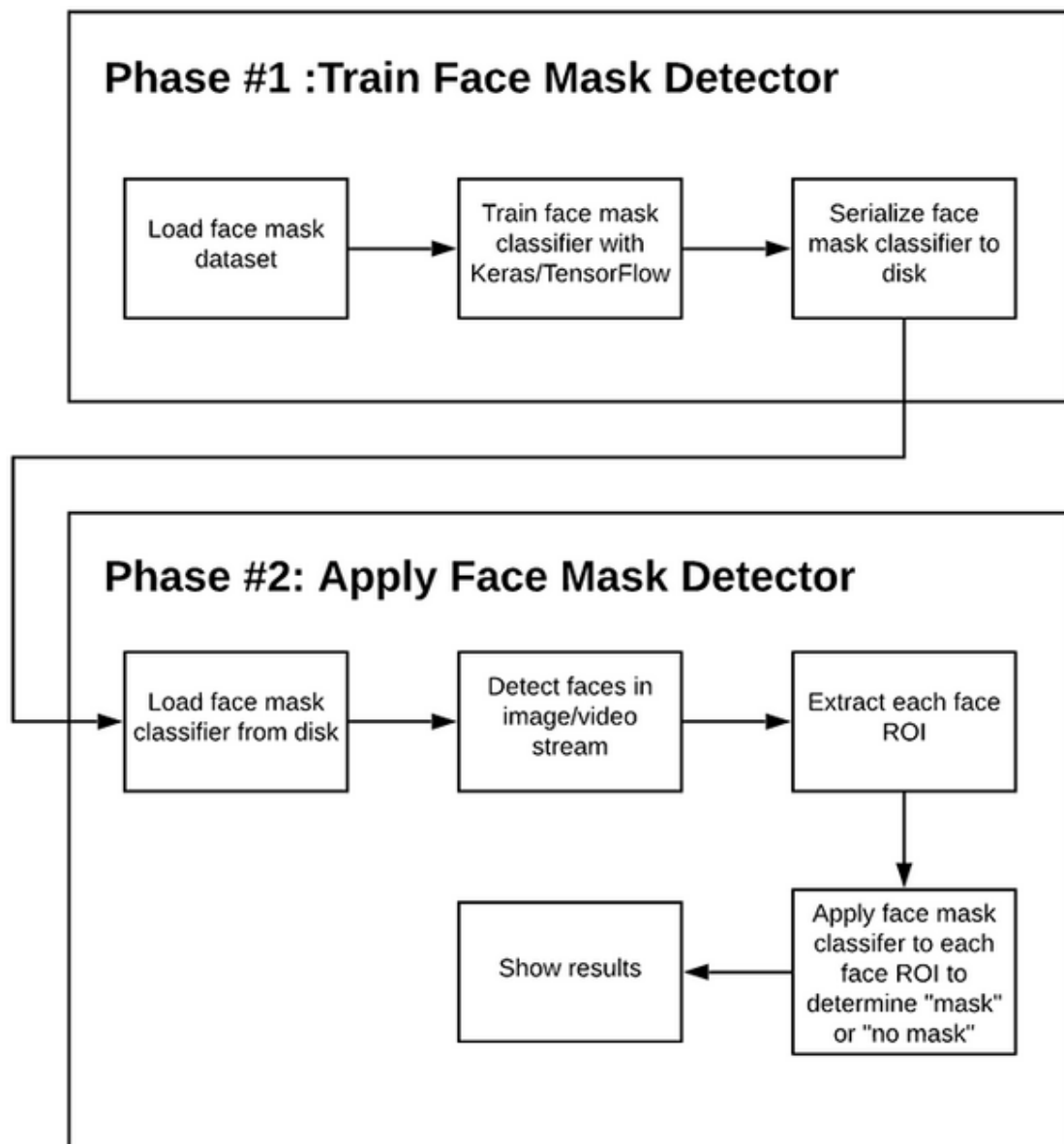
Development Environment:

We will be using python3 and the IDE of our choice will be PyCharm. We will be demonstrating our project with the camera sensor embedded in webcams in our laptops, so that each member has access to it for development. The dataset that we will be using is available freely to be used for open-source on Kaggle Dataset to get training data for our model.

We will also be using various open-source libraries that are available. Here's a list of possible libraries that we may use.

➢ Keras and Tensorflow for training our model.

➢ NumPy for converting our images into arrays of pixel density and it is also a requirement for opencv2

➢ OpenCV2 to help us utilize the webcam and capture videos and images for us to implement our pre-train model into a live scenario.

➢ Imutils and tkinter for some useful functions and GUI effects, if needed.

Tasks for each team member:

We expect the development of the first phase to be done by Nov 5, 2020, when the progress report is due. By December 3, 2020, we expect the complete development to be done.

Nisarg Shah:

Development lead on both the phases, and administrative head (maintains the GitHub repo, YouTube link, document submissions, and collaboration among group members)

<u>Hemantha Govindu:</u>

Primary developer for Phase 1 (Training the Face Mask Detector), in charge of project progress report

<u>Nihar Gupte:</u>

Primary developer for Phase 2 (Applying the Face Mask Detector), in charge of final project report

GitHub:

Nisarg has created the [GitHub](#) repo for this project and added Hemantha and Nihar as contributors. Our project can be tracked at the following link:

https://github.com/nisargushah/face-mask-detection

YouTube:

We plan to demonstrate the working of our project using a video. This will be done at the end of the project, after its completion. One of the team members will upload the demonstration video on their YouTube profile and a link will be shared when it's made available.

Future Goals: If time permits, we would also like to implement a social distancing detector using some of the same libraries.