

**“REAL-TIME DETECTION OF PEOPLE NOT WEARING FACE MASKS”****Motivation:**

The covid-19 pandemic has redefined the term ‘normal’ for people. With the virus having no mercy for anyone, it’s always better to take precautions when we are out there in the streets. World Health Organisation has already made face masks compulsory. However, some people happen to put a deaf ear towards these alerts and ignore the precautionary steps. Taking this into account, this project aims at building a system for real-time detection of people not wearing face masks using Machine Learning so that it can be used to scan people entering any shops, restaurants, etc. and restrict those who are not wearing a face mask.

**Dataset:**

The dataset would consist of images in .jpg format of real faces of people with and without face masks or any sort of face coverings. A person gets bypassed in the system if his nose and mouth are covered by a single line. We plan to keep our training dataset size around 1000 with ~ 1:1 ratio of images with and without face masks.

For data collection, we plan to use python libraries to scrap images of people with and without face mask from google and download them in .jpg format. The dataset would require an initial clean-up before using it to train the model. For this, we plan to use OpenCV python library to detect and delete any corrupt or non-readable images downloaded from the web. Finally, we would do some manual screening through the images to get rid of any irrelevant samples.

Since we plan to use both deep and classical machine learning techniques so we need to prepare a dataset by loading the images in a NumPy array for training the classical machine learning algorithms. Also, we need to load a label column into the array for the same. To reduce the computational time, we intend to consider the prospect of dimension reduction by converting the images to Greyscale.

For **labelling**, while scrapping, we would write a code snippet to auto-save the images as yes\_1, yes\_2, ...no\_1, no\_2, ...etc. where 1, 2, 3, ... keep the image count and ‘yes’ implies person in the image has a face mask on and ‘no’ otherwise. Hence, the file name will serve as the label to know whether the person in the image is wearing a mask or not.

**Method:**

The deep learning technique we intend to explore is **Convolutional Neural Network**. We also plan to investigate the scope of classical machine learning techniques to solve such problems. We have a baseline model that won’t predict as good as the final model.

**Architecture:**

For the **baseline model** we have one with minimum layer added to the model - one pair of Convolutional and MaxPool Layers for feature extraction, and we have one Flatten Layer following this, and for classification - one Dense Layer.

The **improved model** will have more layers. Here is a skeletal overview – 2 pairs of Conv and MaxPool – followed by one Flatten and one Dropout Layer – Then 2 Dense Layers. We also intend to explore batch normalization and regularisation techniques, viz. weight decay and dropout as well as some minor data augmentation like flip, crop, etc to the model to improve accuracy.

**Intended experiments:**

For comparison across the performance and evaluation of the models trained in different machine learning techniques, we plan to use the Confusion Matrices and ROC/AUC curves. Also, we plan to demo the model to our friends and family for live testing.