Mask Detection System

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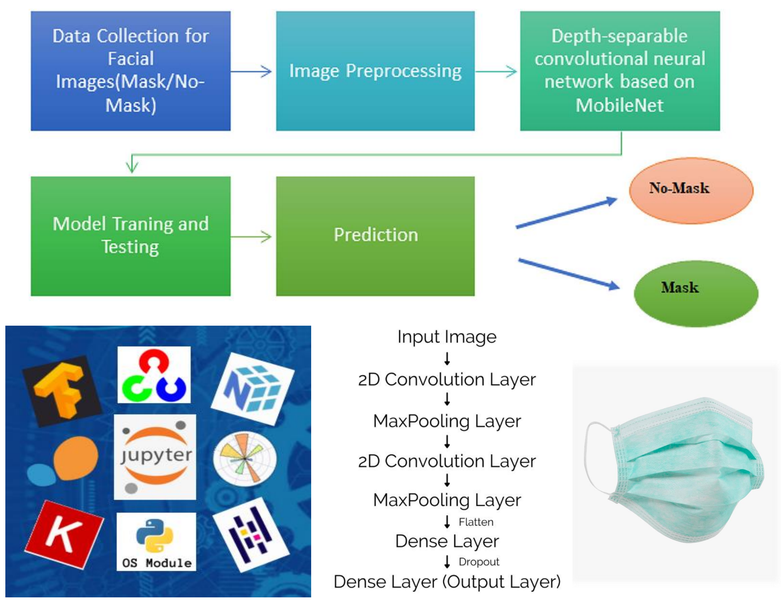
Introduction

During the pandemic, masks played a critical role in preventing transmission of the virus and hence were very widely used. But it has been difficult to implement this relatively new practice effectively. Face masks are often not worn properly by people. So, Face Mask Detection System comes in very handy.

Problem Statement

If face masks are not worn properly, it makes them useless, therefore our aim is to implement a system for checking the same, preferably without human intervention as there is already shortage of personnel in several areas. Hence, the Mask Detection System can be put to use.

Architecture Diagram

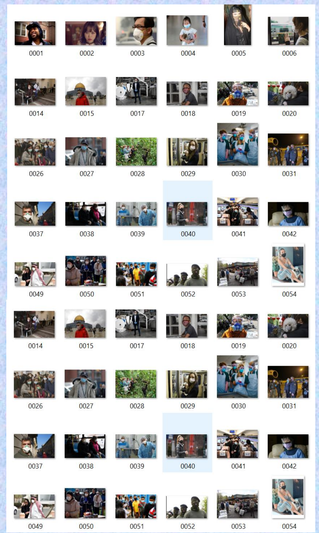


Explanation

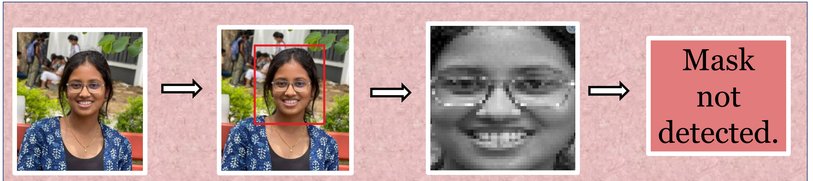
- Import necessary libraries for Face Mask Detection
- Create a training dataset for training an image classification model; train.csv file contains information about images such as the image name, coordinates for bounding boxes of faces as well as the class-name for each bounding box.
- Build classification model (a convolutional neural network) for face mask detection using tensorflow.
- Extract the features from the image and convert to grayscale with focus on the face part of the image.
- After setting up the training and the CNN architecture, make the prediction whether a person in an image is wearing a face mask or not.
- For face detection : **MTCNN** was used. Multi-task Cascaded Convolutional Neural Networks (MTCNN) is a framework developed as a solution for both face detection and face alignment.

Dataset

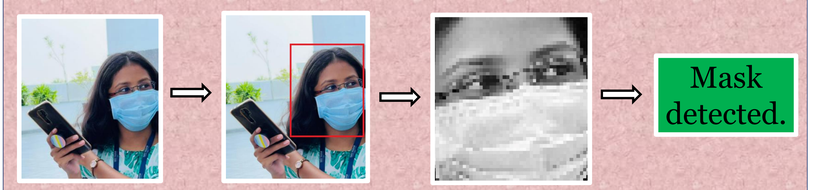
- Obtained from kaggle
- Contains 6024 images in total
- Categories: With mask and no mask
- Biased towards face with mask images
- Biasing removed by decreasing the dataset size to achieve equal weightage in both categories
- Two csv files used for dataset manipulation : train.csv and submission.csv



Result



"Face_no_mask" detection



"Face_with_mask" detection

- If the probability value at index 0 is greater than the probability value at index 1, the classification is "face_no_mask".
- If the probability value at index 1 is greater than the probability value at index 0, the classification is "face_with_mask".

Conclusion

Accuracy: 0.9853

Face_no_mask:
[0.990774 0.00922605]

Face_with_mask:
[6.8810317e-07 9.9999928e-01]