Face Mask Detection

Group Members:

Reyan Naser 20K-0194

Ahzam Imam 20K-1612

Aliyan Khan 20K-1856

Introduction:

Since the outbreak of COVID-19**,** wearing face masks has become an essential safety measure to prevent the spread of the virus. As a result, face mask detection has become an important task in many public places, such as airports, hospitals, schools, and businesses. To automate this process, machine learning models are being developed that can detect whether individuals are wearing face masks or not. In this project, we will be developing a face mask detection model using deep learning techniques. The model will be trained on a dataset of images of people wearing and not wearing face masks and will be able to accurately detect whether a person is wearing a face mask or not in real time.

Methodology:

There will be two kinds of data provided. The first one will be people wearing a face mask, and the other one will be without a face mask. The methodology that will be used will be Convolutional Neural Networks (CNNs), which is a type of deep learning algorithm widely used for image classification tasks. Overall, the methodology that will be used in the project will combine pre-trained models, transfer learning, and image processing techniques to achieve high accuracy in celebrity face classification.

Step Wise Approach:

- Data collection: Collect a dataset of images with and without masks. This dataset can be created by capturing images of people wearing masks and people not wearing masks.
- Data preprocessing: Preprocess the images by resizing them to a uniform size, converting them to grayscale or RGB format, and normalizing the pixel values. This step is important for improving the model's accuracy.
- Data augmentation: Augment the dataset by using techniques such as image flipping, rotation, zooming, and shifting. This helps to increase the size of the dataset and improve the model's ability to generalize.
- Training the model: Train a convolutional neural network (CNN) model using the preprocessed and augmented dataset. The model should be designed to classify the input image as either having a mask or not having a mask.
- Model evaluation: Evaluate the performance of the trained model by using a separate test dataset. Calculate metrics such as accuracy, precision, recall, and F1 score to measure the model's performance.
- Model monitoring: Continuously monitor the model's performance in the production environment, and retrain or update the model as necessary to improve its accuracy and performance. This step is important for maintaining the effectiveness of the model over time.

Dataset Used:

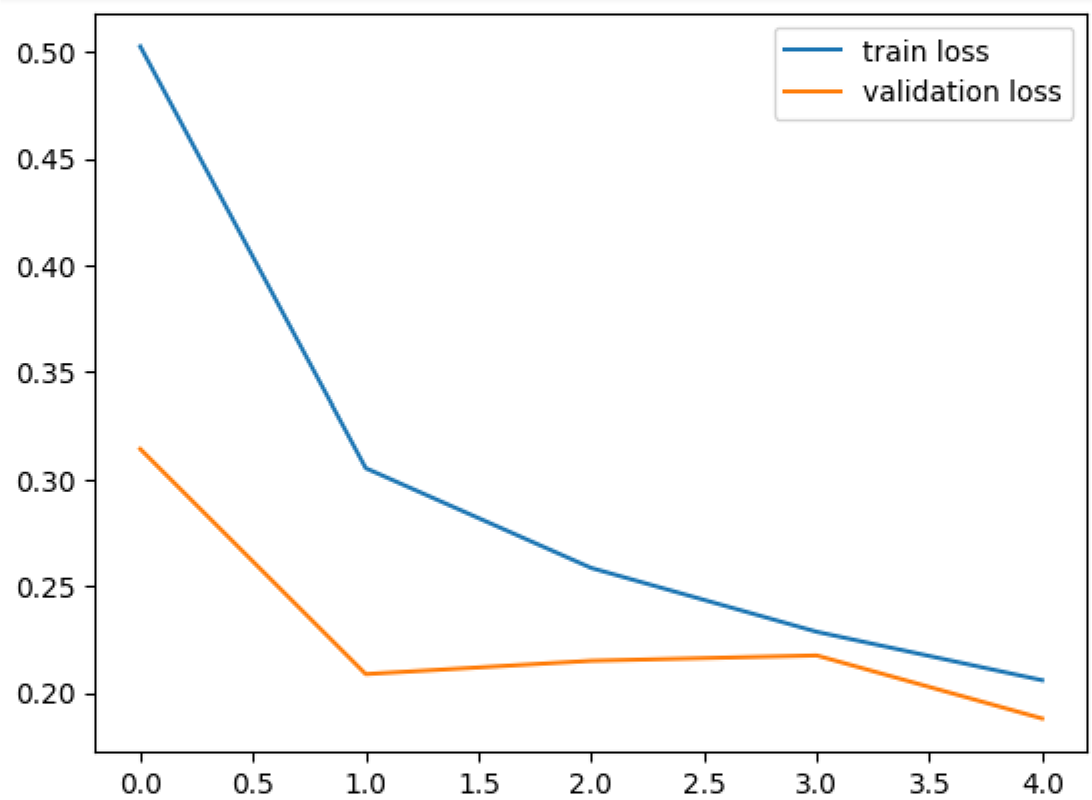
- model that detects face mask trained on 7553 images with 3 color channels (RGB).
  On Custom CNN architecture, Model training accuracy reached 94% and Validation accuracy 96%.
- Data set consists of 7553 RGB images in 2 folders with mask and without a mask. Images are named as labels with masks and without masks. Images of faces with masks are 3725, and images of faces without masks are 3828.

Accuracy:

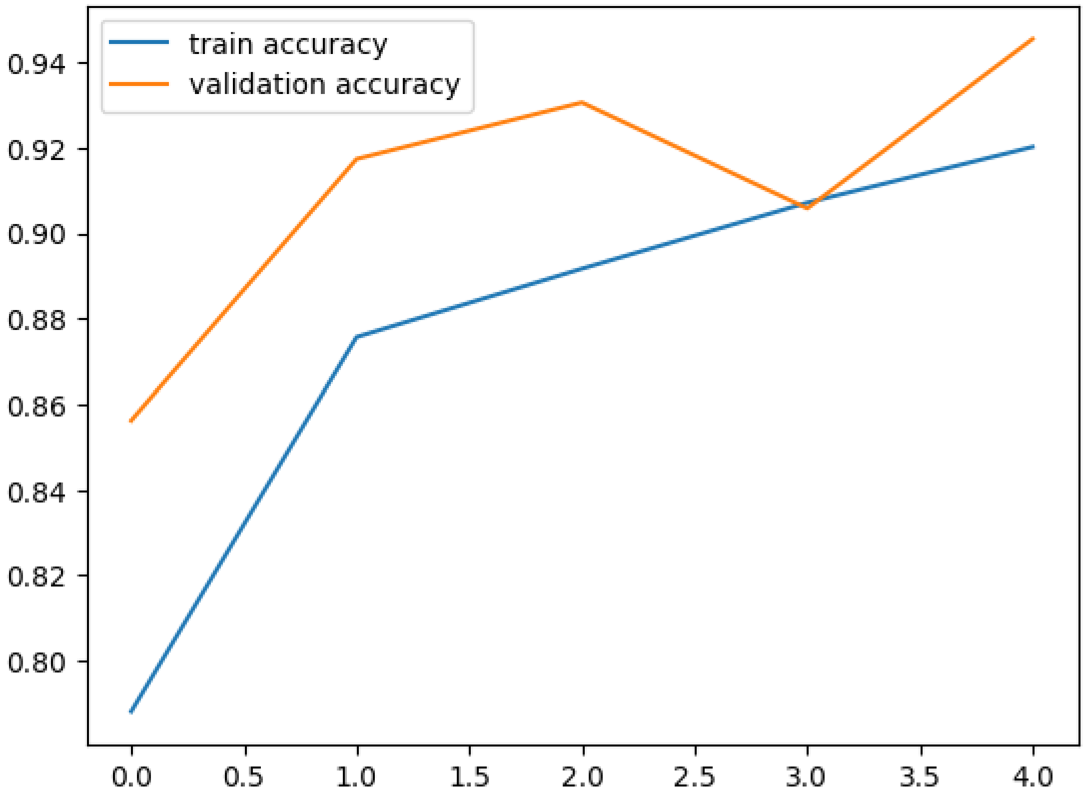
The model gave the accuracy of 92.32%.

```
48/48 [==============================] - 10s 206ms/step - loss: 0.2122 - acc: 0.9232
Test Accuracy = 0.9232296347618103
```

Training loss vs Validation loss:



Training Accuracy vs Validation Accuracy:



Results:

```
Path of the image to be predicted: /content/maskimage.jpeg
```

```
1/1 [==============================] - 0s 51ms/step
[[0.00315035 0.9649649 ]]
1
The person in the image is wearing a mask
```