Face Mask Prediction using U-Net

Advanced Computer Vision

Description

In this hands-on project, the goal is to build a deep learning model using U-Net as architecture that will learn the pixel mapping of the face in an image.

Dataset

WIDER Face Dataset
- WIDER FACE dataset is a face detection benchmark dataset, of which images are selected from the publicly available WIDER dataset.
- This data has 32,203 images and 393,703 faces are labelled with a high degree of variability in scale, pose and occlusion as depicted in the sample images.
- In this project, we are using 409 images and around 1000 faces for ease of computation.

One data sample:
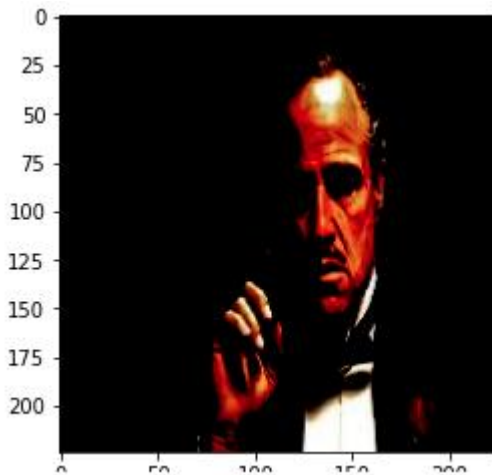
Context

We will be using transfer learning on an already trained model. We will use the MobileNet model which is already trained to detect the face attributes. We will need to train the last 6-7 layers and freeze the remaining layers to train the model for predicting

the mask on the face. To be able to train the MobileNet model, we will be using the WIDER FACE dataset for various images with a single face and multiple faces.

Reference

Acknowledgement for the dataset http://mmlab.ie.cuhk.edu.hk/projects/WIDERFace/
Mobile Net paper: https://arxiv.org/pdf/1704.04861.pdf

Steps

- Load the dataset given in form .npy format.
  - We have already extracted the images from the wider face-dataset and added them in the file images.npy. You can directly use this file for this project.
  - "images.npy" contains details about the image and their masks, there is no separate CSV file for that
  - There is no separate train and test data given
- Create Features(images) and labels(mask) using that data.
- Load the pre-trained model and weights.
- Create a model using the above model.
- Define the Dice Coefficient and Loss function.
- Compile and fit the model.
- Evaluate the model.

Learning outcomes:

- Fask Mask Prediction
- Semantic Segmentation
- U-Net