

Problem Statement:

1. Build an application that sets up a REST endpoint to predict if an image has a person in it
2. Predict if the person in an image is wearing a mask

Approach:

The prediction tasks which starts with index page.

An index page has two options for the user:

1. Human detection
2. Face Mask Detection

Based on the user's action, I redirected to '/predict' html page. This html page is common template for accepting the image as an input from the user. The contents of the web page and the subsequent actions carried out on this web page changes dynamically as per the user's action. The accepted image format for the prediction tasks are 'PNG', 'JPG', 'JPEG'. A JavaScript is implemented to show the preview of the uploaded image in the html page.

Human Detection:

The input image is passed to the pretrained `ssd_mobilenet_v1_coco` object detection model. The labels are mapped to an id. The input image is converted to ndarray using NumPy. The ndarray is passed to the TensorFlow graph and classes are detected. The detected classes are then filtered to identify the humans in the image. If persons are detected in the image, then a green rectangle with "Person" label with accuracy percentage is drawn on the image.

Face Mask Detection:

Once the user clicks upload button, the pretrained face mask detection model is loaded with pretrained weights. The input image is converted to 300x300 resolution using OpenCV library. I used deep neural networks to compute the face detections and see if there is any face on the given image. I set the confidence to 0.5 to avoid weak prediction of faces. Now, the face mask model is used to predict the face and a rectangle of width and height equal to the width and height of the face, is drawn on the image. I used green colour for the rectangle, if the mask is worn on the face and red if not.

Application Packaging:

- Python3
- OpenCV
- TensorFlow Object Detection
- Pillow
- Flask
- NumPy

Deployment:

The application is dockerized and deployed in the Amazon EC2 instance. The IP address is made public and can be accessed from anywhere.

Public IP: <http://52.212.255.16:5000/>