Option#2

Final Project – Implement a ==Real Time== Face Mask Detection

Value: 30%
Date of Project Group Presentation: 20 April during our class meeting
Date of Submitting all necessary Document: 20 April, 11.59 PM

Project Objective:

The objective of the project is to demonstrate the personal abilities and skills required to produce and present an extended piece of work/idea in the field of Artificial Intelligence. Through the project, students are expected to engage in personal inquiry, action and reflection on specific topics and issues to solve a real-world problem. Students build self-confidence, demonstrate independence, and develop professionalism by successfully completing the project.

By completion of the project students will become proficient in building a complete end-to-end machine learning model from loading the data to making predictions.

Object detection, aims to automatically mark the coordinates of objects of interest in pictures or videos, is an extension of image classification. In recent years, it has been widely used in intelligent traffic management, intelligent monitoring systems, military object detection, and surgical instrument positioning in medical navigation surgery, etc. COVID-19, a novel coronavirus outbreak at the end of 2019, poses a serious threat to public health. Many countries require everyone to wear a mask in public to prevent the spread of coronavirus. **To effectively prevent the spread of the coronavirus, design an object detection model to detect people wearing a mask and not wearing a mask in ==real time==.**

Instructions:

Work in **groups of 3(you can also work individually or in group of 2)** and do the following.

1. ==Build== the required dataset using a python code. [Students are **not allowed** to use the Kaggle Dataset, but instead has to write a python script that will capture and thereby collect images through webcam.

2. Label your dataset using ==**labelImg API**== (an annotation tool which provides images with bounding boxes after labeling.) https://github.com/tzutalin/labelImg
   [Additional Help: https://medium.com/@sanghuynh_73086/how-to-install-labelimg-in-windows-with-anaconda-c659b27f0f]

3. You will **not be building** an object detection model from scratch, instead you will use ==TensorFlow Object Detection API== and leverage the concept of Transfer Learning using pre-trained model.

4. Make real time predictions.

Additional Help:
https://tensorflow-object-detection-api-tutorial.readthedocs.io/en/latest/training.html
https://towardsdatascience.com/creating-your-own-object-detector-ad69dda69c85
https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/tf2_detection_zoo.md
https://readthedocs.org/projects/tensorflow-object-detection-api-tutorial/downloads/pdf/latest/
I am also providing a video file.

Required Submissions: (Group Submission)
1. Each group should submit a single word document on the steps to complete the project.
2. Each group should submit all the necessary jupyter notebook files of the code.
3. Each group should submit a screen recording of their real time face mask detection in action and explanation to the code.
4. The requirement.txt file.

Required Submissions: (Individual Submission)
5. Each member of the group should submit a peer evaluation form.

Rubrics:
1. The group have made a presentation of the final project with presentation time equally divided among group members.
2. All submitted code are complete and error free. If any error, your group work will be graded to zero.
3. Does the project give the expected result?
4. All code should be well commented and readable.
5. Has the group submitted all the files and individual members submitted the peer evaluation form?

This exercise relates to the following Course Learning Outcomes:

CLO1- Apply deep learning frameworks like TensorFlow and Keras to define and train deep-learning model.

CLO2- Identify the promises of deep learning methods for applications in Natural language processing problems and Computer vision.

CLO4- Understand how to apply Sequence model - Recurrent Neural Networks (RNNs), and its variants such as GRUs and LSTMs to Natural language problems.

CLO5- Analyze and review research articles from AI journals and conference proceedings to appraise the advanced concepts and applications of AI.

CLO6- Design an end-to-end model for a potential application that uses Machine learning/Deep Learning as its core by choosing the appropriate ML/Deep learning Algorithm.