ITI107 Assignment

Introduction

Object Detection has many useful applications, such as autonomous vehicles, crowd sensing, video surveillance and many more. You have learnt how to train a custom object detector in your practical exercise using TensorFlow Object Detection (TFOD) API. It is time to apply what you have learnt to create your own custom detector.

Tasks

You are to form a **team of 2** to work on this assignment.

For this assignment, you are expected to identify what class of objects you would like to detect and train a custom detector for the identified objects. At least one of the object class you choose **SHOULD NOT** be from existing COCO object class (refers to https://github.com/amikelive/coco-labels/blob/master/coco-labels-2014_2017.txt for the list)

The following are the tasks you will need to complete:

- Collect and annotate the images
- Decide on **ONE** pretrained model you would like to use
- Define the training pipeline in TFOD
- Train the model and evaluate the model performance
- Perform hyperparameter tuning to improve model performance
- Export your best model for inference
- Use your exported model for inference model on a selected test image and selected test video (around 1 minute)

Submission

You are to submit the following to Blackboard:

1. One Report (Maximum 8 pages, font size 12, single column) per team that contains the following:
    - discussion of your data collection and annotation process (group)
    - discussion of training process and experimental results (individual)
    - screenshots of mAP and loss and evaluation images from Tensorboard (individual)
    - a section describing contribution of individual members
2. Training pipeline config file (for all experimental runs) and labelmap file
3. ONE Test image and ONE video file (.mp4) with bounding boxes (produced by the best model)
4. Exported model in SavedModel format (zipped up the model folder)

Submission deadline: 19 Dec 2021 (Sunday) 1159PM.

Grading Rubric

Total Marks: 45 marks

	Need Improvement	Satisfactory	Good	Excellent	Marks
Data Collection	Minimum data collection effort (very few images per class and only 1 object class) or use existing or irrelevant dataset. Data has minimum annotations or wrong annotations.	Some data collection effort (reasonable number of images per class for only1 object class). Dataset is somewhat relevant to final detection task. Data is sufficiently annotated with somewhat correct bounding boxes.	Good data collection effort (reasonable number of images for 2 object classes). Dataset is relevant to the final detection task. Data is well-annotated with mostly accurate bounding boxes.	Significant amount of data collection effort (sufficient number of images per class for 2 or more object classes). Dataset is relevant and representative of final detection task. Data is well annotated with accurate bounding boxes.	Group (10m)
Model Training	Minimum effort in model training using a pretrained model and with minimum training steps. The trained model does not detect most of the time or detect. No tuning of hyper-parameter.	Some effort in model training (e.g. train one model with enough training steps). The trained model shows below average detection precision (measured by IOU@0.5 mAP). Minimum hyper-parameter tuning.	Good effort in experimenting with fine-tuning ONE pretrained model with enough training steps and some level of hyper-parameter tuning. The trained model shows average detection precision (measured by IOU@0.5 mAP).	Significant effort shown in experimenting with ONE pretrained model with sufficient training steps and good hyper-parameter tuning. The trained model shows above average detection precision (measured by IOU@0.5 mAP)	Individual (30m)

	Need Improvement	Satisfactory	Good	Excellent	Marks
Report	Writing is incoherent. Lack of content	Writing is clear. The content is general and lack discussion of experimental result.	Writing is clear. The content is specific with some discussion of experimental results.	Writing is clear. The content is specific with extensive discussion of experimental results.	Individual (5m)