Final Semester Project

I. Overview

- You only look once (YOLO) is one of the best object detection system nowadays with high accuracy and rapid processing time. YOLO is built base on Convolutional Neural Network (CNN). YOLO is designed to run forward propagation on CNN only once. Its output will be bounding boxes, confidence and the class of the object. This is a great advantage compared to traditional methods, in which the input images is processed multiple times (with different image's positions and different scale rate) to locate and identify the object.
- Let's learn more about YOLO and build an application based on it.

II. Requirements

1. (5pts) Installing YOLO and using available models to build a program with web interface which allows to insert an image and return object detection result.
2. (5pts) Applying YOLO to build app:
    a. Understanding and training to detect new object types: learning YOLO's training method and adding new objects' data, in order to train a new model able to detect these new objects.
    b. Applying to build a complete application. For instance: food detection, plants detection…

III. Detailed requirements

- For each requirement, you need to have a detail report about: what have you done, which parts are referenced from the source code.
- With 2nd requirement, you can apply YOLO to any problem.
    - You need to submit the data, which is added to train the new object, and the model. The minimum number of classes is 5. The number of sample data depend on the problem chosen, but it is necessary to collect enough data to have a high relative accuracy.
    - You need to evaluate the model with the F1-score or suitable score. In the report, you need to present the train/test/validation data division, the score on these sets and the score by epoch.
- The model is allowed to load only one time and is used for all classifications. Only when the model need to be updated, the system reload the model again. In case violating this rule, you will be deducted 60% of the points for 1st requirement and 40% of the points for 2nd requirement.
- For powerful computers to train, you can register and use Google Colab.

- You can do the project in groups or individually. For groups, 2nd requirement will have higher level of difficult.
- The project will be graded by Q&A session. Although the training data may not need to be submitted through moodle, it still need to be presented in Q&A session.
- Note: both 1st and 2nd requirement require to build the application. Although 1st requirement is simple and easy, you need to have application to demo. Please pay attention to this to avoid being deducted 5pts for 1st requirement.

IV. References

- Zero to Hero: Guide to Object Detection using Deep Learning: Faster R-CNN, YOLO, SSD
- YOLO: Real-Time Object Detection
- YOLOv3: An Incremental Improvement
- YOLO — You only look once, real time object detection explained
- Convolutional neural networks for visual recognition
- https://github.com/pjreddie/darknet
- Yolo Annotation Tool
- Python Tutorial With Google Colab