

Project Course

Goal: Learn to build an object detector from the scratch by an amazing tool (TensorFlow object detection API). Learn to how to use the API for a new dataset, evaluate it and finally make a prediction on test images.

This project should be done as a team work (2 persons) or you can do it alone.

Deadline: 03.03.2024 at 24:00.

Tool: For labeling the images ([labellmg](#)) and for object detection ([Tensorflow Object Detection API](#))

Data set:

- 1- Create a dataset with your choice: animals, plant, persons, food, activity, tools, vehicles, pedestrians, staffs, etc,...

To create the dataset, you have 2 options as follow:

- Images can be collected are from Google. Then, you can label them by using [labellmg](#) tools.
- Download images and their annotations from [ImagNet](#) or [Open Image Dataset](#).

Note1: You can consider only single object or multiple objects for detection.

Note2: In total, you should have at **least** 200 images (160 are used for training and 40 for test). Of course, more images for training could be more effective to learn a good model but annotating them is more time consuming.

- 2- Use the defined satellite image dataset (available in Moodle)

The data is public and it is hand annotated it from Google maps in March 2021. Source:
<https://www.kaggle.com/ancaco12/aerial-satellite-images/metadata>

The data consists of 3 object detection classes:

- Piscina = swimming pool
- Rotonda = traffic circle/ roundabouts
- Parking = parking

It consists of 200 satellite images with resolution 640x640 for training and 40 images for validation.

Note3: Make sure all your images are **.jpg** images. The usage of images with other extensions may lead to problems during training.

Tasks: by using Tenorflow object detection API:

1- Train a **Faster R-CNN** detector with **ResNet101** as a backbone on your data. You first must do the following sub-tasks before training:

- You first need to download the pre-trained model faster R-CNN_ResNet101 model on COCO dataset from here.
- Then you need Modify the configuration file (faster_rcnn_resnet101_coco.config) in models/research/object_detection/samples/configs

2- Export the model

3- Test the model by modifying the notebook (object_detection_tutorial.ipynb) at

“models/research/object_detection/colab_tutorials/ “

Note: I highly recommended following the instructions in lecture 6, part 2 for doing this project.

Instruction for Submissions: Return a project presentation and a jupyter notebook to Moodle as **two PDF** files.

1. **Project presentation:** submit a PowerPoint project presentation (maximum 5 slides). The presentation should consist of the following parts:

- Names
- Brief description of the dataset, implementation.
- Evaluation the model on your data
- Project conclusions

Note: I will share this file to all students in the course Moodle after the project deadline.

2. **Jupyter notebook:** submit the inference notebook (object_detection_tutorial.ipynb)

Note: convert the PowerPoint and notebook to pdf files and save them with name of your dataset. For example, if you design a detector for car detection, then the name of files are “carDetection_presentation.pdf” and “carDetection_notebook.pdf”.

Assignment Evaluation: The report and notebook are evaluated on 0-20 points scale (0 means that the work is rejected).