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Exercise: Single Shot Detector (SSD) (Reading Task - ca. 1h + Coding Task – ca. 1h)

1. Learning goal

In the last exercises we discussed the YOLO and YOLOv2 model. Now let us consider another important model: the Single Shot MultiBox Detector (SSD).

2. Read the paper AND/OR secondary literature about SSD

You can read the original paper …

Liu, W.; Anguelov, D.; Erhan, D.; Szegedy, C.; Reed, S. E.; Fu, C. & Berg, A. C.
SSD: Single Shot MultiBox Detector
Arxiv, **2015.**

… and/or alternatively find good other sources that summarize the main ideas of the SSD model. There are a lot of good blogs in the WWW where other researchers, PhD students, students, etc. try to describe the central ideas of current object detector models with their own words.

3. Questions

1.) What is the central idea of SSD?

2.) How many output values are generated for one of the feature maps used in SSD for object detection, if the feature map has dimension m x n?

3.) How good is SSD compare to Fast R-CNN, Faster R-CNN and YOLO?

4.) What is the Jaccard overlap/index?

4. Experimenting with SSD and comparing SSD with YOLO

There are stand-alone implementations of SSD available at GitHub. However, Google also has published the "TensorFlow Object Detection API"

https://github.com/tensorflow/models/tree/master/research/object_detection

which allows us to experiment quickly with different object detection models, as Faster R-CNN or SSD.

First get and install this API. In my case, I found this blog very helpful:

https://medium.com/@rohitrpatil/how-to-use-tensorflow-object-detection-api-on-windows-102ec8097699

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Then copy the code from

https://github.com/tensorflow/models/blob/master/research/object_detection/object_detection_tutorial.ipynb

in one Python script test_ssd.py.

It allows you to define a list of own images and test a pretrained SSD model.

Take the same test images from the previous exercise that we used to test the YOLO model (Darknet implementation).

Then compare the resulting SSD predictions with the predictions made by the YOLO(v3) model.

What are the differences?