Programming with neural networks: Exercise sheet 8 SS 2020
University of Würzburg - Chair for Computer Science VI Prof. Dr. F. Doll, A. Hekalo, M. Krug

Exercise sheet: 8

Edited on June 25th

Task 1: Single Shot Detector

Load the SSD[1] and run either the iPython notebook[2] off
or copy the code into a separate python file and run it.
Attention: Paths and the pre-trained checkpoint may have to be adjusted
must be unzipped!

(a) Apply the SSD to another, possibly even your own, image.

(b) As explained in the lecture, the SSD basically delivers an extremely large number of BBs that can then be sorted out by two parameters. Which parameters
Which two procedures are they? Explain what happens if this is very large
or small.

Solution:

- The *select threshold* indicates the threshold from which probability probability (confidence) that BB is taken into account.
- The *nms threshold* (non-maximum suppression) indicates which overlap must have two bounding boxes (of the same class) so that only the More likely to survive.

(c) Change the parameters in the code so that

- The unsafe BBs are also displayed
- all different variants are displayed for the BBs (i.e. e.g. 10 BBs for the same object)
- only the very safe BBs are displayed

(d) You would like to use the pre-trained network to build an SSD on it train that recognizes traffic signs of 53 different types.

- How is the data record or a data point structured?

Solution: A data point consists of an image and the marked ones Traffic signs with their class (and position / dimension)

Page 2

• What must be changed in the network structure?

[1] https://github.com/balancap/SSD-Tensorflow

[2] https://github.com/balancap/SSD-Tensorflow/blob/master/notebooks/ssd_notebook.ipynb

Solution: Each of the different output layers is replaced by a layer that has (53 + 1 + 4) * n_{BB} issues per issue position, d. H. the classes will be expanded or reduced as the case may be. The others Shifts can be taken over 1 to 1.

(e) What problems could arise when using an autonomous vehicle only and relies solely on the output from the SSD to detect the traffic signs grasp. But also explain whether these problems in principle also apply to the People play a role.

Solution: Dirty traffic signs, or „fake "signs can FP or be FN. For example, projection of a traffic sign onto a house wall. People could use background knowledge here to distinguish but certainly not in all cases!