Lab 3

Today we have covered convolutional neural networks, how they work, why they are good for computer vision and how they are implemented in *Keras*. The slides and code are uploaded to *Moodle*.

Instructions

Your task is to run 3 experiments in which you will train a CNN (convolutional neural network), in different setups, test different hyper-parameters and log their impact on the performance. Specifically you should test various:

- Learning rates
- Network architectures
    - Amount of convolutional layers
    - Amount of filter in each layer
    - Sizes of filters
    - Strides
    - Max pooling vs Average pooling
- Optimizers
- Dropout rates

Optimization

Finding the optimal setup that produces the best accuracy is a matter of experimentation. There is no “correct” amount of layers/filters/epochs, in the optimization process you should try many different setups and pick the one that produces the best results. The goal of this lab is to log 3 different experiments and report their metrics (accuracy and loss). In your report you should specify the setups (hyper-parameters you chose) and their accuracy and loss plots accordingly.

Installations

To run the code successfully you should have *Tensorflow*, *Jupyter* and *Keras* installed. Students who finished the last assignment should already have *Tensorflow* and *Jupyter* installed. Installation instructions can be found here:

- Install tensorflow - https://www.tensorflow.org/install/
- Install jupyter - https://jupyter.org/install.html
- Install keras - https://keras.io/#installation
- If all the steps were completed, you should be able to run the following line in python: `import keras`.

Notes

- You can reuse the code from the Jupyter notebook called *02 CNN example* (download via *Moodle*), notice you use the CNN part and not the DNN part.
- To learn more about *Keras*, visit here, the documentation is great and there are a lot of code examples on the internet.
- Note that running a CNN is more computationally intensive than a regular DNN, so you should expect longer run-times, this is perfectly normal and a part of the process.
- Feel free to contact me on *Moodle* if you run into problems (but please make sure you have exhausted google if it's a technical issue with installations).