

DATA.ML.200 Pattern Recognition and Machine Learning

Exercise Set 5: Neural networks

Be prepared for the exercise sessions (watch the demo lecture). You may ask TAs to help if you cannot make your program to work, but don't expect them to show you how to start from the scratch.

1. **python** *Load Traffic sign data for deep neural network processing.*

Download an extended version of the two class German Traffic Sign Recognition Benchmark (GTSRB) dataset (GTSRB_subset_2.zip) from the course Moodle page.

This time, images are in color and there are about 400 from both classes. Split your data into two parts - 80% for training and 20% for testing. Note that there are ready-made functions for that.

2. **python** *Define the network in Keras.*

Define the homework network in your code. You may in the beginning reduce the number of neurons from 100 to 10 in the two layers.

3. **python** *Compile and train the net.*

Use the following parameters:

- **Loss:** binary crossentropy (same thing as log loss; see previous exercises)
- **Optimizer:** stochastic gradient descent (SGD)
- **Number of epochs:** 10

Compute the test set accuracy for your network.

NOTE: if you have GPU in your laptop/desktop report training times per epoch for the both GPU training and CPU training. In the case of GPU you may need to adjust the *batch_size* option to make sure the data fits to your GPU memory.