

Exercise sheet week 12 - Machine Learning I - 2015/16

Please send your submissions (runnable code, plots and written answers) **via email to weis@ccc.cs.uni-frankfurt.de until Friday February 12th 2016**. One submission per student. Prepare to present your solutions in the exercise session. Students that are not able to explain their solutions may not be given credit on their submissions.

1 Deep Learning - 10 points

Finally it's time to train, run and observe a Convolutional Neural Network in action. A nice framework for beginners is given by `nolearn` and `lasagne`, which will be used in this exercise.

1. Install the necessary python packages using these commands:

```
pip install -r https://raw.githubusercontent.com/dnouri/nolearn/master/requirements.txt
```

```
pip install git+https://github.com/dnouri/nolearn.git@master#egg=nolearn==0.7.git
```

or follow the instructions on the `nolearn` GitHub page (<https://github.com/dnouri/nolearn#installation>).

2. Read and implement the tutorial presented in <http://blog.christianperone.com/2015/08/convolutional-neural-networks-and-feature-extraction-with-python/>
3. Compute the response of the trained network on an image you created yourself (use `paint`/`gimp` to draw a number with the mouse). Plot your image, the response and write down the lines of code that were needed to achieve this task.
4. (Textual answer please) Explain in no more than five sentences what *Dropout* is and why it's used.
5. (Textual answer please) You extracted and visualized the filters of the convolution layer. Are they learned or given, and what do they mean?
6. (Textual answer please) While training your network, values for epoch, train loss, valid loss, train/val, valid acc and dur have been shown. Explain their meaning and how they help you to assess the performance of your neural network.