Signal Processing Systems

Machine learning for signal processing *[5LSL0]*

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Where innovation starts

Implementing your own Neural Network

Goal

- Deepen knowledge by implementing own neural network
- Learn to choose and motivate proper training strategies
- Demonstrate your knowledge for assessment (and get ECTS)

Organization

1. Contact hours (for group work/asking questions):
   - June 7
   - June 10
   - June 14
   - June 17
2. Use Discord on Mondays and Thursdays to ask your questions and to work together with the group.
3. Schedule appointment for oral exam with your group via Doodle. The Doodle link will be announced on Canvas.

Peer review

Each group member must submit,
at the latest two days before the oral exam, a peer-review report. This report consists of:

- For each of the group members (including yourself), write down in a concise way what the contribution of the member was
- Based on these contributions, with what grade (0-10, 10 being the best) you would assess each group member (again, including yourself).

Your peer review document will be kept confidential, but we can use it as guideline in the oral examination.

Assessment: oral exam

The assessment is based on an oral exam that you will take with the full group.

- Prepare short presentation (10 minutes) with the group. This can be given by a single (or several) group member(s)
- Each group member must be able to answer questions about all aspects of the project
- Questions will also cover parts of the entire course, so make sure that you study all material and not only the project.
- We might ask you to do a small written assignment during the oral exam and show your results in from of the webcam.

The oral exam counts for 80% of your grade

Project content

With your team, choose any project from the following suggestions:

- Datasets with good opportunities to experiment with unfolding, but also to try more conventional neural networks:
  - FastMRI (http://fastmri.org)
  - Optical super resolution (http://bigwww.epfl.ch/smlm/challenge/index.html?p=datasets)
- Kaggle speech recognition (https://www.kaggle.com/c/tensorflow-speech-recognition-challenge)

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Note that obtaining a high score in any of these challenges does not guarantee in any way a high grade (or even a pass) at the exam. Likewise, poor performance in the challenge does not guarantee a low grade.

Do's and Don'ts

Do's:

- Choose a project and download training and test data
- Design and train your deep learning model
- Apply your model on the test data (if applicable)
- Learn from knowledge shared by others on the various Discussion topics (not necessary, but strongly advised)
- Have fun by experimenting with neural networks and get inspired by the problem and the solutions that you can see or come up with yourself

Don'ts:

- Copy and paste from other (official) competitors without understanding
- Stress about not having a perfect performance. Better to have poor performance but understand why then to have good performance and not understand why.

Important dates/deliverables

- Make appointment for oral exam as soon as the Doodle link is provided
- Send peer-review report two days before oral exam
- Prepare presentation and study course material
- Present group work during exam and be prepared to answer questions