Advanced Machine Learning
Lecture 10.1:
Project Kick-Off

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Learning Objectives for the Project

In parallel to working towards the general learning objectives of the Advanced Machine Learning Course, you are intended to

- **Become familiar** working with a scientific article in machine learning
- **Implement** and **apply** a recent machine learning method
- **Evaluate** and **report** the method performance and compare it to those published in the scientific article

General

- In groups, you are intend to design implement a method from a scientific paper, evaluate and report your work.
  - You have to work in groups of 2–3 people.
  - The group formation happens during the first week of the project.
  - One person from each tentative group must send a list of group members for approval to the course manager latest on Wednesday 13th November.
  - The course manager reserves the right the modify the grouping if it is necessary.
- The Exercise sessions on Wednesday and Friday are **working sessions**
  - The TA will be available
- The course manager has office hours, room 4D18, on Mondays 13–14 on the weeks 47–49.

The Problem Statement

Your task as a group is to select and implement, evaluate and report a machine learning method from one of the following papers scientific papers:

- *Double Q-learning*, 2010
- *LSTM Neural Networks for Language Modeling*, 2012
- *Support Vector Machines (SVMs) versus Multilayer Perception (MLP) in data classification*, 2012
- *Convolutional Neural Networks for Sentence Classification*, 2014
- *Generalized Autoencoder: A Neural Network Framework for Dimensionality Reduction*, 2014
- *Generative Adversarial Nets*, 2014
- *Recurrent Convolutional Neural Networks for Scene Labeling*, 2014
- *Human-level control through deep reinforcement learning*, 2015
- *Analysis of k-means clustering approach on the breast cancer Wisconsin dataset*, 2016
- *Capturing Financial markets to apply Deep Reinforcement Learning*, 2019

The Problem Statement (2)

- If the paper you selected presents experiments on several data sets, you do not need to evaluate all of them but you can choose a subset or even only one of them.
- If you want to solely use other dataset, which is not used in the considered paper, you must contact the course manager to ask for an approval.

Hand-In

- **What should be handed in?** You must hand in both a report (see below) and the source code you have developed to solve the project.
- **Honesty Codex**. By submitting your project, you confirm that you have not submitted this project elsewhere and that you did not copy (plagiarise) foreign content without proper reference.
- Only one person from the group should hand in the project (report and code) on the behalf of the group.
- Your code must be handed in as a single file (either a zip or tar archive).

Implementation and Code

- Your implementation has to be in Python. You may make use of any standard Python libraries and the numerical libraries NumPy and SciPy.
- *The only machine learning library you may make use of is TensorFlow* (without using Keras, or any other similar high-level API).
- Your code should be organised such that is easy to read, i.e. you have to use descriptive names for files, functions, variables, etc.
- The code may be organised in regular Python source files (.py files) or in Jupyter notebooks.
- If you take inspiration from or copy code developed by other people, it is important that you document this in your report.

Project report

- The report must be in PDF format, and the front page must meet the ITU requirements.
- Your report should be no longer than 10 pages (with 2cm margins and 11pt font size) with no more than 2000 words, including figures, tables, code snippets, references, and appendixes, but excluding the ITU front page.
- The number of words and the method used for counting bust be stated.
- The hand-in should be self-contained.
- Your oral presentation should correspond to the structure of your write-up.
- The report in should contain the sections described in the following slide.

Project Report Structure

1. **Introduction**
2. **Methods**
3. **Experiments**
4. **Discussion**
5. **Conclusions**
   References

Good luck!

Any questions?