Deep Learning

Single subject and programme course

3 credits

Deep Learning

732A78

Valid from: 2020 Spring semester

Determined by
Course and Programme Syllabus Board
at the Faculty of Arts and Sciences

Date determined
2019-11-07

Offered for the last time
Spring semester 2024

Replaced by
732A82

Main field of study
Computer Science

Course level
Second cycle

Advancement level
A1F

Course offered for
- Master's Programme in Statistics and Machine Learning

Entry requirements
- Bachelor’s degree equivalent to a Swedish Kandidatexamen in one of the following subjects: statistics, mathematics, applied mathematics, computer science, engineering
- Completed courses in calculus, linear algebra, statistics, and programming
- A course in machine learning that covers at least 6 ECTS and includes neural networks
- English corresponding to the level of English in Swedish upper secondary education (English 6/B).
- Exemption from Swedish 3/B

Intended learning outcomes
After completion of the course the student should at an advanced level be able to:
- use relevant concepts and methods from Deep Learning in order to formulate, structure and solve practical problems that involve large and complex data
- choose a deep learning architecture that is appropriate for a given data structure, problem formulation and application area
- choose appropriate activation functions and hyperparameter settings in Deep Learning models
- estimate the performance of Deep Learning models
- use existing Deep Learning software in order to analyze large and complex datasets, tune the network architecture and make predictions.

Course content

The course introduces main concepts in Deep Learning and widely used Deep Learning models. The course includes the following topics:

- Deep and shallow networks
- Regularization, droupout and early stopping. Optimization of deep neural networks
- Convolutional neural networks and image analysis
- Deep recurrent neural networks and sequence analysis
- Autoencoders and feature extraction
- Generative Adversarial neural networks

Teaching and working methods

The teaching comprises lectures, practical sessions and computer exercises complemented by self-studies. lectures are devoted to presentations of theories, concepts and methods. Practical sessions are devoted to presentations of practical tools needed for computer exercises. Computer exercises provide practical experience of data analysis with Deep Learning software.

Examination

Written reports on the computer assignments.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it. If the coordinator has instead recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

Grades

ECTS, EC

Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is carried out in such a way that both men´s and women´s experience and knowledge is made visible and developed.

Department

Institutionen för datavetenskap