DD2434 Machine Learning, Advanced Course 7.5 credits

Maskininlärning, avancerad kurs

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The official course syllabus is valid from the autumn semester 2024 in accordance with the decision from the director of first and second cycle education: J-2024-0529. Decision date: 2024-04-15.

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Computer Science and Engineering

Specific prerequisites

- Knowledge and skills in Programming, 6 credits, corresponding to completed course DD1337/DD1310-DD1319/DD1321/DD1331/DD100N/ID1018.
- Knowledge in Linear Algebra, 7,5 credits, corresponding to completed course SF1624/SF1672/SF1684.
- Knowledge in Calculus in Several Variables, 7,5 credits, corresponding to completed course SF1626/SF1674.

- Knowledge in Probability Theory and Statistics, 6 credits, corresponding to completed course SF1910-SF1924/SF1935

and at least one of the following:

either

- Knowledge of basic Machine Learning, 7,5 credits, corresponding to completed course DD1420/DD2421/EL2810/EQ2341

or

- Knowledge of higher mathematics relevant to advanced Machine Learning, 15 credits, e.g. corresponding to completed courses SF2940 Probability Theory and SF2955 Computer Intensive Methods in Mathematical Statistics.
- Knowledge of basic computer science, 6 credits, corresponding to completed course DD1338/DD1320-DD1328/DD2325/ID1020/ID1021.
- Additional skills in independent software development, 12 credits, from completed courses in computer science, computer technology or numerical methods with laboratory elements that are not carried out in groups larger than two people. These courses are in addition to the above mentioned courses.

Active participation in a course offering where the final examination is not yet reported in Ladok is considered equivalent to completion of the course.
Registering for a course is counted as active participation.
The term 'final examination' encompasses both the regular examination and the first re-examination.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to

- explain and justify several important methods for machine learning
- give an account of several types of methods and algorithms that are used in the field of deterministic inference methods
- implement several types of methods and algorithms that are used in the field based on a high-level description
- extend and modify the methods that the course deals with

in order to be able to do a degree project in deterministic inference methods.

Course contents

- The basics of the probabilistic method.

- Probabilistic modelling.
- Dimensionality reduction.
- Graphical models.
- Hidden Markov models.
- Expectation-Maximization.
- Variational Inference.
- Networks in variational inference.

Examination

- HEM1 - Take-home exam, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Project assignment, 4.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.