DD2434 Machine Learning, Advanced Course 7.5 credits

Maskininlärning, avancerad kurs

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

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

Establishment

Course syllabus for DD2434 valid from Autumn 2014

Grading scale

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

Education cycle

Second cycle

Main field of study

Computer Science and Engineering

Specific prerequisites

DD2431 Machine learning or the equivalent. SF1901 Probability Theory and

statistics or the equivalent.

Language of instruction

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

Intended learning outcomes

After the course, the student should be able to

* explain, derive and implement a number of models of supervised

and unsupervised learning,

* analytically demonstrate how different models and algorithms relate

to one another,

* explain strengths and weaknesses for different models and algorithms,

choose appropriate model or strategy for a new

machine learning task.

More specifically, regarding methodologies the student should be able to

* explain the EM-algorithm and identify problems where it is

applicable,

* explain the terminology for Bayesian networks and topic models and

apply these on realistic amounts of data,

* explain and derive boosting algorithms and design new

boosting algorithms with different cost functions,

* explain and implement methods for learning of

feature representations from various types of data.

Course contents

Machine learning is the science of algorithms that improve their

performance by learning from experience; most often in the form of data

with or without labelled examples.

Machine learning algorithms are used within a large number of application fields.

Independently of the field, a developer of

such algorithms need to have a systematic understanding of how a given

assignment can be formulated as a machine learning problem.

The aim of this course is to give you this systematic understanding.

We will present a number of machine learning algorithms and statistical modelling algorithms. But above all, you will learn how the different algorithms are constructed, how they relate to one another and when they are applicable in theory and in practice.

Disposition

12 lectures

5 exercises

6 computer lab sessions

Course literature

Kapitel från en eller flera av följande böcker:

"Bayesian Reasoning and Machine Learning" by David Barber, "Computer Vision - Models, Learning and Inference" by Simon Prince, "Machine Learning - A Probabilistic Perspective" by Kevin Murphy, "Pattern recognition and Machine Learning" by Christopher Bishop, "Pattern Classification" by Richard Duda, Peter Hart and David Stork.

Examination

- LAB1 - Labs, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Exam, 3.5 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.

Other requirements for final grade

Examination (TEN1; 4 credits; A-F)

Laboratory assignments (LAB1; 3.5 credits; P/F)

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.