FIK3616 Learning Machines 7.5 credits

Lärande maskiner

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 FIK3616 valid from Autumn 2015

Grading scale

Education cycle

Third cycle

Specific prerequisites

Ph.D students and master students planning to enroll on a Ph.D program.

Recommended Prerequisites:

Discrete mathematics, linear algebra, machine learning, programming, AI.

Language of instruction

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

Intended learning outcomes

1. Autonomously solving problems
   Applying existing as well as future tools to building LMs
   Self-testing understanding and critiquing
   Interpreting the work of others
2. Mastering abstraction
   Recognising what an LM is (not)
   Identifying relevant concepts and applicable methods/tools
   Mastering the meta-level, modelling LMs
   Associating different relevant concepts with LMs
   Instrumentalising abstract concepts relevant to LMs
3. Implementing LMs
   Using tools in the LM context
   Exploring the effects of assumptions on a concept
   Programming (and testing) LMs
   Assessing the adequacy and complexity of LM programs

Course contents

- Foundations of AI for learning machines. (Default lecturer first year Magnus Boman)
- History of learning machines. (Nina Wormbs)
- The future of learning machines. (Magnus Boman)
- TBC. (Anders Holst)
- Pronouncers. (Magnus Boman)
- Multi-AI (AI2AI) systems. (Magnus Boman)
- Concept formation in learning machines. (Daniel Gillblad)
- Deep learning. (John Ardelius)
- Systemic properties of large-scale learning machines. (Daniel Gillblad & Magnus Boman)
- Critical perspectives and fear of learning machines. (Francis Lee)
- Massive data for learning machines. (Jim Dowling)
- Applications of learning machines. (Magnus Sahlgren & Jussi Karlgren)
- Learning from failure in combinatorial problem solving. (Christian Schulte)

Disposition

Foundation is a series of lectures on established literature. Invited lectures focus on deep technical subjects and applications of learning machines. Use of new interactive software platforms for building learning machines.

Course literature

Relevant articles and research papers, plus documentation from Internet sources. During the course, a compendium will be developed, with all of the lecturers (and possibly their collaborators or students) as invited contributors. Students will be motivated to comment on, and influence the contents of, the compendium. Such influence can come in the form of course examination. The outcome will not be a collection of individual chapters by individual authors, but rather a monograph with many co-authors.

Some default lecturers have already suggested literature to cover their respective lectures.

Example (Lee):

1. Solon Barocas, Sophie Hood, Malte Ziewitz. (2013) Governing Algorithms: A Provocation Piece http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2245322
2. Ziewitz, M. (2011). How to think about an algorithm? Notes from a not quite random walk. Discussion paper for Symposium on "Knowledge Machines between Freedom and Control", 29 September 2011.

Equipment

None, lab work can be done on personal computing devices or on accessible servers.

Examination

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.

Flexible exam: essay, documented program, contribution to course compendium, documented applied work at company, All types of exam have the same deadline.

Other requirements for final grade

Completed exam and at least two thirds of the lectures attended.

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.