



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Tillämpad maskininläring **Applied Machine Learning**

EDAN95, 7,5 credits, A (Second Cycle)

Valid for: 2021/22

Faculty: Faculty of Engineering, LTH

Decided by: PLED C/D

Date of Decision: 2021-04-20

General Information

Elective for: BME4-sbh, C4-pv, D4-bg, D4-mai, E4-bg, F4, F4-pv, F4-mai, MSOC2, Pi4-fm, Pi4-pv, MMSR2

Language of instruction: The course will be given in English

Aim

To give an introduction to several subdomains of machine learning and to give an orientation about fundamental methods and algorithms within these domains. To convey knowledge about breadth and depth of the domain.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- display basic knowledge concerning theories and methods related to the following subdomains:
- unsupervised and supervised learning, classification and regression
- neural networks, including convolutional neural networks, recurrent neural networks and deep learning
- bayesian learning
- reinforcement learning
- support vector machines, decision trees, random forests, ensemble methods

Competences and skills

For a passing grade the student must

- complete a number of assignments based on problems related to some of the previously

mentioned subdomains and demonstrating the ability to:

- evaluate and prepare the data
- select and train a model
- evaluate the outcome and fine-tune the model

Judgement and approach

For a passing grade the student must

- be able to judge suitability of a given machine learning method to a given problem,
- understand limitations of applicability of machine learning methods

Contents

- unsupervised and supervised learning, classification and regression
- neural networks, including convolutional neural networks, recurrent neural networks and deep learning
- bayesian learning
- reinforcement learning
- support vector machines, decision trees, random forests, ensemble methods

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: (Laboratory) Assignments and optional written exam. Completed assignments result in a pass (mark 3), better grades can be achieved through participation in the optional written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Admission requirements:

- At least 120 credits(hp) in the engineering programme or equivalent previous education
- EDA017 Programming, First Course or EDAA45 Introduction to Programming or EDAA55 Programming, First Course
- EDAA01 Programming - Second Course or EDAA30 Programming in Java - Second Course or FMNN25 Advanced Course in Numerical Algorithms with Python/SciPy or FRTF25 Introduction to Machine Learning, Systems and Control

The number of participants is limited to: 90

Selection: Completed university credits within the program incl credited such. Cut-off date for inclusion of credits in the ranking is the day after the enrolment period ends, if

nothin else is published on the course website. Priority is given to students enrolled on programmes that include the course in their curriculum.

Reading list

- Kevin P. Murphy: Machine Learning, A Probabilistic Perspective. MIT Press, 2012, ISBN: 9780262018029. Reference text about machine learning.
- Ian Goodfellow, Yoshua Bengio, Aaron Courville: Deep Learning. MIT Press, 2016, ISBN: 9780262035613. Reference text on deep learning.
- François Chollet: Deep Learning with Python. Manning Publications, 2018, ISBN: 9781617294433. Reference text about the applied part of the course.
- Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction. MIT Press Ltd, 2018, ISBN: 9780262039246. Reference text about Reinforcement Learning / Action Learning.

Contact and other information

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Course homepage: <http://cs.lth.se/edan95>

Further information: Detailed rules concerning the assignments will be found in the course web site.