



KURSPLAN

Djupinläring, 7,5 högskolepoäng

Deep Learning, 7.5 credits

Kurskod:	TDIS22	Utbildningsnivå:	Avancerad nivå
Fastställd av:	VD 2021-03-01	Utbildningsområde:	Tekniska området
Gäller fr.o.m.:	2022-01-01	Ämnesgrupp:	DT1
Version:	1	Fördjupning:	A1F
		Huvudområde:	Datavetenskap

Lärandemål

After a successful course, the student shall

Kunskap och förståelse

- display knowledge of state-of-the-art deep learning algorithms
- demonstrate comprehension of optimization, backpropagation and computational graphs
- demonstrate comprehension of loss functions, activation functions and weight initialization, various regularization methods and various deep learning architectures
- show familiarity with common deep learning applications

Färdighet och förmåga

- demonstrate the ability to implement various deep learning architectures, including feed-forward, convolutional, recurrent and generative neural networks
- demonstrate the ability to implement deep reinforcement learning algorithms
- demonstrate skills of applying various deep learning algorithms to common tasks

Värderingsförmåga och förhållningssätt

- demonstrate an understanding of appropriate deep learning architecture for various tasks
- demonstrate an understanding of ethics and fairness in deep learning

Innehåll

This is an introductory course in Deep Learning. The course covers basic and state-of-the-art algorithms for training various deep neural network architectures, alternating theory with practice. The course includes assignments where the students both implement various deep learning algorithms from scratch, and use modern deep learning software. After completing the course, the student shall have acquired a thorough theoretical understanding of, and practical experience with, modern algorithms for deep learning, applied on common deep learning tasks. Specifically, the student should understand and be able to apply all theoretical concepts covered.

The course includes the following elements:

- Loss/Activation Functions, Optimization, SGD, Backpropagation, Computational Graphs
- Neural Networks: Feed-Forward, Convolutional, Recurrent, GANs, Autoencoders

- Methodology for training Neural Networks
- Deep Reinforcement Learning
- Analysis, Interpretation and Evaluation of Deep Learning Models
- Ethics and Fairness in Deep Learning
- Deep Learning Applications, such as; Computer Vision, Natural Language Processing, Image Segmentation and Image Captioning

Undervisningsformer

The teaching in the course consists of lectures, quizzes, workshops, assignments and tutoring.

Undervisningen bedrivs på engelska.

Förkunskapskrav

Passed courses at least 90 credits within the major subject Computer Engineering, Electrical Engineering (with relevant courses in Computer Engineering), or equivalent, or passed courses at least 150 credits from the programme Computer Science and Engineering, and completed courses Artificial Intelligence, 7,5 credits, Mathematics for Intelligent Systems, 7,5 credits, and Machine Learning, 7.5 credits or equivalent. Proof of English proficiency is required.

Examination och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Sluttentamen ¹	4,5 hp	5/4/3/U
Inlämningsuppgifter	3 hp	U/G

¹ Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

Kurslitteratur

The literature list for the course will be provided 8 weeks before the course starts.

Principal texts:

Title: Deep Learning (Adaptive Computation and Machine Learning Series), 1st ed, 2016.

Authors: Goodfellow, I., Bengio, Y. and Courville, A.

Publisher: MIT Press

ISBN: 978-0262035613

www.deeplearningbook.org

Title: Reinforcement Learning: An Introduction (Adaptive Computation and Machine Learning series), 2nd ed, 2018.

Authors: Sutton, R.S. and Barto, A.G.

Publisher: Bradford Books

ISBN: 978-0262039246

www.incompleteideas.net/book/the-book-2nd.html