FDD3601 Deep Generative Models and Synthesis 7.5 credits

Djupa generativa modeller och syntes

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

Establishment

The official course syllabus is valid from the autumn semester 2025 as decided by the Faculty Board decision HS-2025-0377. Date of decision: 2025-06-10.

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Intended learning outcomes

After passing the course, the students should be able to:
characterise synthesis problems, deep generative methods, and their applications
distinguish different objectives, performance measures, and common problems with generative modelling
describe the relation between deep generative models and regression-based methods
train and tune deep generative models on different datasets
evaluate generative models objectively and subjectively
discuss ethical aspects of particular relevance to generative AI
in order to

be able to judiciously use deep generative modelling to solve problems in industrv and/or academia.

Course contents

Relevant concepts from probability theory and estimation Introduction to synthesis problems and generative models
Principles of synthesis versus classification
Regression versus probabilistic modelling
Modelling goals and evaluation
Mixture density networks (MDNs)
Autoregression and large language models (LLMs)
Normalising flows
Variational autoencoders (VAEs)
Diffusion models and flow matching
Generative adversarial networks (GANs)
Subjective evaluation
Hybrid approaches
Recent developments
Ethical aspects of generative AI

Examination

- LAB1 - Laboratory work, 7.5 credits, grading scale: P, F

Examination is based on several exercises which includes both programming and theoretical questions and contains different parts for higher grades.

Other requirements for final grade

The final grade is determined by accumulating the grades in individual exercises.

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.