Deep Learning, Winter 2024/25

Course Outline

Instructors:

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Schedule: Wednesdays 9:50 – 11:20, room G-111

Course Content

Number	Lecture
Week 1	Course organization, Mathematical Foundations of Deep Learning (Chapters 6 to 8)
Week 2	Mathematical Foundations of Deep Learning cont.
Week 3	Mathematical Foundations of Deep Learning cont.
Week 4	Basics of Deep Learning Modelling (Chapters 6 to 8)
Week 5	Basics of Deep Learning Modelling cont.
Week 6	Convolutional Neural Networks (Chapter 9)
Week 7	Generative modelling: Autoencoders and Variational Autoencoders (Chapters 14 and 20.10.3)
Week 8	Generative modelling: Autoencoders and Variational Autoencoders cont.
Week 9	Generative modelling: Generative Adversarial Networks (Chapter 20.10.4)
Week 10	Generative modelling: Diffusion models (Chapter 20.10.4)
Week 11	Recurrent Neural Networks (Chapter 10)
Week 12	Recursive Neural Networks (Chapter 10)
Week 13	Attention models
Week 14	Graph Neural networks

Textbooks

- Goodfellow I., Bengio Y., Courville A. (2016), Deep Learning (http://www.deeplearningbook.org/)
- Roberts D. A., Yaida S., Hanin B. (2022), The Principles of Deep Learning Theory: An Effective Theory Approach to Understanding Neural Networks, Cambridge University Press (https://deeplearningtheory.com/)
- Calin O. (2020), Deep Learning Architectures: A Mathematical Approach, Springer.
- Howard J., Gugger S. (2020), Deep Learning for Coders with Fastai and PyTorch: AI Applications Without a Ph,D first Edition (https://course.fast.ai/Resources/book.html)
- Boyd S., Vandenberghe L. (2018), Introduction to Applied Linear Algebra – Vectors, Matrices, and Least Squares (http://vmls-book.stanford.edu/)
- Hastie T., Tibshirani R., Friedman J. (2013), The Elements of Statistical Learning (http://www-stat.stanford.edu/~tibs/ElemStatLearn/)

Julia Programming Materials

Course Evaluation

Students evaluation will be based on the report from building a deep learning model (60 points) and open book exam (40 points). Grading depends on the points obtained from the report and additional tasks (up to 50 points):

Points		Grade
From	To	
0	49	Fail (2.0)
50	59	Sufficient (3.0)
60	69	Sufficient Plus (3.5)
70	79	Good (4.0)
80	89	Good Plus (4.5)
90	100	Very good (5.0)