

Seminar Deep learning WS 2023-2024

Studiengang Finanzmathematik, Aktuarwissenschaften und Risikomanagement (Master)

Lecturer: Dr. Alla Petukhina

The availability of large amounts of data and increased computational power enabled the renaissance of neural networks as universal paradigm for machine learning. While initially mainly boosted by advances on image classification, Deep Learning methods recently progress into different domains. In this seminar, students will discuss state of the art deep learning algorithms with particular focus on the implementation of algorithms to financial problems.

The Seminar with access to all premium courses from [DataCamp](#).



The final examination will be in form of a project work including:

- paper (15 pages),
- R or Python code with a dataset (submitted to [HTW-WM-FAR GitHub Group](#))
- presentation of the project.

The project can be done in the group of two people.

Examples of methods for projects:

- Feedforward Networks
- Bayesian neural networks
- Recurrent Neural Networks (RNN)
- GANs (Generative Adversarial Networks)
- LSTM (Long Short-Term Memory)
- Convolutional Neural Networks (CNN)
- Reinforcement learning

Examples of applications for projects:

- Financial trading strategies (for traditional and digital assets)
- Portfolio analysis
- Predictions of financial applications with high-frequency data
- Option prices calibration
- Mortgage risk management

Prerequisites: minimal requirements are a solid background on probability and statistics and linear algebra. Coding experience in R or Python is desirable.

Literature and sources:

Ian Goodfellow et al (2016) Deep Learning, MIT Press.

Nikhil Buduma (2017) Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms, O'Reilly

Dixon, M.F., Halperin, I., & Bilokon, P. (2020). Machine learning in Finance. Springer International Publishing.

Practical examples - Quantlets are in www.quantlet.de