

Bachelor's Thesis Assignment



148202

Institut: Department of Intelligent Systems (UITs)
Student: **Lapeš Zdeněk**
Programme: Information Technology
Specialization: Information Technology
Title: **Reinforcement Learning for Automated Stock Portfolio Allocation**
Category: Artificial Intelligence
Academic year: 2022/23

Assignment:

1. Study the state-of-the-art methods for automated stock portfolio allocation. Focus on the methods based on reinforcement learning and planning in Markov Decision Processes.
2. Experimentally evaluate selected open access tools for automated portfolio allocation including e.g. FinRL-Meta and identify their weak points.
3. Propose and implement improvements of a selected method/tool allowing to mitigate these weak points.
4. Using suitable benchmarks and datasets, perform a detailed experimental evaluation of the implemented improvements with the focus on the portfolio allocation returns.

Literature:

Rao A., Jelvis T., Foundations of Reinforcement Learning with Applications in Finance. 1st Edition, Taylor & Francis 2022

* Li, Xinyi and Li, Yinchuan and Zhan, Yuancheng and Liu, Xiao-Yang, Optimistic Bull or Pessimistic Bear: Adaptive Deep Reinforcement Learning for Stock Portfolio Allocation, In ICML 2019.

* Liu X.-Y. Rui J. Gao J. aj.: FinRL-Meta: A Universe of Near-Real Market Environments for Data-Driven Deep Reinforcement Learning in Quantitative Finance. Workshop on Data Centric AI 35th Conference on Neural Information Processing Systems at NeurIPS 2021.

* Mao Guan and Xiao-Yang Liu. 2021. Explainable Deep Reinforcement Learning for Portfolio Management: An Empirical Approach. In ICAIF 2021.

Requirements for the semestral defence:

Items 1, 2, and partially 3.

Detailed formal requirements can be found at <https://www.fit.vut.cz/study/theses/>

Supervisor: **Češka Milan, doc. RNDr., Ph.D.**

Head of Department: Hanáček Petr, doc. Dr. Ing.

Beginning of work: 1.11.2022

Submission deadline: 10.5.2023

Approval date: 3.11.2022