Roman Knyazhitskiy

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Summary

MPhil student in Machine Learning at Cambridge with research experience in differentiable simulation, reinforcement learning, and large language models. Developed methods improving stability in BPTT, accelerating LLM inference via FFF and contributed to AutoML and meta-learning projects under Prof. Tom Viering. Also maintains open-source contributions to JAX-based ML libraries.

Education

MPhil in MLMI (Machine Learning), University of Cambridge 10/2025 - 09/2026

BSc Computer Science and Engineering, TU Delft 09/2022 - 07/2025

- GPA: 8.7/10. Graduated with Honours.

Work Experience

Research Associate, TU Delft 03/2023 - 08/2025

- Under supervision of Professor Tom Viering worked on several AutoML and Meta Learning projects, including two yet to be published papers.
- Participated in departmental research meetings and academic discussions.

ML Engineer → Lead AI/ML Engineer, Delft Mercurians 05/2023 - 09/2025 (Part-Time)

- Led a team of 2-5 engineers in developing AI control systems for RoboCup competition.
- Designed and implemented a Model Predictive Control (MPC) system for real-time trajectory optimization.
- Worked closely with the higher management to ensure adequate integration and planning.
- Ensured AI solution robustness via runtime type checking, and a comprehensive test suite.

Publications

[1] J. Luijmes, A. Gielisse, R. Knyazhitskiy, and J. van Gemert. ARC: Anchored representation clouds for high-resolution INR classification. In *ICLR 2025 Workshop on Weight Space Learning*, 2025. Accepted.

[2] R. Knyazhitskiy and P. R. Van der Vaart. A simple scaling model for bootstrapped DQN. 2025. Under review.

Honours and Awards

- **1st Place**, Bunq Hackathon 6 (2025), team of 4 against 50+ teams with a prize of €30,000.
- **2nd Place & Special Prize**, Epoch AI Hackathon (2024).
- **'Best Software Solution'** award, RoboCup World Championships, Sydney (2019).
- **1st Place**, RoboCup Junior National Competitions (2017, 2018, 2019).

Open Source Contributions

- Enhanced functionalities in jaxtyping and Equinox, resolving multiple issues and enabling IPython runtime type checking.
- Contributed to Gymnax, a widely used JAX RL environments collection with 800+ stars on GitHub.

Selected Projects

High-Frequency Weather Forecasting, Hierarchical Bayesian Models, CNF 2025

- Developed hybrid forecasting system combining continuous normalizing flows with an autoregressive model for well-calibrated forecasting.

Lyapunov Discounting for BPTT Optimization, JAX, Differentiable Simulation 2024

- Novel stability improvement method for backpropagation through differentiable simulators, achieving significant gains over windowed BPTT, 5-fold increase in the peak performance achieved on Brax environments

pytest-mut: High-Performance Mutation Testing, Python, Parallel Computing 2024

- Developed mutation testing library achieving 10-15x speedup over alternatives through novel partial parallelization strategies