Roman Knyazhitskiy

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Summary

MPhil student in Machine Learning at Cambridge with research experience in differentiable simulation, reinforcement learning, and control. Developed methods improving stability in BPTT, contributed to AutoML and meta-learning projects under Prof. Tom Viering, and co-authored papers under submission. Also maintain 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.

Head of AI/Control, Delft Mercurians (Student Robotics Team)　　　　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](https://github.com) and [Equinox](https://github.com), resolving multiple issues and enabling IPython runtime type checking.
- Contributed to [Gymnax](https://github.com), a widely used JAX RL environments collection with 800+ stars on GitHub.

Selected Projects

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

High-Frequency Weather Forecasting, Hierarchical Bayesian Models, CNF   2023

- Developed hybrid forecasting system combining continuous normalizing flows with autoregressive models for improved temporal resolution