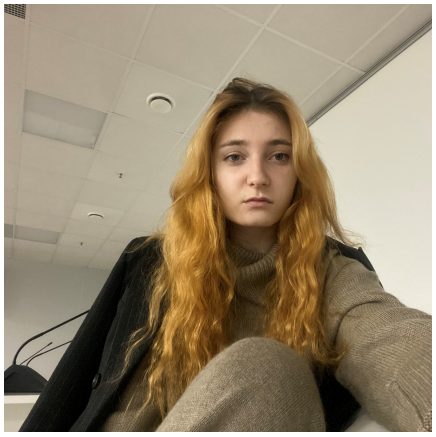

Rudenko Varvara

Student of MIPT

Skills

Python 4+ yrs.

SQL 3+ yrs.

LaTeX 5+ yrs.

English C1

French B1

Interests

- Stochastic Optimization
- RL
- MCMC

Grants

- High Professional Potential Group (HSE Personnel Reserve) Category "New researchers"
- Laureate of the scholarship for achievements in the field of numerical optimization methods
- Optimization, training and control methods in the tasks of synthesizing the motion of complex robotic systems with many degrees of freedom in a dynamic environment

Publications

Algorithm for Constrained Markov Decision Process with Linear Convergence — AISTATS 2023

The problem of constrained Markov decision process is considered. An agent aims to maximize the expected accumulated discounted reward subject to multiple constraints on its costs (the number of constraints is relatively small). A new dual approach is proposed with the integration of two ingredients: entropy regularized policy optimizer and Vayda's dual optimizer, both of which are critical to achieve faster convergence. The finite-time error bound of the proposed approach is provided. Despite the challenge of the nonconcave objective subject to nonconcave constraints, the proposed approach is shown to converge (with linear rate) to the global optimum. The complexity expressed in terms of the optimality gap and the constraint violation significantly improves upon the existing primal-dual approaches. (https://arxiv.org/pdf/2206.01666.pdf)

Markov Decision processes and convex optimization — CRM 2023

Review-article "Markov Decision processes and convex optimization"
The main goal was to translate existing RL information into Russian and combine existing results for further work in this area. The existing algorithms of Q-learning and the existing estimates for various types of MDP are considered. And the open problem of reducing the gap between the upper and lower estimates on AMDP is also considered. (http://crm.ics.org.ru/journal/issue/245/)

Work experience

Researcher — 09/2024 - today
TFAIM lab

Training, understanding and optimization of artificial intelligence models. Work on articles on the topic of RL.

Researcher — 2020 - 2024
International Laboratory of Stochastic Algorithms and Multidimensional Data Analysis

Training, understanding and optimization of artificial intelligence models. Work on articles on the topic of RL.

Researcher — 2021 - 2024
Laboratory of mathematical methods of optimization

Work on articles on the topic of Stochastic optimization.

Lecturer/The seminarian — 2023 - today
HSE University, MIPT University

Course on mathematical statistics at HSE and the course on RL for MIPT.

Additional education

Education

2019 - 2023

Bachelor's degree Department of Control and Applied Mathematics
Moscow Institute of Physics and Technology

2023 - today

Master's degree Department of Control and Applied Mathematics
Moscow Institute of Physics and Technology

Charitable activity

10/2022 - today

Teaching mathematics at a charity school for cancer-stricken children
Charity Fund "Gift of life"

Contact

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github.com/Rudenshtok

hse.ru/persons

labmmo.ru/en/team

Student — 08/2020
Sirius University of Science and Technology in the program "Modern methods of information theory, optimization and management" with the direction " Sampling, management and optimization"

Student — 2021
"SQL for Data Science", University of California, Davis

Student — 2021
"Fundamentals of Reinforcement Learning", The Alberta Institute & Alberta Machine Intelligence Institute

Student — 03/2021 - 05/2021
"Data Analysis in the Industry", Tinkoff

Student — 07/2021 - 08/2021
Sirius University of Science and Technology in the program "Modern methods of information theory, optimization and management" with the direction "Stochastic algorithms and machine learning"

Student — 10/2022 - 11/2022
Sirius University of Science and Technology in the program "Modern methods of information theory and optimization" with the direction "Modern methods of optimization"

Projects

- Importance Sampling and control variates
  There exist many problems in science and engineering whose exact solution either does not exist or is difficult to find. For the solutions of those problems, one has to resort to approximate methods. The Variational Monte Carlo (VMC) technique is relatively insensitive to the size of the system, it can be applied to large systems where some other methods are computationally not feasible.
- UVIP: Model-Free Approach to Evaluate Reinforcement Learning Algorithms
  During the shift, the task assigned to me was completed, as well as, due to the early completion of the work, helping a person on another part of the project. It was proposed to use the KBSF method to estimate the probabilistic transition and an algorithm was written that simplifies the work, unlike the classical KBRL.
  Work on articles arxiv.org/pdf/2010.11366.pdf arxiv.org/pdf/1801.02309.pdf with subsequent preparation of seminars for HDI lab. In development, an algorithm for two Gaussians is being tested.

Conferences

65th All-Russian Scientific Conference of MIPT "Markov Decision processes and convex optimization"

Fall into ML 2023 "ALGORITHM FOR CONSTRAINED MARKOV DECISION PROCESS WITH LINEAR CONVERGENCE"