Andrii Semenov

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Profile GitHub Website Scholar

Education

Moscow Institute of Physics and Technology
BSc in Applied Mathematics and Physics Sep 2020 -

- Landau Phystech School of Physics and Research
- Chair of Problems of Physics and Astrophysics
- Affiliated with Yandex chair of Data Analysis
- Advisor: Aleksandr Beznosikov

Work Experience

Teaching assistant | Department of Mathematical Fundamentals of Control, MIPT Jan 2024 -

- Reinforcement Learning course. Lecturer: Yudin Nikita.

Deep Learning Engineer | Huawei-MIPT research group Nov 2023 -

- Deep Learning and Reinforcement Learning.
- Head : Professor Roland Hildebrand.

Research Student | Yandex.Research-MIPT Lab Jul 2023 -

- Machine Learning and Optimization.
- Head: PhD Aleksandr Beznosikov.

Research Student | Laboratory of Mathematical Methods of Optimization Jul 2023 -

- Optimization.
- Head : Professor Alexander Gasnikov.

Research Student | Laboratory of Fundamental and Applied Research of Relativistic Objects Nov 2022 -

- Theoretical Physics, Astrophysics.
- Head : D.Sc. Elena Nokhrina.

Research Physicist | P.N.Lebedev Physical Institute Nov 2022 - Jul 2023

- Theoretical Physics, Astrophysics.

Skills

Stack	Python, C++, C#, LaTeX, PostgreSQL, MySQL, Git, Linux, macOS
Language	English – C1, Russian – native, Ukrainian – native
Hobbies	Swimming, Football

Research Interests

Federated Learning, Natural Language Processing, Computer Vision and applications of Stochastic Optimization in Deep Learning.

- In Laboratory of Mathematical Methods of Optimization I mostly cover research in field of distributed optimization, Heavy Tailed Noise and gradient clipping in NLP.
- In Yandex Research I work on privacy concepts in Vertical Federated Learning, as well as on Contrastive Learning and interpretability increasing techniques, such as Concept Bottleneck Models approach.
- As Deep Learning Engineer in joint MIPT-Huawei group I improve neural networks used in production paying more attention to the theoretical aspects. Mostly we solve DPD problems with second-order methods for NNs with Complex weights.

Honors and Awards

University

- **Summer 2023:** Participated in the Terra Quantum AG Summer School. Studied Neural Networks and received an award for the best project in Parameter-Efficient Fine-Tuning.
- **Spring 2023:** Participated in MIPT "Match of the Century" football tournament.
- **Autumn 2022:** MIPT football tournament contestant. Currently team captain.
- **Spring 2022:** Honorable Award in MIPT Swimming championship.
- **Spring 2022:** Participated in MIPT "Match of the Century" football tournament.
- **Spring 2022:** Organized students Olympiad in Physics.
- **Winter 2021–2022:** Organized film screenings at the MIPT.
- **Winter 2021:** Passed Landau Theoretical Minimum exam.
- **Autumn 2021:** Third prize at the MIPT football tournament.
- **2021 – 2023:** Abramov scholarship for 1-3 year bachelor students with the best grades at MIPT.
- **2020:** Increased Scholarship for students with Olympiad awards.

School

- **Autumn 2020:** Silver medal in GeCAA (International Olympiad in Astronomy and Astrophysics), was held online during the first semester at University because of pandemic risk.
- **Winter 2019–2020:** Bronze medal at IZhO, Almaty, Kazakhstan.
- **Autumn 2018:** Honorable Mention in IAO, Colombo, Sri-Lanka.

Publications

Sparse Concept Bottleneck Models: Gumbel tricks in Contrastive Learning Feb 2024

Under review as a conference paper at ICML 2024

- arXiv.
- Code.

Bregman Proximal Method for Efficient Communications under Similarity Nov 2023

Under review as a conference paper at ICML 2024 arXiv:2311.06953

- Work has been done along with my advisor in Laboratory of Mathematical Methods of Optimization.
- arXiv.
- PDF.

Projects

PAUS | Optimization, Machine Learning Ongoing

MIPT, Laboratory of Mathematical Methods of Optimization (Expected by Jan '24)

- Numerical simulations for paper.
- Developed a new distributed algorithm for convex-concave saddle-point problems in non-euclidean setup.
- Derived the optimal parameters and stepsizes for the algorithms.
- I will be able to push it on my GitHub after the review process is completed.

Llama-LoRA project | Natural Language Processing, Transformers Jul 2023

Terra Quantum AG Project Link

- Best project award at Terra Quantum Summer School in Neural Networks.
- Studied a novel methods of Parameter-Efficient Tuning of LLMs.
- Tuned a 13B and 7B models on custom dataset containing my Telegram chats.
- Pushed my models to HuggingFace hub. Where they got 10000+ downloads! HuggingFace Link

Solar System Model in Python | Python, Computational Physics Nov 2020 – Dec 2020

Moscow Institute of Physics and Technology Project Link

- We have developed a simple model approximating the Solar System and implemented it on Python.

TALKS

- 26 March 2024, MIPT-Yandex Optimization Seminar. Talk on "Model Reconstruction Attacks". [video]
- 12 March 2024, MIPT-Yandex Optimization Seminar. Talk on "Concept Bottleneck Models". [video]

TEACHING

Moscow Institute of Physics and Technology

Teaching assistant Jan 2024 -

- Spring 2024: Reinforcement Learning. Owner of the course repository.