Evgenii Nikishin

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A final-year PhD student studying agents and reasoning. I currently work on improving the capability of language models to self-correct generated code based on execution feedback.

Education

2021–Now	Ph.D. student in Computer Science (GPA: 4.3/4.3). **Mila, University of Montreal** Advisors: Pierre-Luc Bacon, Aaron Courville
2019–2020	Ph.D. student in Operations Research. **Cornell University**, transferred to Mila
2017–2019	M.Sc. in Computer Science, with honors (GPA: 8.9/10.0). **Higher School of Economics** (HSE) and **Skolkovo Institute of Science and Technology** Advisor: Dmitry Vetrov
2013–2017	B.Sc. in Computer Science, with honors (GPA: 4.9/5.0). **Lomonosov Moscow State University** Advisor: Alexander D'yakonov

Experience

Jul 2022– Dec 2022	Research Scientist Intern, **DeepMind**. Understanding loss of plasticity in deep RL. Hosts: Junhyuk Oh, André Barreto Resulted in one oral paper at ICML 2023 and one spotlight paper at NeurIPS 2023.
May 2020– Dec 2020	Research Intern (remote), **Mila, University of Montreal**. Addressing the objective misalignment in model-based RL. Hosts: Pierre-Luc Bacon, Yoshua Bengio Resulted in a publication at AAAI 2022.
Sep 2017– Aug 2019	Research Assistant, **Bayesian Methods Research Group** and **Samsung AI Lab**. Improving stability and transfer in deep RL. Supervisor: Dmitry Vetrov Resulted in two workshop papers at UAI 2018 and NeurIPS 2019.
Jul 2018– Aug 2018	Research Fellow, **ETH Zürich**. Applying offline RL for personalized medical treatment. Host: Gunnar Rätsch Selected as one of 16 participants of the Summer Research Fellowship program from among 1,000+ applicants.
Jul 2016– Dec 2016	Research & Development Intern, **Kaspersky Lab**. Implemented an autoencoder-based feature extractor for textual representations of executable files. The features were later used in production for detecting malicious software.

Selected Awards

2023	University of Montreal End of PhD scholarship.
2023	Co-author and co-recipient of Google Institute Research Program Grant.
2023	University of Montreal AI scholarship.
2022	ICML outstanding reviewer.
2021, 2022	DIRO excellence scholarship.
2021	ICLR outstanding reviewer.
2020	Mitacs-Mila short-term research grant.
2019	Cornell graduate fellowship.
2019	NeurIPS 2019 travel award.
2019	MLSS 2019 full travel grant.
2016	State academic excellence scholarship.
2016	Second place in Yandex Chatbot Hackathon.
2015	Bronze medal in Driver Telematics Analysis competition on Kaggle.

Media Coverage

2024	How Selective Forgetting Can Help AI Learn Better, Quanta Magazine.

Invited Talks

2023   The Promise of Foundation Models for Reinforcement Learning.
University of Alberta

2023   Deep Reinforcement Learning with Plasticity Injection.
ML Collective
Higher School of Economics
Bellairs Research Institute

2023   A Summary of Perspectives on Plasticity Loss.
University of Alberta

2022   The Primacy Bias in Deep Reinforcement Learning.
Higher School of Economics
DeepMind
Vector Institute, University of Toronto
University of Oxford and **Waymo**
Microsoft Research
ML Collective

2021   Control-Oriented Model-Based Reinforcement Learning with Implicit Differentiation.
Contextual Optimization Workshop, University of Montreal
Cornell Tech
AI Research Institute Moscow
Amsterdam ML Lab
Stanford University
ML Collective
Google Brain
University of Bristol

Publications

2024   Maxwell's Demon at Work: Efficient Pruning by Leveraging Saturation of Neurons.
Simon Dufort-Labbé, Pierluca D'Oro, **Evgenii Nikishin**, Razvan Pascanu, Pierre-Luc Bacon, Aristide Baratin
We show that neuron saturation, which traditionally was viewed as undesirable, could instead lead to sparse yet accurate networks.
ArXiv.

2024   The Curse of Diversity in Ensemble-Based Exploration.
Zhixuan Lin, Pierluca D'Oro, **Evgenii Nikishin**, Aaron Courville
We demonstrate that individual ensemble members in RL exhibit surprisingly low performance and propose a mechanism to address the limitation.
ICLR 2024.

2023   Deep Reinforcement Learning with Plasticity Injection.
Evgenii Nikishin, Junhyuk Oh, Georg Ostrovski, Clare Lyle, Razvan Pascanu, Will Dabney, André Barreto
We propose an intervention for diagnosing the loss of plasticity phenomenon in RL and dynamically growing neural networks in RL for increasing computational efficiency.
NeurIPS 2023 (**Spotlight**); also Reincarnating RL workshop, ICLR 2023 (**Spotlight**).

2023   Understanding Plasticity in Neural Networks.
Clare Lyle, Zeyu Zheng, **Evgenii Nikishin**, Bernardo Avila Pires, Razvan Pascanu, Will Dabney
An analysis of plasticity loss showing its relation to pathologies in loss landscapes and demonstrating efficiency of layer normalization for mitigating it.
ICML 2023 (**Oral**).

2023   Sample-Efficient Reinforcement Learning by Breaking the Replay Ratio Barrier.
Pierluca D'Oro*, Max Schwarzer*, **Evgenii Nikishin**, Pierre-Luc Bacon, Marc Bellemare, Aaron Courville
We achieve model-free state-of-the-art performance by applying resets for scaling of the number of updates per step
ICLR 2023 (**Oral**); also Deep RL workshop, NeurIPS 2022. Code

2022   The Primacy Bias in Deep Reinforcement Learning.
Evgenii Nikishin*, Max Schwarzer*, Pierluca D'Oro*, Pierre-Luc Bacon, Aaron Courville
We identify a damaging tendency of deep RL agents to overfit early experiences and propose a simple yet powerful remedy based on periodic resetting of a part of the agent
ICML 2022; also RLDM 2022. Code

2021   Control-Oriented Model-Based Reinforcement Learning with Implicit Differentiation.
Evgenii Nikishin, Romina Abachi, Rishabh Agarwal, Pierre-Luc Bacon
A model learning method for RL that directly optimizes the sum of rewards instead of likelihood, a proxy to the agent's objective
AAAI 2022; also Unsupervised RL workshop, ICML 2021. Code

2020 **Quantifying and Understanding Adversarial Examples in Discrete Input Spaces.**
Volodymyr Kuleshov, **Evgenii Nikishin**, Shantanu Thakoor, Tingfung Lau, Stefano Ermon
A framework for attacks based on synonyms and theoretical analysis of adversarial examples in genomics, language, and graphs domains
ArXiv.

2019 **Unsupervised Domain Adaptation with Shared Latent Dynamics for Reinforcement Learning.**
Evgenii Nikishin, Arsenii Ashukha, Dmitry Vetrov
Domain adaptation via learning shared dynamics in a latent space and adversarial matching of the latent representations of states
Bayesian Deep Learning workshop, NeurIPS 2019. Code

2018 **Improving Stability in Deep Reinforcement Learning with Weight Averaging.**
Evgenii Nikishin, Pavel Izmailov, Ben Athiwaratkun, Dmitrii Podoprikhin, Timur Garipov, Pavel Shvechikov, Dmitry Vetrov, Andrew Gordon Wilson
Averaging weights during training to reduce the variance of policy gradient estimates
Uncertainty in Deep Learning workshop, UAI 2018

Service

Organizing: **Decision Awareness in RL** workshop at ICML 2022 (lead organizer), **DeepBayes** summer school 2018, 2019.

Reviewer: NeurIPS 2023, ICML 2023, ICLR 2023 Reincarnating RL workshop, ICML 2022, ICLR 2022, NeurIPS 2021 workshop proposals, NeurIPS 2021, ICML 2021, ICLR 2021, AAAI 2021, ICML 2020 BIG workshop, IndabaX-AI4D innovation grants 2020, ICLR 2020.

Volunteer: Mila WiML Mentor 2023, ICLR 2020, NeurIPS 2019 WiML workshop.

Admissions: Cornell CS PhD applicants starting in Fall 2020.

Technical Knowledge

Languages Python, C/C++, SQL
ML Libraries PyTorch, JAX, vLLM, HuggingFace, SciPy stack, scikit-learn
Technologies Git, Bash, Docker, LaTeX

Teaching

Sep 2020– Teaching Assistant, **Cornell University**.
Dec 2020 ORIE 4350, Introduction to Game Theory

Sep 2017– Practice Lecturer, **Higher School of Economics**.
Dec 2017 Machine Learning classes for 3rd year CS students

Jul 2017 Teaching Assistant, **Coursera**.
Quizzes and assignments for the Bayesian Methods for Machine Learning course.
The specialization of the course received Coursera Outstanding Educator Award

Additional Education

Aug 2020 (Virtual) DL and RL Summer School, Mila, Canada.

Jul 2019 Machine Learning Summer School, Gatsby Unit, UK.

Jul 2019 Reinforcement Learning Summer School, INRIA, France.

Mar 2017 Spring school "Structural Inference", Humboldt University, Germany.

Feb 2017 Winter school on Reinforcement Learning, MIPT, Russia.