Egor Shulgin

Web – ✉ – ☎ – Scholar – GitHub – LinkedIn

Education

Jan 2020 – present | Ph.D. program in Computer Science, Adviser: Peter Richtárik
King Abdullah University of Science and Technology (KAUST), Saudi Arabia
Selected Coursework: Federated Learning, Stochastic Gradient Descent Methods

Sept 2015 – Jul 2019 | BSc in Applied Mathematics and Physics with specialization in Data Science
Moscow Institute of Physics and Technology (MIPT), Russia
Main courses: Probability Theory, Statistics, Convex Optimization, Machine Learning

Research and Work Experience

Jul 2022 – Oct 2022 | **AI/ML internship** at Apple. Cambridge, United Kingdom
Research on heterogeneous and personalized federated learning in Private Machine Learning team.

Sept 2021 – Jan 2022 | **Research internship** at Samsung AI Center. Cambridge, United Kingdom
Work in Distributed AI Team headed by Dr. N. Lane with a focus on federated learning.

Jul 2018 – Dec 2019 | **Research assistant** at P. Richtárik MIPT group. Moscow, Russia
Conducted mostly experimental research on optimization methods for Machine Learning in multiple projects which resulted in coauthoring several published papers.

Apr 2019 – Dec 2019 | **Research project** at Laboratory of Methods for Big Data Analysis, HSE. Russia
Developed a synthetic data generator, implemented graph neural network, visualized the process of training and validation for various models under the supervision of Dr. F. Ratnikov.

Selected Publications and Preprints

1. *"Towards a Better Theoretical Understanding of Independent Subnetwork Training"* E. Shulgin and P. Richtárik. Under review, 2023.
2. *"Shifted Compression Framework: Generalizations and Improvements"* E. Shulgin and P. Richtárik. arXiv:2206.10452, **UAI** 2022, proceedings. Originally presented at **NeurIPS** OPT-ML 2021 workshop.
3. *"Certified Robustness in Federated Learning"* M. Alfarra, J. C. Pérez, E. Shulgin, P. Richtárik, B. Ghanem. arXiv:2206.02535, **NeurIPS** 2022 Workshop on Federated Learning.
4. *"ADOM: Accelerated Decentralized Optimization Method for Time-Varying Networks"* D. Kovalev, E. Shulgin, P. Richtárik, A. Rogozin, A. Gasnikov. arXiv:2102.09234, **ICML** 2021, proceedings
5. *"Uncertainty Principle for Communication Compression in Distributed and Federated Learning and the Search for an Optimal Compressor"* M. Safaryan, E. Shulgin, P. Richtárik. arXiv:2002.08958 (2020). Published in **Information and Inference: a Journal of the IMA**
6. *"Revisiting stochastic extragradient"* K. Mishchenko, D. Kovalev, E. Shulgin, P. Richtárik and Y. Malitsky. arXiv:1905.11373, **AISTATS** 2020, proceedings
7. *"SGD: general analysis and improved rates"* R. M. Gower, N. Loizou, X. Qian, A. Sailanbayev, E. Shulgin and P. Richtárik. arXiv:1901.09401, extended oral presentation **ICML** 2019, proceedings

Achievements and Scholarships

Jul 2022 — ICML 2022 **Outstanding Reviewer** (Top 10%)

Jul 2020 – Aug 2020 — Summer **Research Fellowship** at ETH Zurich CS Department
Selected among 19 out of 2870 students (0.7% of applicants). Confirmation of acceptance.

Sept 2019 – June 2020 — MIAI@Grenoble Alpes Master's Excellence **Scholarship** (awarded but declined)

Sept 2019 – Jan 2020, Feb 2019 – June 2019 — Increased State Academic **Scholarship** for scientific achievements
$\sim$ 2% of the student cohort is awarded

Scientific Interests: Optimization for Distributed/Federated Machine Learning, Reinforcement Learning, Bayesian/Probabilistic methods in Machine Learning, Privacy, ML Robustness and Safety

Skills

Programming:	Python (multiple projects), C, bash; university projects with R, SQL
Python libraries:	NumPy, SciKit-Learn, PyTorch, Jax, Pandas, Matplotlib, Statsmodels, SciPy
Software:	Jupyter Notebook, Git, LaTeX, Beamer
Languages:	English – Fluent (C1 Certificate), Russian – Native, French – Basic

Conferences, Workshops and Invited Talks

Dec 2022	Poster presentation at NeurIPS 2022 Workshop on Federated Learning. Virtual
Sep 2022	Poster presentation at IMA Conference on The Mathematical Challenges of Big Data.
Mar 2022	Invited speaker at *"Rising Stars in AI"* **Symposium**. KAUST, Saudi Arabia
July 2021	Poster presentation on ADOM at **Conference** *"Optimization without Borders"*. Russia
July 2021	Re-recorded spotlight video and poster presentation on ADOM at ICML 2021. Virtual
July 2021	Online talk on ADOM at Maths & AI: MIPT-UGA young researchers virtual **Workshop**
Apr 2021	Pre-recorded presentation on ADOM at KAUST **Conference** on AI. KAUST
Apr 2021	Poster on ADOM at *"Communication Efficient Distributed Optimization"* **Workshop**
Nov 2019	Talk at 19th **Conference** *"Mathematical methods of pattern recognition"*. Moscow, Russia

Extracurricular Activities

10–17 June, 21	**Summer School** *"Control, Information, Optimization"*. Moscow, Russia Presented poster on ADOM and attended mini-courses, lectures by A. Naumov, M. Rakhuba, etc.
June 28 – Jul 10, 20	**Machine Learning Summer School** by the MPI-IS in Tübingen. Virtual Acceptance rate 14% (180 out of 1300+ applications), one of 14 attended MS students. Presented a 10 minute talk on *"Kashin compression for distributed learning"*.
19 – 22 Feb, 20	**Winter school** *"Math of Machine Learning"*. Sirius University, Sochi
26–29 Nov, 19	**HSE-Yandex Autumn school** on generative models. Yandex, Moscow Attended mini-courses on optimal transport (HDI Lab), generative models (LAMBDA)
3–4 Aug, 19	**ICCOPT Summer** School. Berlin, Germany Attended P. Richtárik mini-course on Optimization for Machine Learning.
1–12 Jul, 19	**Samsung AI Bootcamp** at Samsung R&D Institute Russia. Moscow Listened to lectures by leading Samsung researchers; analyzed the mobile devices sales data and investigated the impact of marketing with correlation analysis technics.
17–22 June, 19	**Summer School** *"Control, Information, Optimization"*. Moscow, Russia Presented poster and attended mini-courses, lectures by A. Nemirovsky, E. Tyrtyshnikov, etc.

Service, Social and Organisational Work

2023	**Reviewer** for TMLR; ICML 2023; NeurIPS 2023; ICLR 2023; FL-ICML 2023
2021, 2022	**Reviewer** for ICML 2021, 2022; NeurIPS 2021, 2022; AISTATS 2022, OPT-ML 2022
Jan 2022 – May, 2022	**Teaching Assistant** on Federated Learning course at KAUST
June 2021 – Sep 2021	**Seminar organizer** of *"All Hands Meetings on Big Data Optimization"*
Sep 2019 – Jan, 2020	**Teaching Assistant** on Machine Learning course at MIPT
Oct 2017 – Nov 2018	**Head** of the academic division at DCAM Student Council at MIPT
Feb 2016, 2017, 2018	**Organizer** of school Olympiads in mathematics and physics

Hobbies: Hiking/Backpacking, Alpine Skiing, Running, Frisbee, Tennis, Rationality