Rustem Islamov

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Education

PhD in Computer Science — Oct. 2023 – Pres.
University of Basel — Basel, Switzerland

Master of Science in Applied Mathematics — Sept. 2021 – Aug. 2023
Institut Polytechnique de Paris — Palaiseau, France
GPA: 17.65/20, transcript of records

Bachelor of Science in Applied Mathematics and Physics — Sept. 2017 – July 2021
Moscow Institute of Physics and Technology — Dolgoprudny, Russia
GPA: 4.95/5 (9.27/10), Top 3 at the department, transcript of records

Research Interests

Machine Learning, Optimization, Distributed Optimization

Recent Research Projects

Error-Feedback for SGD — Oct. 2022 – Oct. 2023
CISPA, Supervisor: Sebastian Stich — Saarbrücken, Germany
Brief description: develop a theory for SGD with biased compression which recovers optimal rates in all possible scenarios.

Analysis of Gradient-type methods over directed graphs — Apr. 2022 – Aug. 2022
EPFL, Supervisor: Hadrien Hendrikx, Links: technical report — Lausanne, Switzerland
Brief description: development of a theory for gradient-type methods over directed graphs. The goal is to create a method which supports stochastic updates, variance reduction and acceleration and whose convergence rates match optimal rates in undirected case.

Adaptive stepsize selection for PDHG algorithm — Sept. 2021 – Mar. 2021
IP Paris, Supervisor: Olivier Fercoq, Links: technical report — Palaiseau, France
Brief description: the goal is to develop a mechanism for adaptive stepsize selection for PDHG. The idea is based on checking in each iteration the Quadratic Error Bound inequality introduced in [Fercoq, 2021].

Second Order Methods for Distributed Optimization — Jul. 2020 – Dec. 2020
KAUST, Supervisor: Peter Richtárik — Thuwal, Saudi Arabia
Brief description: development of a theory for Newton-type methods for distributed optimization. The goal is to create the first communication-efficient Newton-type method that inherits its local superlinear convergence. As a part of internship, I attended the course on modern analysis of a family SGD algorithms by Prof. Richtárik.

Publications

9. Y. Gao*, R. Islamov*, S. Stich. **EControl: Fast Distributed Optimization with Compression and Error Control**, arXiv preprint arXiv: 2311.05645, 2023.
8. R. Islamov, M. Safaryan, D. Alistarh. **AsGrad: A Sharp Unified Analysis of Asynchronous-SGD Algorithms**, arXiv preprint arXiv: 2310.20452, 2023.
7. K. Mishchenko, R. Islamov, E. Gorbunov, S. Horváth. **Partially Personalized Federated Learning: Breaking the Curse of Data Heterogeneity**, arXiv preprint arXiv: 2305.18285, 2023.
6. S. Khirirat, E. Gorbunov, S. Horváth, R. Islamov, F. Karray, P. Richtárik. **Clip21: Error Feedback for Gradient Clipping**, arXiv preprint arXiv: 2305.18929, 2023.
5. M. Makarenko, E. Gasanov, R. Islamov, A. Sadiev, P. Richtárik. **Adaptive Compression for Communication-Efficient Distributed Training**, Transactions on Machine Learning Research, 2022.
4. R. Islamov, X. Qian, S. Hanzely, M. Safaryan, P. Richtárik. **Distributed Newton-Type Methods with Communication Compression and Bernoulli Aggregation**, Transactions on Machine Learning Research, 2022.

3. X. Qian, R. Islamov, M. Safaryan, P. Richtárik. **Basis Matters: Better Communication-Efficient Second Order Methods for Federated Learning**, in Proc. of the 25th International Conference on Artificial Intelligence and Statistics, 2022.
2. M. Safaryan, R. Islamov, X. Qian, P. Richtárik. **FedNL: Making Newton-Type Methods Applicable to Federated Learning**, In Proc. of 39th International Conference on Machine Learning, 2022.
1. R. Islamov, X. Qian, P. Richtárik. **Distributed Second Order Methods with Fast Rates and Compressed Communication**, In Proc. of 38th International Conference on Machine Learning, 2021.

* denotes equal contributions

Research Visits and Internships

Internship at Distributed Algorithms and Systems Lab — Apr. 2023 – Oct. 2023
IST Austria, Supervisors: Mher Safaryan, Dan Alistarh — Klosterneuburg, Austria

Internship at Machine Learning and Optimization Lab — Apr. 2022 – Aug. 2022
EPFL, Supervisors: Hadrien Hendrikx, Martin Jaggi — Lausanne, Switzerland

Internship at Optimization and Machine Learning Lab — Mar. 2021 – Aug. 2021
KAUST, Supervisor: Peter Richtárik — Jul. 2020 – Dec. 2020
Thuwal, Saudi Arabia

Scholarships, Honors and Awards

French Embassy Scholarship — Sept. 2022 – May. 2023
Given to students enrolled to French universities with high academic achievements; 700 Euro per month

PhD Track Excellence Scholarship — Sept. 2021 – Mar. 2022, Sept. 2022 – Mar. 2023
IP Paris awards merit-based excellence scholarships for students enrolled in PhD tracks; 1000 Euro per month

Increased State Academic Scholarship — Feb. 2021 – June 2021, Sept. 2020 – Jan. 2021
Given to 4 year Bachelor and Master students at MIPT with scientific achievements; 16,000 Russian roubles per month

Prizewinner of Student Olympiad in Maths — Apr. 2020
"I am professional" Student Olympiad organized by Yandex and MIPT

Abramov scholarship — Sept. 2017 – June 2020
Given to 1-3 year Bachelor students with the best grades at MIPT; 12,000 Russian rubles per month

Prizewinner of Final Round of All-Russian Physics Olympiad — Apr. 2016

Participant of Final Round of All-Russian Physics Olympiad — 2015, 2017

Talks and Posters

Talk at NTDS workshop, Links: paper — 24 October, 2023

Talk at CISPA for the group of Prof. Sebastian Stich, Links: paper — 16 March, 2023

Talk at ETH AI Center Symposium for PhD fellows, Links: paper — 9-10 February, 2023

Poster at NeurIPS workshop: Order up! The Benefits of Higher-Order Optimization in Machine Learning, Links: poster, paper — 2 December, 2022

Poster at International Conference on Artificial Intelligence and Statistics, Links: poster, paper — 29 March, 2022

Prerecorded Talk at Beyond first-order methods in ML systems workshop, Links: video, paper — 24 July, 2021

Poster at International Workshop on Federated Learning for User Privacy and Data Confidentiality, Links: poster, paper — 24 July, 2021

Poster and Prerecorded Talk at International Conference on Machine Learning, Links: video, poster, paper — 22 July, 2021

Poster at PRAIRIE/MIAI AI Summer School, Links: poster, paper — 6 July, 2021

Talk at Maths & AI: MIPT-UGA young researchers workshop, Links: video, slides, paper — 1 July, 2021

Prerecorded Talk at KAUST Conference on Artificial Intelligence, Links: video, paper — 28 April, 2021

Poster at NSF-TRIPODS Workshop on Communication Efficient Distributed Optimization, Links: poster, paper — 9 April, 2021

Summer Schools

PRAIRIE/MIAI AI Summer School, Links: certificate — 5-9 July, 2021

Technical skills

Programming Languages: Python (NumPy, Matplotlib, PyTorch, Pandas), C++, LaTeX
Mathematics: Calculus, Linear Algebra, Probability Theory, Convex Analysis

Languages

Russian: Native
English: Advanced (C1)
French: Elementary (A1)

Hobbies and Interests

Football, former member of student football team
Travelling, hiking, photo shooting

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