Nikita Doikov

Email: nikita.doikov@epfl.ch
Homepage: doikov.com
Residence: Switzerland, Lausanne

RESEARCH INTERESTS

Optimization (numerical methods, convex and non-convex problem classes, second-order methods, tensor methods, complexity bounds, stochastic optimization)
Machine Learning (deep learning, federated learning, distributed learning, privacy)
Algorithmic Foundations of AI (transformers, optimization for AI, landscape analysis)

EDUCATION

PhD, UCLouvain, Belgium — 2021
Thesis: "New second-order and tensor methods in Convex Optimization"
Supervisor: Yurii Nesterov

MSc, Higher School of Economics, Russia, GPA – 9.3/10.0 — 2017
Faculty of Computer Science
Program: Mathematical Methods of Optimization and Stochastics

BSc, Lomonosov Moscow State University, Russia, GPA – 4.9/5.0 — 2015
Faculty of Computational Mathematics and Cybernetics
Program: Machine Learning

EXPERIENCE

Postdoctoral Researcher at **EPFL**, Switzerland (2 years) — 09.2022 – *now*
Machine Learning and Optimization Laboratory, hosted by Martin Jaggi

Postdoctoral Researcher at **UCLouvain**, Belgium (1 year) — 09.2021 – 08.2022
ICTEAM / CORE, hosted by Yurii Nesterov

Intern at **Google**, Switzerland (4 months) — 08.2018 – 11.2018
Machine learning infrastructure in Google Maps

Intern at **Google**, Switzerland (3 months) — 07.2016 – 09.2016
Deep neural nets for video matching

Software Engineer at **Yandex**, Russia (9 months) — 11.2015 – 07.2016
Algorithms for maps routing

TEACHING AND MENTORING

Overall, I have taught approximately 350 students in the following courses:

- Large-scale Optimization and Applications at Skoltech — 2017
- Optimization Methods at Faculty of Computer Science, HSE — 2017, 2018
- Bayesian Methods in Machine Learning at HSE — 2017, 2018, 2019
- Optimization models and methods II at UCLouvain — 2021

Led intern, MSc and PhD student projects at MIPT, HSE, and EPFL

TECHNICAL SKILLS

Advanced: Algorithms and Data Structures, Numerical Optimization Methods, Machine Learning

Technologies: C++, Python, Matlab, R, SQL, Intel Assembler, UNIX OS architecture, MapReduce, Flume, TensorFlow, PyTorch, JAX, LaTeX, Git, SVN

Languages: Russian (native), English (fluent), French (basic)

PUBLICATIONS

Refereed Publications (17 papers in the leading peer-reviewed journals and conferences on Mathematical Optimization, Statistics, and Machine Learning)**:**

Spectral Preconditioning for Gradient Methods on Graded Non-convex Functions, 2024
N. Doikov, S.U. Stich, and M. Jaggi, ICML

On Convergence of Incremental Gradient for Non-Convex Smooth Functions, 2024
A. Koloskova, **N. Doikov**, S.U. Stich, and M. Jaggi, ICML

Super-Universal Regularized Newton Method, 2024
N. Doikov, K. Mishchenko, and Yu. Nesterov, SIAM Journal on Optimization

Unified Convergence Theory of Stochastic and Variance-Reduced 2024
Cubic Newton Methods, E.M. Chayti, M. Jaggi and **N. Doikov**, TMLR

Linearization Algorithms for Fully Composite Optimization, 2023
M.L. Vladarean, **N. Doikov**, M. Jaggi, and N. Flammarion, COLT

Polynomial Preconditioning for Gradient Methods, 2023
N. Doikov, A. Rodomanov, ICML

Second-order optimization with lazy Hessians, 2023
N. Doikov, E.M. Chayti, and M. Jaggi, ICML (**Oral Presentation**)

Gradient Regularization of Newton Method with Bregman Distances, 2023
N. Doikov and Yu. Nesterov, Mathematical Programming Journal

High-Order Optimization Methods for Fully Composite Problems, 2022
N. Doikov and Yu. Nesterov, SIAM Journal on Optimization

Affine-invariant contracting-point methods for Convex Optimization, 2022
N. Doikov and Yu. Nesterov, Mathematical Programming Journal

Local Convergence of Tensor Methods, 2021
N. Doikov and Yu. Nesterov, Mathematical Programming Journal

Minimizing Uniformly Convex Functions by Cubic Regularization of Newton Method, 2021
N. Doikov and Yu. Nesterov, Journal of Optimization Theory and Applications

Convex optimization based on global lower second-order models, 2020
N. Doikov and Yu. Nesterov, NeurIPS (**Oral Presentation**)

Contracting Proximal Methods for Smooth Convex Optimization, 2020
N. Doikov and Yu. Nesterov, SIAM Journal on Optimization

Stochastic Subspace Cubic Newton Method, 2020
F. Hanzely, **N. Doikov**, P. Richtárik, and Yu. Nesterov, ICML

Inexact Tensor Methods with Dynamic Accuracies, 2020
N. Doikov and Yu. Nesterov, ICML

Randomized Block Cubic Newton Method, 2018
N. Doikov and P. Richtárik, ICML (**Oral Presentation**)

Preprints / under review:

Cubic regularized subspace Newton for non-convex optimization 2024
J. Zhao, A. Lucchi, and **N. Doikov**

Complexity of Minimizing Regularized Convex Quadratic Functions 2024
D. Berg Thomsen and **N. Doikov**

First and zeroth-order implementations of the regularized Newton method with lazy approximated Hessians, **N. Doikov** and G. N. Grapiglia 2023

Minimizing Quasi-Self-Concordant Functions by Gradient Regularization of Newton Method, **N. Doikov** 2023

Lower Complexity Bounds for Minimizing Regularized Functions, **N. Doikov** 2022

ACADEMIC SERVICE

Conference reviews: COLT, NeurIPS, ICML

Journal reviews: Mathematical Programming, SIAM Journal on Optimization, Journal of Optimization Theory and Applications, Journal of Global Optimization, IMA Journal of Numerical Analysis, Computational Optimization and Applications, Optimization Methods and Software, IEEE Transactions on Information Theory

Symposium organization: *Optimization Methods with Worst-Case Complexity Guarantees* at FGS-2024 conference in Spain with Geovani Nunes Grapiglia

INVITED TALKS, CONFERENCES, AND SCHOOLS

- Workshop on Algorithmic Optimization: Tools for AI and Data Science, Louvain, 2024
- International Conference on Machine Learning (ICML), Vienna, 2024
- European Conference on Operational Research (EURO), Copenhagen, 2024
- 21st Conference on Advances in Continuous Optimization (EUROPT), Lund, 2024
- French-German-Spanish conference on Optimization (FGS), Gijón, 2024
- Workshop on Nonsmooth Optimization and Applications (NOPTA), Antwerp, 2024
- 20th Workshop on Advances in Continuous Optimization (EUROPT), Budapest, 2023
- International Conference on Machine Learning (ICML), Hawaii, 2023
- SIAM Conference on Optimization (OP23), Seattle, 2023
- Workshop on Advances in Continuous Optimization (EUROPT), Lisbon, 2022
- French-German-Portuguese conference on Optimization (FGP), Porto, 2022
- Workshop on Advances in Continuous Optimization (EUROPT), online, 2021
- Symposium on Numerical Analysis and Optimization, UFPR, online, 2021
- Conference on Neural Information Processing Systems (NeurIPS), online, 2020
- International Conference on Machine Learning (ICML), online, 2020
- French-German-Swiss conference on Optimization (FGS), Nice, 2019
- International Conference on Continuous Optimization (ICCOPT), Berlin, 2019
- Workshop on Advances in Continuous Optimization (EUROPT), Glasgow, 2019
- Summer School on Optimization, Big Data and Applications in Veroli, 2019
- Traditional School Control, Information and Optimization in Moscow, 2018 – 2019
- International Conference on Machine Learning (ICML), Stockholm, 2018
- Recent Advances in Algorithms in St. Petersburg, 2017
- Deep Hack Artificial Intelligence competition and lecture series at MIPT, 2016
- Participant of the MIPT fall programming training, 2014

- Winter and Summer Programming Training Camps in Petrozavodsk, 2012 – 2014
- Winter Programming School on Advanced Algorithms in Kharkiv, 2012

ACHIEVEMENTS AND AWARDS

2023	ICML Oral Presentation
2020	ICML Top Reviewer NeurIPS Oral Presentation
2019	Best Paper Presentation Award at OBA School NeurIPS Top Reviewers Award
2018	Best Talk Award at Control, Information and Optimization School ICML travel award
2015 – 2016	Participant of Challenge24 Finals – International 24-hour Programming Contest
2015	Top-200 in Facebook Hacker Cup Moscow festival of sport programming – First degree diploma
2012 – 2015	University Advanced Scholarship
2014	Moscow festival of sport programming – Second degree diploma All Siberian open programming contest – Second degree diploma Participant of ACM ICPC NEERC – Third degree diploma
2013	Top-600 in Russian Code Cup
2011	Prizewinner of ROI (Russian National Olympiad in Informatics among high school students) – 26th place Gold medal for extraordinary successes in study
2010	Prizewinner of ROI – 90th place