Konstantin Mishchenko

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Education

2017-2021 KAUST, **PhD** in Computer Science, Adviser: Peter Richtárik
2016–2017 ENS Cachan and Paris-Dauphine, **MSc** in Machine Learning
2012–2016 Moscow Institute of Physics and Technology, **BSc** in Computer Science and Physics

Research interests

- Optimization algorithms
- Deep learning
- Federated and private learning

Positions

2021–2022 Postdoctoral Researcher at Inria Sierra
2020 Research Intern at Google Brain, hosts: Nicolas Le Roux and Courtney Paquette
2018 Applied Scientist Intern at Amazon, Seattle
2016 C++ Software Engineering Intern, AIM High Tech (High Frequency Trading), Moscow

Achievements and awards

2021 Named a **Rising Star in Data Science** by the University of Chicago (link)
2021 NeurIPS 2021 **Outstanding Reviewer** (Top 8%)
2021 ICML 2021 **Best Reviewer** (Top 10%)
2021 ICLR 2021 **Outstanding Reviewer**
2021 KAUST CEMSE Student **Research Excellence** Award
2020 ICML 2020 **Top Reviewer**
2020 One of 12 **Outstanding Program Committee members** for AAAI 2020 selected from >6000 reviewers, Free registration (**$1075**)
2019 NeurIPS 2019 Travel Award, **$1400**
2019 NeurIPS 2019 **Best Reviewer** Award, Free registration (**$750**)
2018 **71st place worldwide** in IEEEXtreme team programming competition
2017-2020 **PhD progress** marked as "**Outstanding**" at every yearly evaluation
2017-2020 Dean's Award (**$5000** annually for 3 years), given to a few top students accepted to KAUST
2017 **1st place** in the Plume Labs machine learning competition on air pollution prediction
2017 **123rd place worldwide** in IEEEXtreme team programming competition
2016-2017 Paris Graduate School of Mathematics **fellowship** (awarded to 24 people from 12 countries)
2015 **1st prize** in Higher School of Economics Olympiad on Applied Math and Informatics
2014 Abramov-Frolov **scholarship for excellence in study**
2012 **Top-1** (max score) at the National Exam in math (only 54 participants out of >800k scored max)
2012 **1st prize** in Moscow Mathematical Olympiad

Conferences: presenting and organizing

2020 NeurIPS, 1 conference poster and 1 workshop poster

2020 International Conference on Machine Learning, poster

2020 SIAM Conference on Mathematics of Data Science, organizer of session on Optimization for Deep Learning

2019 NeurIPS, co-author of 5 workshop papers: 2 spotlights and 3 posters

2019 International Conference on Continuous Optimization, invited talk, organizer of 3 sessions

2019 International Conference on Machine Learning, Time Series Workshop, poster

2018 Conference on Neural Information Processing Systems, poster

2018 International Conference on Machine Learning, oral presentation

2018 International Symposium on Mathematical Programming, invited talk

2018 Informs Optimization Society Meeting, invited talk, organizer of a session

2017 Google Machine Learning Summit, Zurich, poster

2017 Workshop on Decentralized Machine Learning, Optimization and Privacy, poster

Papers

Conference/workshop papers

14. K. Mishchenko
Regularized Newton Method with Global $O(1/k^2)$ Convergence
ICML, Spotlight at Beyond First-Order Methods in ML Systems Workshop, 2021
13. K. Mishchenko, A. Khaled, P. Richtárik
Random Reshuffling: Simple Analysis with Vast Improvements
NeurIPS, 2020
12. Y. Malitsky, K. Mishchenko
Adaptive Gradient Descent Without Descent
ICML, 2020
11. K. Mishchenko, F. Hanzely, P. Richtárik
99% of Worker-Master Communication in Distributed Optimization Is Not Needed
UAI, 2020
10. K. Mishchenko, D. Kovalev, E. Shulgin, Y. Malitsky, P. Richtárik
Revisiting Stochastic Extragradient
AISTATS, 2020
9. A. Khaled, K. Mishchenko, P. Richtárik
Tighter Theory for Local SGD on Identical and Heterogeneous Data
AISTATS, 2020
8. S. Soori, K. Mishchenko, A. Mokhtari, M. Dehnavi, M. Gürbüzbalaban
DAve-QN: A Distributed Averaged Quasi-Newton Method with Local Superlinear Convergence Rate
AISTATS, 2020
7. A. Khaled, K. Mishchenko, P. Richtárik
Better Communication Complexity for Local SGD
NeurIPS, Oral at Federated Learning for Data Privacy and Confidentiality workshop, 2019
6. D. Kovalev, K. Mishchenko, P. Richtárik
Stochastic Newton and Cubic Newton Methods with Simple Local Linear-Quadratic Rates
NeurIPS, Spotlight at Beyond First-Order Methods in ML workshop, 2019
5. K. Mishchenko
Sinkhorn Algorithm as a Special Case of Stochastic Mirror Descent
NeurIPS, Optimal Transport & Machine learning workshop, 2019
4. A. Khaled, K. Mishchenko, P. Richtárik
First Analysis of Local GD on Heterogeneous Data
NeurIPS, Federated Learning for Data Privacy and Confidentiality workshop, 2019
3. K. Mishchenko, M. Montgomery, F. Vaggi
A Self-supervised Approach to Hierarchical Forecasting with Applications to Groupwise Synthetic

Controls
ICML, Time Series workshop, 2019

2. F. Hanzely, K. Mishchenko, P. Richtárik
SEGA: Variance Reduction via Gradient Sketching
NeurIPS, Conference poster, 2018

1. K. Mishchenko, F. Iutzeler, J. Malick, M.-R. Amini
A Delay-Tolerant Proximal-Gradient Algorithm for Distributed Learning
ICML, **Oral** and conference poster, 2018

Journal papers

1. K. Mishchenko, F. Iutzeler, J. Malick
A Distributed Flexible Delay-tolerant Proximal Gradient Algorithm
SIAM Journal on Optimization (**SIOPT**)

Preprints

8. K. Mishchenko, B. Wang, D. Kovalev, P. Richtárik
IntSGD: Floatless Compression of Stochastic Gradients
arXiv:2102.08374
7. K. Mishchenko, A. Khaled, P. Richtárik
Proximal and Federated Random Reshuffling
arXiv:2102.06704
6. A. Salim, L. Condat, K. Mishchenko, P. Richtárik
Dualize, Split, Randomize: Fast Nonsmooth Optimization Algorithms
arXiv:2004.02635
5. X. Qian, A. Sailanbayev, K. Mishchenko, P. Richtárik
MISO is Making a Comeback With Better Proofs and Rates
arXiv:1906.01474
4. K. Mishchenko, P. Richtárik
A Stochastic Decoupling Method for Minimizing the Sum of Smooth and Non-Smooth Functions
arXiv:1905.11535
3. S. Horváth, D. Kovalev, K. Mishchenko, S. Stich, P. Richtárik
Stochastic Distributed Learning with Gradient Quantization and Variance Reduction
arXiv:1904.05115
2. K. Mishchenko, E. Gorbunov, M. Takáč, P. Richtárik
Distributed Learning with Compressed Gradient Differences
arXiv:1901.09269
1. K. Mishchenko, P. Richtárik
A Stochastic Penalty Model for Convex and Nonconvex Optimization with Big Constraints
arXiv:1810.13387

Reviewing and serving as Program Committee Member

2022 International Conference on Learning Representations (**ICLR**), Reviewer

2021 NeurIPS New Frontiers in Federated Learning: Privacy, Fairness, Robustness, Personalization and Data Ownership Workshop, Program Committee Member

2021 NeurIPS Optimization for Machine Learning Workshop, Program Committee Member

2021 NeurIPS "I (Still) Can't Believe It's Not Better! " Workshop, Reviewer

2021 **IEEE** Transactions on Pattern Analysis and Machine Intelligence, Reviewer

2021 Conference on Neural Information Processing Systems (**NeurIPS**), Program Committee Member

2021 International Conference on Machine Learning (**ICML**), Expert Reviewer

2021 International Conference on Artificial Intelligence and Statistics (**AISTATS**), Reviewer

2021 International Conference on Learning Representations (**ICLR**), Reviewer

2020 Conference on Neural Information Processing Systems (**NeurIPS**), Program Committee Member

2021 Journal of Machine Learning Research (**JMLR**), Reviewer

2020 Conference on Uncertainty in Artificial Intelligence (**UAI**), Program Committee Member

2020 **IJCAI-PRICAI**, **Workshop** on Federated Learning for User Privacy and Data Confidentiality, Program Committee member

2020 ($\times 2$) Journal of Machine Learning Research (**JMLR**), Reviewer

2020 International Conference on Machine Learning (**ICML**), Program Committee Member (top 33% ranking reviewer)

2020 International Joint Conference on Artificial Intelligence (**IJCAI-PRICAI**), Program Committee Member

2020 NeurIPS 2019 **Reproducibility Challenge**, Reviewer

2019 Journal of Optimization Theory and Applications (**JOTA**), Reviewer

2019 Bridging Game Theory and Deep Learning (**NeurIPS Workshop**), Reviewer

2019 AAAI Conference on Artificial Intelligence (**AAAI**), Program Committee Member, One of 12 outstanding PC members

2019 Conference on Neural Information Processing Systems (**NeurIPS**), Program Committee Member, Best Reviewer Award

2019 Mathematical Programming, Journal, Reviewer

2019 Conference on Uncertainty in Artificial Intelligence (**UAI**), Program Committee Member

2019 International Conference on Machine Learning (**ICML**), Program Committee Member

People I visited for collaboration

2019 Alexander Gasnikov, Moscow Institute of Physics and Technology, Russia

2019 Stephen Boyd, Stanford, USA

2019 Matthias Ehrhardt, Bath University, UK

2019 Martin Jaggi, EPFL, Switzerland

2018 Lin Xiao, Microsoft Research Redmond, USA

2018 Dmitriy Drusvyatskiy, Washington University, USA

2018 Aryan Mokhtari, MIT, USA

2018 Mert Gürbüzbalaban, Rutgers University, USA

2017 Carola-Bibiane Schönlieb, Cambridge, UK

2017 Jérôme Malick, Université Grenoble Alpes, France

Talks

08/2021 Modeling and Optimization: Theory and Applications (MOPTA), Online

07/2021 Beyond First-Order Methods in ML Systems Workshop at ICML, Online

03/2021 Federated Learning One World Seminar (FLOW), Online

10/2020 Google Brain Montreal, Online

10/2020 JetBrains Research Machine Learning Seminar, Online

06/2020 All-Russian Optimization Seminar, Online

03/2020 Statistics Department of London School of Economics, UK

02/2020 Imperial College of London Reading Group, UK

02/2020 Oxford Data Science seminar, UK

02/2020 Gatsby Unit, University College of London, UK

02/2020 Google Deepmind London, UK

02/2020 Facebook Artificial Intelligence Research New York, USA

01/2020 Sierra team (led by Francis Bach) at Inria, France
12/2019 LIONS group at EPFL, Switzerland
10/2019 Boris Polyak's seminar on theory of automatic control, Institute for Control Sciences, Russia
10/2019 Seminar on applied mathematics, Moscow Institute of Physics and Technology, Russia
10/2019 Modern optimization methods seminar, Moscow Institute of Physics and Technology, Russia
06/2019 Numerical Analysis seminar, Bath University, UK
03/2019 Machine Learning and Optimization Laboratory seminar, EPFL, Switzerland
11/2018 Microsoft Research Seattle, USA
10/2017 Optimization at Work, Moscow Institute of Physics and Technology, Russia