Konstantin Mishchenko

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Positions

2023–now Research Scientist at Samsung AI Center, Cambridge, UK
2021–2022 Postdoctoral Researcher at Inria Sierra, Paris, France
2020 Research Intern at Google Brain, remote
2018 Applied Scientist Intern at Amazon, Seattle, US
2016 C++ Software Engineering Intern, AIM Tech (High Frequency Trading), Moscow, Russia

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

Achievements and awards

2023 ICML 2023 **Outstanding Paper Award**
2022 ICML 2022 **Outstanding Reviewer** (Top 10%)
2022 ICLR 2022 **Highlighted Reviewer**
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**
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 **Best Reviewer** Award, Free registration (**$750**)
2018 **71st place worldwide** in IEEEXtreme team **programming competition**
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

Papers

Conference papers

15. A. Khaled, K. Mishchenko, C. Jin
DoWG Unleashed: An Efficient Universal Parameter-Free Gradient Descent Method
NeurIPS, 2023
14. A. Defazio, K. Mishchenko

Learning-Rate-Free Learning by D-Adaptation
ICML, 2023
Outstanding Paper Award

13. B. Woodoworth, K. Mishchenko, F. Bach
Two Losses Are Better Than One: Faster Optimization Using a Cheaper Proxy
ICML, 2023
12. K. Mishchenko, F. Bach, M. Even, B. Woodworth
Asynchronous SGD Beats Minibatch SGD Under Arbitrary Delays
NeurIPS, 2022
11. K. Mishchenko, G. Malinovsky, S. Stich, P. Richtárik
ProxSkip: Yes! Local Gradient Steps Provably Lead to Communication Acceleration! Finally!
ICML, 2022
10. K. Mishchenko, A. Khaled, P. Richtárik
Proximal and Federated Random Reshuffling
ICML, 2022
9. K. Mishchenko, B. Wang, D. Kovalev, P. Richtárik
IntSGD: Adaptive Floatless Compression of Stochastic Gradients
ICLR, Spotlight, 2022
8. K. Mishchenko, A. Khaled, P. Richtárik
Random Reshuffling: Simple Analysis with Vast Improvements
NeurIPS, 2020
7. Y. Malitsky, K. Mishchenko
Adaptive Gradient Descent Without Descent
ICML, 2020
6. K. Mishchenko, F. Hanzely, P. Richtárik
99% of Worker-Master Communication in Distributed Optimization Is Not Needed
UAI, 2020
5. K. Mishchenko, D. Kovalev, E. Shulgin, Y. Malitsky, P. Richtárik
Revisiting Stochastic Extragradient
AISTATS, 2020
4. A. Khaled, K. Mishchenko, P. Richtárik
Tighter Theory for Local SGD on Identical and Heterogeneous Data
AISTATS, 2020
3. 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
2. F. Hanzely, K. Mishchenko, P. Richtárik
SEGA: Variance Reduction via Gradient Sketching
NeurIPS, 2018
1. K. Mishchenko, F. Iutzeler, J. Malick, M.-R. Amini
A Delay-Tolerant Proximal-Gradient Algorithm for Distributed Learning
ICML, 2018

Journal papers

5. N. Doikov, K. Mishchenko, Yu. Nesterov
Super-Universal Regularized Newton Method
SIAM Journal on Optimization (**SIOPT**)
4. K. Mishchenko
Regularized Newton Method with Global $O(1/k^2)$ Convergence
SIAM Journal on Optimization (**SIOPT**)
3. S. Horváth, D. Kovalev, K. Mishchenko, S. Stich, P. Richtárik
Stochastic Distributed Learning with Gradient Quantization and Double Variance Reduction
Optimization Methods and Software

2. A. Salim, L. Condat, K. Mishchenko, P. Richtárik
   Dualize, Split, Randomize: Fast Nonsmooth Optimization Algorithms
   Journal of Optimization Theory and Applications (**JOTA**)
1. K. Mishchenko, F. Iutzeler, J. Malick
   A Distributed Flexible Delay-tolerant Proximal Gradient Algorithm
   SIAM Journal on Optimization (**SIOPT**)

Workshop papers

5. A. Khaled, K. Mishchenko, P. Richtárik
   Better Communication Complexity for Local SGD
   NeurIPS, Oral at Federated Learning for Data Privacy and Confidentiality workshop, 2019
4. 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
3. K. Mishchenko
   Sinkhorn Algorithm as a Special Case of Stochastic Mirror Descent
   NeurIPS, Optimal Transport & Machine learning workshop, 2019
2. A. Khaled, K. Mishchenko, P. Richtárik
   First Analysis of Local GD on Heterogeneous Data
   NeurIPS, Federated Learning for Data Privacy and Confidentiality workshop, 2019
1. K. Mishchenko, M. Montgomery, F. Vaggi
   A Self-supervised Approach to Hierarchical Forecasting with Applications to Groupwise Synthetic Controls
   ICML, Time Series workshop, 2019

Preprints

9. A. Defazio, A. Cutkosky, H. Mehta, K. Mishchenko
   When, Why and How Much? Adaptive Learning Rate Scheduling by Refinement
   arXiv:2310.07831
8. K. Mishchenko, A. Defazio
   Prodigy: An Expeditiously Adaptive Parameter-Free Learner
   arXiv:2306.06101
7. K. Mishchenko, R. Islamov, E. Gorbunov, S. Horváth
   Partially Personalized Federated Learning: Breaking the Curse of Data Heterogeneity
   arXiv:2305.18285
6. S. Horváth, K. Mishchenko, P. Richtárik
   Adaptive Learning Rates for Faster Stochastic Gradient Methods
   arXiv:2208.05287
5. G. Malinovsky, K. Mishchenko, P. Richtárik
   Server-Side Stepsizes and Sampling Without Replacement Provably Help in Federated Optimization
   arXiv:2201.11066
4. X. Qian, A. Sailanbayev, K. Mishchenko, P. Richtárik
   MISO is Making a Comeback With Better Proofs and Rates
   arXiv:1906.01474
3. K. Mishchenko, P. Richtárik
   A Stochastic Decoupling Method for Minimizing the Sum of Smooth and Non-Smooth Functions
   arXiv:1905.11535
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

2023-Now Transactions on Machine Learning Research (**TMLR**), **Expert Reviewer** and **Action Editor**
2023 Mathematical Programming, Reviewer
2023 International Conference on Machine Learning (**ICML**), Reviewer
2023 International Conference on Learning Representations (**ICLR**), Reviewer
2022 Conference on Neural Information Processing Systems (**NeurIPS**), Program Committee Member
2022 Asian Conference on Machine Learning (**ACML**), **Senior** Program Committee member (Area Chair)
2022 Transactions on Machine Learning Research (**TMLR**), Reviewer
2022 International Conference on Machine Learning (**ICML**), Reviewer
2022 Journal of Machine Learning Research (**JMLR**), Reviewer
2022 International Conference on Learning Representations (**ICLR**), Reviewer
2021 Journal of Optimization Theory and Applications (**JOTA**), 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, Reviewer
2019 Conference on Uncertainty in Artificial Intelligence (**UAI**), Program Committee Member
2019 International Conference on Machine Learning (**ICML**), Program Committee Member

Conference organization

2020 SIAM Conference on Optimization, organizer of 2 minisymposia (event cancelled due to COVID)

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

2019 International Conference on Continuous Optimization, organizer of 3 sessions

2018 Informs Optimization Society Meeting, organizer of 1 session

Talks

02/2024 Cambridge University, UK

06/2023 MIT Operations Research Center, Online

05/2023 Google Brain Seminar, Online

03/2023 AIDRC Seminar, AIDRC Seminar, UAE (remote)

12/2022 NeurIPS Workshop on Federated Learning: Recent Advances and New Challenges, US (remote)

07/2022 EUROPT Workshop on Advances in Continuous Optimization, Portugal

05/2022 Google Deepmind London, UK

12/2021 One-World Optimization Seminar, Online

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

11/2020 INFORMS Annual Meeting, 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

08/2019 International Conference on Continuous Optimization, TU Berlin, Germany

06/2019 Numerical Analysis seminar, Bath University, UK

03/2019 Machine Learning and Optimization Laboratory seminar, EPFL, Switzerland

11/2018 Microsoft Research Seattle, USA

07/2018 International Symposium on Mathematical Programming, Bordeaux, France

03/2018 Informs Optimization Society Meeting, University of Colorado, USA

10/2017 Optimization at Work, Moscow Institute of Physics and Technology, Russia