Filip Hanzely

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EDUCATION

Ph.D. Applied Mathematics and Computational Science Aug '17 – Jul '20
King Abdullah University of Science and Technology (KAUST), KSA
Thesis: Optimization for Supervised Machine Learning: Randomized Algorithms for Data and Parameters
Defense committee: Stephen Wright, Tong Zhang, Raúl Tempone, Bernard Ghanem
Supervisor: Peter Richtárik

M.Sc. by Research with Distinction, Mathematics and Statistics[1] Sep '16 – May '17
University of Edinburgh, UK
Thesis: Randomized algorithms for minimizing relatively smooth functions
1st supervisor: Peter Richtárik, 2nd supervisor: Lukasz Szpruch

Bc. in Economic and Financial Mathematics Sep '13 – June '16
Comenius University, Bratislava, Slovakia
Thesis: Analysis of causal relationships in reconstructed phase space
Supervisor: Anna Krakovská

PAPERS

Lower Bounds and Optimal Algorithms for Personalized Federated Learning
Filip Hanzely, Slavomír Hanzely, Samuel Horváth, Peter Richtárik 2020
Tech. report

Stochastic Subspace Cubic Newton Method
Filip Hanzely, Nikita Doikov, Peter Richtárik, Yurii Nesterov 2020
ICML 2020

Federated Learning of a Mixture of Global and Local Models
Filip Hanzely, Peter Richtárik 2020
ArXiv:12002.05516

Variance Reduced Coordinate Descent with Acceleration: New Method with a Surprising Application to Finite-Sum Problems
Filip Hanzely, Dmitry Kovalev, Peter Richtárik 2020
ICML 2020

One Method to Rule Them All: Variance Reduction for Data, Parameters and Many New Methods
Filip Hanzely, Peter Richtárik 2019
ArXiv:1905.11266

A Unified Theory of SGD: Variance Reduction, Sampling, Quantization and Coordinate Descent
Eduard Gorbunov, Filip Hanzely, Peter Richtárik 2019
AISTATS 2020

Best Pair Formulation & Accelerated Scheme for Non-convex Principal Component Pursuit
Aritra Dutta, Filip Hanzely, Jingwei Liang, Peter Richtárik 2019
IEEE TSP

99% of Worker-Master Communication in Distributed Optimization is Not Needed
Konstantin Mishchenko, Filip Hanzely, Peter Richtárik 2019
UAI 2020

[1] It started off as PhD. It was changed to M.Sc. as I decided to move to KAUST after the first year with my advisor Peter Richtárik

Accelerated Coordinate Descent with Arbitrary Sampling and Best Rates for Minibatches
Filip Hanzely, Peter Richtárik 2018
AISTATS 2019

A Nonconvex Projection Method for Robust PCA
Aritra Dutta, Filip Hanzely, Peter Richtárik 2018
AAAI 2019

A Privacy Preserving Randomized Gossip Algorithm via Controlled Noise Insertion
Filip Hanzely, Jakub Konečný, Nicolas Loizou, Peter Richtárik, Dmitry Grischenko 2018
Privacy Preserving Machine Learning workshop (NeurIPS 2018)

Accelerated Bregman Proximal Gradient Methods for Relatively Smooth Convex Optimization
Filip Hanzely, Peter Richtárik, Lin Xiao 2018
ArXiv:1808.03045

SEGA: Variance Reduction via Gradient Sketching
Filip Hanzely, Konstantin Mishchenko, Peter Richtárik 2018
NeurIPS 2018

Accelerated Stochastic Matrix Inversion: General Theory and Speeding up BFGS rules for Faster Second-Order Optimization
Robert Gower, Filip Hanzely, Sebastian Stich, Peter Richtárik 2018
NeurIPS 2018

Fastest Rates for Stochastic Mirror Descent
Filip Hanzely, Peter Richtárik 2018
ArXiv:1803.07374

Privacy Preserving Randomized Gossip Algorithms
Filip Hanzely, Jakub Konečný, Nicolas Loizou, Peter Richtárik, Dmitry Grischenko 2017
ArXiv:1706.07636

Testing for Causality in Reconstructed State Spaces by Optimized Mixed Prediction Method
Anna Krakovská, Filip Hanzely 2016
Physical Review E 94 (5)

AWARDS

NeurIPS travel award $1500 2018
Travel support for attending NIPS 2018 (Montreal)

#3, WEP poster competition 2018
Third place on a poster competition during Winter Enrichment Program (KAUST)

Dean's Award 2017 – present
Awarded to a few best incoming PhD students at KAUST

KAUST Fellowship 2017 – present
A generous fellowship provided for PhD students at KAUST

EPSRC CASE Award[2], £93,333/3.5 years 2016 – 2017
Industrial PhD scholarship funded by EPSRC and Amazon

AN70 Travel Grant, CAD$750 2017
Travel support for attending Workshop on Modern Convex Optimization and Applications: AN70, Toronto

PMPML Travel Grant, £600 2016
Travel support for attending NIPS conference, Barcelona

[2]The fellowship was awarded for 3,5 years. It was canceled since I decided to move to KAUST after the first year of my PhD in Edinburgh. The Amazon part of the funding is still in place.

Academic Praise 2015
Praise awarded by Dean of Comenius University; it is received by 2-3 selected students from each school of Comenius University every year. Awarded for the leadership in Trojsten (educational NGO in Slovakia) and excellent academic results.

Second Prize (102^{th} place out of 324 competitors) 2014
International Mathematics Competition, Blagoevgrad, Bulgaria

9^{th} Place out of 79 competitors 2014
Vít Jarník International Mathematical Competition, Ostrava, Czech republic

Bronze Medal (163^{rd} place) 2013
International Mathematical Olympiad (IMO), Santa Marta, Colombia

Acknowledgement 2013 & 2012
For the successful representation of Slovakia by *Minister of Education, Science, Research and Sport of the Slovak Republic.*

1^{st} Place 2013
Slovak national round of Mathematical Olympiad for high school students, Košice, Slovakia

Bronze Medal (13^{th} place) 2012
Middle European Mathematical Olympiad, Solothurn, Switzerland

TALKS & POSTERS

Federated Learning One World (FLOW) seminar Jun '20
Talk: Federated Learning of a Mixture of Global and Local Models: Local SGD and Optimal Algorithms
Online/Zoom

Machine Learning MeetUp (MLMU), Košice Apr '20
Talk: Optimization for Machine Learning: From Theory to Practice and Back
Online/Zoom

SIERRA seminar, INRIA Jan '20
Talk: One Method to Rule Them All: Variance Reduction for Data, Parameters and Many New Methods
Paris, France

MLO seminar, EPFL Dec '19
Talk: One Method to Rule Them All: Variance Reduction for Data, Parameters and Many New Methods
Lausanne, Switzerland

KAUST NeurIPS meetup Dec '19
Talk: Better Optimization for Deep Learning
KAUST, Saudi Arabia

Operation Research seminar, UC Louvain Nov '19
Talk: One Method to Rule Them All: Variance Reduction for Data, Parameters and Many New Methods
Louvain la Neuve, Belgium

Google Research Aug '19
Talk and Poster: One Method to Rule Them All: Variance Reduction for Data, Parameters and Many New Methods
Talk: Better Optimization for Deep Learning and the Reason why LARS Works
New York

AISTATS Apr '19
Poster: Accelerated Coordinate Descent with Arbitrary Sampling and Best Rates for Minibatches
Okinawa, Japan

AAAI Jan '19

Poster: A Nonconvex Projection Method for Robust PCA
Honolulu, Hawaii

NeurIPS Dec '18
2 Posters (main venue): SEGA: Variance Reduction via Gradient Sketching, Accelerated Stochastic Matrix Inversion: General Theory and Speeding up BFGS rules for Faster Second-Order Optimization
Poster (PPML workshop): A Privacy Preserving Randomized Gossip Algorithm via Controlled Noise Insertion
Montreal, Canada

Microsoft Research Nov '18
Talk: Accelerated Stochastic Matrix Inversion: General Theory and Speeding up BFGS rules for Faster Second-Order Optimization, during a month-long visit of Lin Xiao
Seattle, Washington

Informs Annual Meeting Nov '18
Talk: Accelerated Coordinate Descent with Arbitrary Sampling and Best Rates for Minibatches
Phoenix, Arizona

Amazon Jun '18 – Sep'18
Talk: Accelerated Stochastic Matrix Inversion: General Theory and Speeding up BFGS rules for Faster Second-Order Optimization
Talk: Better optimization of log-likelihood for ABLR model
Berlin, Germany

Optimization Seminar Sep '17 – Jun '18
Organizer of a group seminar, gave 5 talks given the time period
KAUST, Saudi Arabia

Microsoft Research Mar '18
Talk: Randomized and Accelerated Algorithms for Minimizing Relatively Smooth Functions, followed by week-long research visit of Lin Xiao
Seattle, Washington

Informs Optimization Mar '18
Talk: Randomized and Accelerated Algorithms for Minimizing Relatively Smooth Functions
Denver, Colorado

Optimization and Big Data Feb '18
Spotlight Talk and Poster: Randomized and Accelerated Algorithms for Minimizing Relatively Smooth Functions
KAUST, Saudi Arabia

4$^{\text{th}}$ Conference on Optimization Methods and Software Dec '17
Talk: Randomized and Accelerated Algorithms for Minimizing Relatively Smooth Functions
Havana, Cuba

Workshop on Modern Convex Optimization and Applications: AN70 July '17
Poster: Randomized Algorithms for Minimizing Relatively Smooth Functions
Toronto, Canada

Google Machine Learning Summit June '17
Poster: Randomized Algorithms for Minimizing Relatively Smooth Functions
Zurich, Switzerland

SIAM Conference on Optimization May '17
Talk: Randomized Methods for Minimizing Relatively Smooth Functions
Vancouver, Canada

All Hands Meeting on Big Data Optimization Nov '16 – May '17
3 talks at local group seminar
Edinburgh, UK

Visual Computing - Modeling and Reconstruction Apr '17
Poster: Randomized Algorithms for Minimizing Relatively Smooth Functions

KAUST, Saudi Arabia

ACADEMIC SERVICE

Journal reviews: Numerical Linear Algebra with Applications, Informs Journal on Optimization, Operations Research Letters, SIAM Journal on Mathematics of Data Science, Journal of Machine Learning Research, SIAM Journal on Optimization
Conference reviews: AAAI 2018 (1), ICML 2019 (7), NeurIPS 2019 (6), AAAI 2020 (5), NeurIPS 2020 (7)

Session/minisymposium organizer
2017: Optimization Methods and Software
2018: Informs Optimization, Informs Annual Meeting
2019: International Conference on Continuous Optimization (ICCOPT)
2020: SIAM MDS

RESEARCH VISITS

SIERRA, INRIA/**Alex D'Aspremont** (1 week)	Jan '20
EPFL/**Martin Jaggi** (1 week)	Dec '19
UC Louvain/**Yurii Nesterov** (4 days)	Nov '19
UC Berkeley/**Michael Mahoney** (3 weeks)	Jun '19
Microsoft Research/**Lin Xiao** (4 weeks)	Oct '18 – Nov '18
Microsoft Research/**Lin Xiao** (1 week)	Mar '18

ATTENDANCE AT CONFERENCES & WORKSHOPS

Deep Learning Boot Camp May '19
Simons Institute, Berkeley, CA

Challenges in Optimization for Machine Learning Mar '17
A technical meeting focused on research in optimization for machine learning .
Alan Turing Institute, London, UK

Neural Information Processing Systems (NIPS) Dec '16
Barcelona, Spain

5th IMA Conference of Numerical Linear Algebra and Optimization Sep '16
Birmingham, UK

TEACHING

KAUST, Saudi Arabia Feb '19
Guest Lecturer (1 lecture), Contemporary Topics in Data Sciences (PhD course)

KAUST, Saudi Arabia Aug '17 – Dec '17
Teaching Assistant, Special Topics in Data Sciences (PhD course)

University of Edinburgh, UK Feb '17 – Apr '17
Tutor of Engineering Mathematics (undergraduate course) and Modern Optimization Methods for Big Data Problems (graduate course)

WORK EXPERIENCE

Google, New York (∼40h/w) Jul – Oct '18
Research intern: Improving/understanding optimization and normalization in neural networks. Gave 1 talk and 1 poster presentation during the internship.
Manager: Sashank Reddi

Amazon, Berlin (∼40h/w) Jun – Sep '18
Applied science intern: Speeding up negative log-likelihood minimization for ABLR model (Bayesian optimization). Gave 3 talks on various topics during the internship.
Manager/mentor: Rodolphe Jenatton

Slovak Academy of Sciences, Slovakia (∼30h/m) Jul – Aug '15, Feb – Jun '16
Research assistant: Designing new methods for causality detection in reconstructed phase space;

continued as my Bachelor thesis.

FinViz, Slovakia (~70h/m) Oct '14 – June '15
Part-time C# developer: building automatic detector of stock chart patterns, backtesting trading strategies based on the patterns.

Trojsten NGO, Slovakia (~30h/m) May '13 – Aug '16
Teacher, manager (volunteer): Co-organize competitions and camps (9 one week camps, approx. 35 participants) for talented high school students in mathematics in Slovakia and Czech republic. Gave approx. 45 lectures on different topics, proposed approx. 80 problems and marked 560 solutions. In 2014 and 2015 I was one of 3 leading organizers of the math division of Trojsten (approx. 30 volunteers in the division).

Slovak Mathematical Olympiad Dec '13 – Jun '16
Coordinator of regional (3 times, approx. 90 solutions marked), national round (2 times, approx 80 solutions marked) and team selection camp (3 times, approx. 60 solutions marked).
Lecturer at preparation camp for IMO and MEMO (5 times 3,5 hour lecture for 12 students).

Tatra Banka, Slovakia (~70h/m) Jun '14 – Oct '14
VBA developer: building Excel macros in order to simplify the routine at the project management department.

Gymnázium J. Hronca, Slovakia (~8h/m) Sep '13 – Jun '14
Teacher: preparing talented high school students for Mathematical Olympiad (approx. 8 students).

PhD TRAINING

PhD courses - KAUST Aug '17 – Jun '19
Qualifying Exams (passed): Numerical Linear Algebra, Probability and Statistics, Partial Differential Equations
Other: Data Mining, Numerical Optimization, Contemporary topics in Machine Learning, Stochastic Methods in Engineering

Deep Learning Mar '18 – Aug '18
Passed a Udacity Nanodegree course on Deep Learning (certificate).

PhD courses - Edinburgh Sep '16 – May '17
Convex Analysis and Convex Optimization, Matrix Theory, Modern Optimization Methods for Big Data Problems, Research Seminar on Big Data Optimization

Autumn School on Algorithmic Optimization Sep '16
Trier, Germany

Mathematics of Machine Learning Apr '16
One week intensive course focused mostly on optimization taught by a guest from the University of Edinburgh and held in Bratislava, Slovakia

SKILLS

Languages: Slovak (native), English (fluent)
Computer skills Julia, Python, MxNet/Gluon, Tensorflow, PyTorch, R, MatLab LaTeX