Dep. of Industrial and Systems Eng.
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Martin Takáč

Curriculum Vitae

"The true sign of intelligence is not knowledge but imagination." — Albert Einstein

A. Biographical information

Martin Takáč,
Home address: 1946 Pine Ct., Hellertown, PA 18055.
Work address #1: Harold S. Mohler Laboratory 200 West Packer Avenue Bethlehem, PA 18015-1582
Work address #2: Bldg. C, 113 Research Dr, Bethlehem, PA 18015 .

Education

2010–2014 **Ph.D., Operations Research**,
School of Mathematics, University of Edinburgh, United Kingdom,
Supervisors: Dr. Peter Richtárik, Prof. Jacek Gondzio.
Thesis: Randomized Coordinate Descent Methods for Big Data Optimization

2008–2010 **Master (Summa Cum Laude), Mathematics of Economics and Finance**,
School of Mathematics, Physics and Informatics, Comenius University, Slovakia,
Supervisor: Prof. Daniel Ševčovič.
Thesis: Analysis of partial differential equations with stochastic diffusion

2005–2008 **Bachelor (Summa Cum Laude), Mathematics of Economics and Finance**,
School of Mathematics, Physics and Informatics, Comenius University, Slovakia,
Supervisor: Prof. Daniel Ševčovič.
Thesis: Mathematical analysis of a class of path-dependent options

Full employment history/professional experience

2014–Present **Assistant Professor**, Industrial and Systems Engineering Department, Lehigh University, Bethlehem, PA.
I am responsible for research and teaching in the area of operation research, machine learning, Big Data analytics and developing an active research program.
Achievements:

- 2015-2017, P.C. Rossin Assistant Professorship, *P.C. Rossin College of Engineering and Applied Science, Lehigh University*

2013–2016 **Founder & CEO**, Big Data & Analytics Solutions, s.r.o., Čechy, Slovakia.
Consulting in data management, databases and machine learning

2010–2016 **Co-Founder**, Laurus Group, s.r.o., Bratislava, Slovakia.
Software development: Java, php, C++, MySQL

2007–2010 **Business Analyst & Software Developer**, Plaut Slovensko, s.r.o., Slovakia.
After two months, I have become a business analyst; I was responsible for analyzing processes at Slovak Post, creating UML specifications for software developers, proposing changes and improving the workflow of processes at Slovak Post, electronification of processes at Slovak Post. After the specification had been finalized, I worked as a software developer (Oracle & Java) to implement proposed changes. Once the system was deployed, I was working on an OLAP, which helped to support managerial decisions.

Affiliations

2016–now **Cognitive Science Program @ Lehigh**, *affiliated faculty*.

2015–now **Optimization and Machine Learning Research Group at Lehigh University**, *core faculty*.

B. Publications and Creative Activities[1]

Books

[1] **Modeling and Optimization: Theory and Applications MOPTA, Bethlehem, PA, USA, August 2016 Selected Contributions**
Martin Takáč, Tamás Terlaky
Springer Proceedings in Mathematics & Statistics, 2017

Articles in refereed journals

[2] **Active Metric Learning for Supervised Classification**
Krishnan Kumaran, Dimitri Papageorgiou, Laurens Lueg, Nicolas Sahinidis
Computers and Chemical Engineering, 2020

[3] **Alternating Maximization: Unifying Framework for 8 Sparse PCA Formulations and Efficient Parallel Codes**
Peter Richtárik, Majid Jahani, Selin Damla Ahipasaoglu
Optimization and Engineering (OPTE), 2020

[4] **Inexact SARAH Algorithm for Stochastic Optimization**
Lam Minh Nguyen, Katya Scheinberg
Optimization Methods and Software (GOMS), 2020

[5] **A Class of Parallel Doubly Stochastic Algorithms for Large-Scale Learning**
Aryan Mokhtari, Alec Koppel, Alejandro Ribeiro
Journal of Machine Learning Research, 2020

[6] **Uncertainty quantification in digital image correlation for experimental evaluation of deep learning based damage diagnostic**
Nur Sila Gulgec, Shamim N. Pakzad
Structure and Infrastructure Engineering, 2020

[7] **A Deep Q-Network for the Beer Game: Deep Reinforcement Learning for Inventory Optimization**
Afshin OroojlooyJadid, MohammadReza Nazari, Lawrence Snyder
Manufacturing and Service Operations Management (accepted), 2020

[1] As of September 01, my publications (published and submitted) have 2,640+ citations on Google Scholar.

[8] **Stochastic Reformulations of Linear Systems: Algorithms and Convergence Theory**
Peter Richtárik
SIAM Journal on Matrix Analysis and Applications (SIMAX), 2020

[9] **Structural sensing with deep learning: Strain estimation from acceleration data for fatigue assessment**
Nur Sila Gulgec, Shamim N. Pakzad
Computer-Aided Civil and Infrastructure Engineering, 2020

[10] **Randomized sketch descent methods for non-separable linearly constrained optimization**
Ion Necoara
IMA Journal of Numerical Analysis, 2020

[11] **Modal Identification of Bridges using Mobile Sensors with Sparse Vibration Data**
Soheil Sadeghi Eshkevari, Shamim N. Pakzad, Thomas J. Matarazzo
ASCE's Journal of Engineering Mechanics, 2020

[12] **A Robust Multi-Batch L-BFGS Method for Machine Learning**
Albert S. Berahas
Optimization Methods and Software, 2019

[13] **An Accelerated Communication-Efficient Primal-Dual Optimization Framework for Structured Machine Learning**
Chenxin Ma, Martin Jaggi, Frank E. Curtis, Nathan Srebro
Optimization Methods and Software , 2019

[14] **New Convergence Aspects of Stochastic Gradient Algorithms**
Lam Minh Nguyen, Phuong Ha Nguyen, Peter Richtárik, Katya Scheinberg, Marten van Dijk
minor revision in Journal of Machine Learning Research (JMLR), 2019

[15] **Applying Deep Learning to the Newsvendor Problem**
Afshin OroojlooyJadid, Lawrence Snyder
IISE Transactions, 2019

[16] **Convolutional Neural Network Approach for Robust Structural Damage Detection and Localization**
Nur Sila Gulgec, Shamim N. Pakzad
Journal of Computing in Civil Engineering (Volume 33 Issue 3 - May 2019), 2019

[17] **Distributed Mini-Batch SDCA**
Peter Richtárik, Nathan Srebro
Journal of Machine Learning Research (JMLR) (to appear), 2019

[18] **CoCoA: A General Framework for Communication-Efficient Distributed Optimization**
Virginia Smith, Simone Forte, Chenxin Ma, Michael I. Jordan, Martin Jaggi
Journal of Machine Learning Research (JMLR), 2018

[19] **Dual Free Adaptive Minibatch SDCA for Empirical Risk Minimization**
Xi He, Rachael Tappenden
Frontiers in Applied Mathematics and Statistics, section Optimization, 2018

[20] **On the Complexity of Parallel Coordinate Descent**
Rachael Tappenden, Peter Richtárik
Optimization Methods and Software, 2017

[21] **Hybrid Methods in Solving Alternating-Current Optimal Power Flows**
Alan C. Liddell, Jie Liu, Jakub Marecek
IEEE Transactions on Smart Grid, 2017

[22] **Distributed Optimization with Arbitrary Local Solvers**
Chenxin Ma, Jakub Konečný, Martin Jaggi, Virginia Smith, Michael I. Jordan, Peter Richtárik
Optimization Methods and Software, 2017

[23] **A low-rank coordinate-descent algorithm for semidefinite programming relaxations of optimal power flow**
Jakub Mareček
Optimization Methods and Software, 2017

[24] **Linear Convergence of the Randomized Feasible Descent Method Under the Weak Strong Convexity Assumption**
Chenxin Ma, Rachael Tappenden
Journal of Machine Learning Research, 2016

[25] **On optimal probabilities in stochastic coordinate descent methods (code: 'NSync)**
Peter Richtárik
Optimization Letters, 10(6), 1233-1243, 2016

[26] **Matrix Completion under Interval Uncertainty**
Jakub Mareček, Peter Richtárik
European Journal of Operational Research, 2016

[27] **Distributed coordinate descent method for learning with big data (code: Hydra)**
Peter Richtárik
Journal of Machine Learning Research, 2016

[28] **Mini-Batch Semi-Stochastic Gradient Descent in the Proximal Setting**
Jakub Konečný, Jie Liu, Peter Richtárik
IEEE Journal of Selected Topics in Signal Processing, 2016

[29] **Parallel Coordinate Descent Methods for Big Data Optimization**
Peter Richtárik
Mathematical Programming, 2015

[30] **Distributed Block Coordinate Descent for Minimizing Partially Separable Functions**
Jakub Mareček, Peter Richtárik
Numerical Analysis and Optimization 2014, Springer Proceedings in Mathematics and Statistics, 2014

[31] **Iteration complexity of randomized block-coordinate descent methods for minimizing a composite function**
Peter Richtárik
Mathematical Programming, Series A, 38 pages, 2012, 2011

[32] **Sensitivity analysis of the early exercise boundary for American style of Asian options**
Daniel Ševcovič
International Journal of Numerical Analysis and Modeling, Ser. B, 2(2-3), 2011 231-247, 2011

Published reports and conference proceedings

[33] **Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy**
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro
AISTATS 2020, 2020

[34] **Experimental Study on Digital Image Correlation for Deep Learning-Based Damage Diagnostic**
Nur Sila Gulgec, Shamim N. Pakzad
Dynamics of Civil Structures, Volume 2 pp. 205-210, 2020

[35] **High Resolution Bridge Mode Shape Identification Via Matrix Completion Approach**
Soheil Sadeghi Eshkevari, Shamim N. Pakzad, Soheila Sadeghi Eshkevari
Structural Health Monitoring 2019, 2019

[36] **Accelerating Distributed Stochastic L-BFGS by sampled 2nd-Order Information**
Jie Liu, Yu Rong, Junzhou Huang
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, 2019

[37] **FD-Net with Auxiliary Time Steps: Fast Prediction of PDEs using Hessian-Free Trust-Region Methods**
Nur Sila Gulgec, Zheng Shi, Neil Deshmukh, Shamim Pakzad
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, 2019

[38] **Sampled Quasi-Newton Methods for Deep Learning**
Albert S. Berahas, Majid Jahani
Optimization and Machine Learning @ NeurIPS 2019, 2019

[39] **Grow Your Samples and Optimize Better via Distributed Newton CG and Accumulating Strategy**
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, 2019

[40] **Multi-Agent Image Classification via Reinforcement Learning**
Hossein K. Mousavi, MohammadReza Nazari, Nader Motee
Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2019), 2019

[41] **Entropy-Penalized Semidefinite Programming**
Jakub Marecek, Mikhail Krechetov, Yury Maximov
IJCA2019, 2019

[42] **TOP-SPIN: TOPic discovery via Sparse Principal component INterference**
Selin Damla Ahipasaoglu, Ngai-Man Cheung, Peter Richtárik
Springer Proceedings in Mathematics & Statistics (MOPTA), 2019

[43] **Matrix Completion under Interval Uncertainty: Highlights**
Jakub Marecek, Peter Richtárik
The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, 2018

[44] **Anomaly Detection in Manufacturing Systems Using Structured Neural Networks**
Jie Liu, Jianlin Guo, Philip Orlik, Masahiko Shibata, Daiki Nakahara, Satoshi Mii
The 13th World Congress on Intelligent Control and Automation (WCICA 2018), 2018

[45] **Innovative Sensing by Using Deep Learning Framework**
Nur Sila Gulgec, Shamim N. Pakzad
In Dynamics of Civil Structures, 2018

[46] **Reinforcement Learning for Solving the Vehicle Routing Problem**
MohammadReza Nazari, Afshin Oroojlooy, Lawrence V. Snyder
Neural Information Processing Systems (NeurIPS) 2018, 2018

[47] **SGD and Hogwild! Convergence Without the Bounded Gradients Assumption**
Lam Minh Nguyen, Phuong Ha Nguyen, Marten van Dijk, Peter Richtárik, Katya Scheinberg
ICML 2018 (35th International Conference on Machine Learning), 2018

[48] **A Coordinate-Descent Algorithm for Tracking Solutions in Time-Varying Optimal Power Flows**
Jie Liu, Jakub Marecek, Andrea Simonetto
20th Power Systems Computation Conference, 2018

[49] **A Deep Q-Network for the Beer Game, an Approach to Solve Inventory Optimization Problems**
Afshin OroojlooyJadid, MohammadReza Nazari, Lawrence Snyder
Deep Reinforcement Learning Symposium @ Neural Information Processing Systems (NeurIPS) 2017, 2017

[50] **Structural Damage Detection Using Convolutional Neural Networks**
Nur Sila Gulgec, Shamim N. Pakzad
In Model Validation and Uncertainty Quantification, Volume 3 (pp. 331-337). Springer, Cham., 2017

[51] **Structural damage diagnosis with time-varying loads using convolutional neural networks**
Nur Sila Gulgec, Shamim N. Pakzad
SMAR 2017 (the fourth International Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures), 2017

[52] **Distributed Inexact Damped Newton Method: Data Partitioning and Load-Balancing**
Chenxin Ma
AAAI Workshop on Distributed Machine Learning, 2017

[53] **SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient**

Lam Minh Nguyen, Jie Liu, Katya Scheinberg
ICML 2017 (34th International Conference on Machine Learning), 2017

[54] **Projected Semi-Stochastic Gradient Descent Method with Mini-Batch Scheme under Weak Strong Convexity Assumption**
Jie Liu
Proceedings of MOPTA 2016, 2017

[55] **Large Scale Distributed Hessian-Free Optimization for Deep Neural Network**
Xi He, Dheevatsa Mudigere, Mikhail Smelyanskiy
AAAI Workshop on Distributed Machine Learning, 2016

[56] **A Multi-Batch L-BFGS Method for Machine Learning**
Albert S. Berahas, Jorge Nocedal
NeurIPS, 2016

[57] **SDNA: Stochastic Dual Newton Ascent for Empirical Risk Minimization**
Zheng Qu, Peter Richtárik, Olivier Fercoq
ICML 2016 (33rd International Conference on Machine Learning), 2016

[58] **Primal-Dual Rates and Certificates**
Celestine Dunner, Simone Forte, Martin Jaggi
ICML 2016 (33rd International Conference on Machine Learning), 2016

[59] **Partitioning Data on Features or Samples in Communication-Efficient Distributed Optimization?**
Chenxin Ma
OptML@NeurIPS 2015, 2015

[60] **Dual Free SDCA for Empirical Risk Minimization with Adaptive Probabilities**
Xi He
OptML@NeurIPS 2015, 2015

[61] **Adding vs. Averaging in Distributed Primal-Dual Optimization**
Chenxin Ma, Virginia Smith, Martin Jaggi, Michael I. Jordan, Peter Richtárik
ICML 2015 (32nd International Conference on Machine Learning), 2015

[62] **mS2GD: Mini-batch semi-stochastic gradient descent in the proximal setting (code: mS2GD)**
Jakub Konečný, Jie Liu, Peter Richtárik
OPT 2014: Optimization for Machine Learning @NeurIPS 2014, 2014

[63] **Communication-Efficient Distributed Dual Coordinate Ascent**
Martin Jaggi, Virginia Smith, Jonathan Terhorst, Thomas Hofmann, Michael I. Jordan
NeurIPS, 2014

[64] **Fast Distributed Coordinate Descent for Non-Strongly Convex Losses**
Olivier Fercoq, Zheng Qu, Peter Richtárik
MLSP2014: IEEE International Workshop on Machine Learning for Signal Processing, 2014

[65] **Mini-Batch Primal and Dual Methods for SVMs**
Avleen Bijral, Peter Richtárik, Nathan Srebro
ICML 2013 (30th International Conference on Machine Learning), 2013

[66] **Efficient serial and parallel coordinate descent methods for huge-scale truss topology design**
Peter Richtárik
Operations Research Proceedings 2011, pp. 27-32, Springer-Verlag 2012, 2011

[67] **Efficiency of randomized coordinate descent methods on minimization problems with a composite objective function**
Peter Richtárik
Proceedings of SPARS11 (4th Workshop on Signal Processing with Adaptive Sparse Structured Representations), June 27-30, 2011, 2011

Submitted papers

[68] **DynNet: Physics-based neural architecture design for linear and nonlinear structural response modeling and prediction**
Soheil Sadeghi Eshkevari, Shamim Pakzad, Majid Jahani

[69] **Constrained Combinatorial Optimization with Reinforcement Learning**
Ruben Solozabal, Josu Ceberio

[70] **SONIA: A Symmetric Blockwise Truncated Optimization Algorithm**
Majid Jahani, Mohammadreza Nazari, Rachael Tappenden, Albert S. Berahas

[71] **Finite Difference Neural Networks: Fast Prediction of Partial Differential Equations**
Zheng Shi, Nur Sila Gulgec, Albert S. Berahas, Shamim N. Pakzad

[72] **Quasi-Newton Methods for Deep Learning: Forget the Past, Just Sample**
Albert S. Berahas, Majid Jahani, Peter Richtárik

[73] **Distributed Fixed Point Methods with Compressed Iterates**
Selim Chraibi, Ahmed Khaled, Dmitry Kovalev, Peter Richtárik, Adil Salim

[74] **A Layered Architecture for Active Perception: Image Classification using Deep Reinforcement Learning**
Hossein K. Mousavi, Guangyi Liu, Weihang Yuan, Héctor Muñoz-Avila, Nader Motee

[75] **Don't Forget Your Teacher: A Corrective Reinforcement Learning Framework**
MohammadReza Nazari, Majid Jahani, Lawrence V. Snyder

[76] **Scaling Up Quasi-Newton Algorithms: Communication Efficient Distributed SR1**
Majid Jahani, MohammadReza Nazari, Sergey Rusakov, Albert S. Berahas

[77] **Distributed Learning with Compressed Gradient Differences**
Konstantin Mishchenko, Eduard Gorbunov, Peter Richtárik

[78] **On the Acceleration of L-BFGS with Second-Order Information and Stochastic Batches**
Jie Liu, Yu Rong, Junzhou Huang

[79] **A Class of Parallel Doubly Stochastic Algorithms for Large-Scale Learning**
Aryan Mokhtari, Alec Koppel, Alejandro Ribeiro

[80] **Active Metric Learning for Supervised Classification**
Krishnan Kumaran, Dimitri Papageorgiou, Yutong Chang, Minhan Li

[81] **Stock-out Prediction in Multi-echelon Networks**
Afshin OroojlooyJadid, Lawrence Snyder

[82] **Underestimate Sequences via Quadratic Averaging**
Chenxin Ma, Naga Venkata C. Gudapati, Majid Jahani, Rachael Tappenden

[83] **Stochastic Recursive Gradient Algorithm for Nonconvex Optimization**
Lam Minh Nguyen, Jie Liu, Katya Scheinberg

Patents

2015, Nov. **System for Feedback Summarization and Questionnaire** , Preliminary Patent Application No. 62/252,918, filing date: 09.11.2015

2013, July **Method and System for Classifying Images**, PCT/GB2014/052245, filing date: 23.07.2014

Creative Activities

24am Parallel (multicore and GPU) and Distributed (MPI) library for large scale sparse principal component analysis

ac-dc Accelerated coordinate descent methods for minimizing composite functions

C. Honors and awards

C.1. Teaching Awards

2019 **Richard P. Vinci Award for Educational Excellence of the RCEAS,** This award recognizes a Rossin College faculty member who has demonstrated effective teaching AND/OR enhanced the student learning experience by introducing innovative teaching methods into the classroom AND shows an outstanding commitment to the success of their students. *Lehigh University*

2018 **Faculty of the Year 2017/18 voted by PhD students**, Certificate of recognition for outstanding teaching and distinguished service, *ISE, Lehigh University*

2017 **Master's Faculty of the Year 2016/17**, Certificate of recognition for outstanding teaching and distinguished service, *ISE, Lehigh University*

C.2. Recognition by Professional Societies

2017 **UK OR Society PhD Thesis Prize Winner for 2014**, *The Operational Research Society, United Kingdom*. The Doctoral Award prize, for the "Most Distinguished Body of Research leading to the Award of a Doctorate in the field of O.R.", is an annual award, with the award being made at the OR Society's Blackett Lecture.

2013 **SIAM Certificate** in recognition of outstanding efforts and accomplishments on behalf of the SIAM Chapter at the University of Edinburgh for academic year 2012-2013

2013 **16th IMA Leslie Fox Prize** (2nd prize), *Parallel coordinate descent methods for big data optimization*

2012 **INFORMS Computing Society Student Paper Award 2012** (sole runner-up), *Iteration complexity of randomized block-coordinate descent methods for minimizing a composite function*, Phoenix, USA

C.3. Graduate, and Undergraduate Academic Awards

2012 Best Talk at the SIAM National Student Chapter Conference, *How to climb a hill in billion dimensions using a coin and a compass?*, Manchester, United Kingdom

2012 Alice Margaret Campbell Bequest Fund Award (for success in first year of PhD)

2012 Best Talk at the Edinburgh Postgraduate Colloquium, *Inpainting* (also nominated in categories: Best Delivery, Most Entertaining)

2011 Certificate of Appreciation at the 24th Biennial Conference on Numerical Analysis, *Iteration complexity of randomized block-coordinate descent methods for minimizing a composite function*, Glasgow

2011 Best Poster at the Edinburgh SIAM Student Chapter Conference, *A randomized coordinate descent method for large-scale truss topology design*, Edinburgh

2009 3rd Place at the International Student Scientific Conference, *Using approximation of averaged time-dependent random variables in the valuation of Asian options*, Košice, Slovakia

2008 Honorable Mention at the International Student Scientific Conference, *Analysis of partial differential equations with stochastic diffusion*, Brno, Czech Republic

2008 Honorable Mention at the International Student Scientific Conference, *Newton method applied to solving nonlinear programming problems*, Olomouc, Czech Republic

2007 Winner at the International Student Scientific Conference, *Comparison of various methods for solving extremely ill-conditioned linear systems*, Bratislava, Slovakia

C.4. Other awards

2015 **P.C. Rossin Assistant Professorship**, *P.C. Rossin College of Engineering and Applied Science, Lehigh University*

D.1. Extramural research funding and training grants - Awarded

Competitively awarded research grants

CIAMTIS **Smart Mobile Platform for Model Updating and Life Cycle Assessment of Bridges**
amount: **$132,877**
role: **co-PI**
status: **Awarded**
submitted on: **10/15/2019**
collaborators: **Shamim Pakzad (PI)** .

CIAMTIS **Fatigue Life Estimation of Bridges with Smart Mobile Sensing**
amount: **$65,273**
role: **co-PI**
status: **Awarded (1 year)**
submitted on: **2018**
collaborators: **Shamim Pakzad (PI)** .

NSF 1740796 **Collaborative Research: TRIPODS Institute for Optimization and Learning**
amount: **$1,484,152 (Lehigh $895,670)(my share 47%)**
role: **co-PI**
status: **Awarded (3 years)**
submitted on: **03/15/2017**
collaborators: **Frank Curtis (PI), Katya Scheinberg (co-PI)**
Han Liu (Northwestern University)
Francesco Orabona (Boston University) .

PITA **Uncertanity Quantification and Reduction in Digital Image Correlation for Deep Learning Damage Diagnostic**
amount: **$28,875(my share 50%)**
role: **co-PI**
status: **Awarded (1 year)**
submitted on: **2017**
collaborators: **Shamim Pakzad (PI)** .

NSF 1663256 **GOALI: Machine Learning Approaches for Supply Chain Decision-Making**
amount: **$513,698 (awarded: $328,846)**
role: **PI**
status: **Awarded (3 years)**
submitted on: **09/15/2016**
collaborators: **Lawrence V. Snyder (co-PI)** .

NSF 1618717 **AF: Small: New classes of optimization methods for nonconvex large scale machine learning models**
amount: **$499,143(my share 33%)**
role: **co-PI**
status: **Awarded (3 years)**
submitted on: **11/18/2015**
collaborators: **Frank Curtis (PI), Katya Scheinberg (co-PI)** .

Non-competitive research grants

XSEDE IRI180020 **Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy**
amount: **$4,103 (computing resources)**
role: **PI**
status: **Awarded (1 year)**
submitted on: **2019**
collaborators: – .

Competitively awarded training grants

NSF — **TRIPODS+X: VIS: The DISC Institute workshop series on Machine Learning + X.**
amount: **$199,353**
role: **Sr. Personel**
status: **Awarded**
submitted on: **2018**
collaborators: **Hector Munoz-avila (PI), multiple sr. Pesonnel** .

Competitively awarded travel grants

SIAM — **Travel Grant**
amount: **$800**
status: **Awarded**
year: **2014**
detail: **attending *S*IAM Conference on Optimization, San Diego** .

SIAM — **Travel Grant**
amount: **$800**
status: **Awarded**
year: **2014**
detail: **attending *S*IAM Annual Meeting, Chicago** .

NSF — **Travel Grant**
amount: **$1,400**
status: **Awarded**
year: **2014**
detail: **attending *F*OCM, Uruguay** .

Numerical Algorithms and Intelligent Software — **Travel Grant**
amount: **$13,000**
status: **Awarded**
year: **2013**
detail: **attending *T*heoretical Foundations of Big Data Analysis, Simons Institute for the Theory of Computing, UC Berkeley** .

TTIC — **Travel Grant**
amount: **$1,000**
status: **Awarded**
year: **2012**
detail: **research visit at Toyota Technological Institute at Chicago** .

Singapore University of Technology and Design — **Travel Grant**
amount: **€2,000**
status: **Awarded**
year: **2012**
detail: **research visit at SUTD** .

NAIS **Travel Grant**
amount: **£500**
status: **Awarded**
year: **2012**
detail: **attending International Conference on Operations Research in Zürich** .

NAIS **Travel Grant**
amount: **£1,500**
status: **Awarded**
year: **2012**
detail: **INFORMS meeting in Phoenix** .

Institutional/equipment grants

NSF **CC* Compute: Acquisition of a campus HPC cluster to enhance collaboration, research productivity, and educational impact**
amount: **$400,000**
role: **Sr. Personnel**
status: **Awarded**
submitted on: **01/21/2020**
collaborators: **Edmund Webb (PI), Ganesh Balasubramanian (co-PI), Lisa Fredin (co-PI), Srinivas Rangarajan (co-PI), Alexander Pacheco (co-PI), Jeffrey M. Rickman (sr.personnel), Rosi Reed (sr.personnel), Steve Anthony (sr.personnel)** .

Contract/consulting work

OSIsoft **Data-science education module for OSIsoft**
amount: **$20,000**
role: **co-leader**
status: **Awarded**
submitted on: **2018**
collaborators: **Brian Davison (co-leader)** .

D.2. Intramural research funding and training grants - Awarded

Competitively awarded research grants

Lehigh FIG **Developing a Machine Learning approach to optimize power take-off from a Wave Energy Converter**
amount: **$30,000**
role: **co-PI**
status: **Awarded**
submitted on: **2020**
collaborators: **ARINDAM BANERJEE (PI), Larry Snyder (co-PI)** .

Lehigh **Faculty Grants for International Connections for visiting Prof. Thomas Hofmann, Data Analytics Lab, ETH Zürich**
amount: **$3,990**
role: **PI**
status: **Awarded**
submitted on: **2017**
collaborators: — .

Lehigh **P.C. Rossin Assistant Professorship Award**
amount: **$10,000/year**
role: –
status: **Awarded**
submitted on: **2015–2017**
collaborators: .

D.3. Extramural research funding and training grants - Pending

Competitively awarded research grants

NSF AI Institue - Planning **AI for Science and Engineering: Dealing with Imperfect Data (AI4ID)**
amount: **$500,000**
role: **co-PI**
status: **Pending preproposal**
submitted on: **01/30/2020**
collaborators: **Srinivas Rangaraja (co-PI), Hector Munoz-Avila (PI), Anand Jagota (co-PI), Brian D. Davison (co-PI)** .

NSF AI Institue **AI Institute: AI Instrumentation Institute (AI^3) for Discovery in Physics**
amount: **$25,000,000**
role: **co-PI**
status: **Pending preproposal**
submitted on: **01/28/2020**
collaborators: **Seda Ogrenci-Memik (Northwestern), Ralph Etienne-Cummings (Johns Hopkins), Hooman Mohseni (Northwestern), Lifange He, Joshua Agar, Alok Choudhary (Northwestern), Ankit Agrawal (Northwestern), Kristian Allan Hahn (Northwestern), Chris Jacobsen (Northwestern), Hao Su (UCSD), Javier Mauricio Duarte (Fermi National Accelerator Laboratory), Mitra Taheri (Johns Hopkins)** .

DOE **Adaptive and Scalable Algorithms for Hard Machine Learning Problems**
amount: **$750,000**
role: **PI**
status: **Pending preproposal**
submitted on: **2020**
collaborators: .

NSF OE **Data-Driven Stochastic Multi-Objective Optimization**
amount: **$719,047**
role: **co-PI**
status: **Pending**
submitted on: **10/18/2019**
collaborators: **Luis Vincente (PI)** .

NSF **AF: Medium: Scalable and Distributed Algorithms for Large-Scale Learning**
amount: **$1,199,530**
role: **co-PI**
status: **Pending**
submitted on: **09/30/2019**
collaborators: **Frank Curtis (PI), Luis Vincente (co-PI), Daniel Robinson (co-PI)** .

Singapore Ministry of Education **Unsupervised Learning of Discrete Representation for Data Clustering and Hashing**
amount: **S$683,500.00**
role: **Collaborator**
status: **Pending**
submitted on: **08/18/2019**
collaborators: **Ngai Man Cheung (PI, Singapore University of Technology and Design), Harold Vincent Poor (Collaborator, Princeton University)** .

FaceBook **Subspace Suppression for Inference privacy**
amount: **$100,000**
role: **co-PI**
status: **Pending**
submitted on: **2019**
collaborators: **Parv Venkitasubramaniam (PI)** .

Institutional/equipment grants

NSF **MRI: Development of Artificially Intelligent Atomic Force Microscope**
amount: **$1,249,771**
role: **co-PI**
status: **Pending**
submitted on: **01/21/2020**
collaborators: **Joshua Agar (PI), Hector Munoz-Avila (co-PI), Volkmar Dierolf (co-PI), Himanshu Jain (co-PI)** .

Contract/consulting work

Salad bowl **Reinforcement Learning for controlling green-houses**
amount: **$150,000**
role: **co-leader**
status: **Pending**
submitted on: **2019**
collaborators: **Larry Snyder (co-leader)** .

E. Editor/editorial review board membership for scholarly publications

2019–now, **Member of Editorial Board – Associate Editor** of *O*ptimization Methods and Software (OMS)

2019–now, **Member of Editorial Board – Associate Editor** of *M*athematical Programming Computation (MPC)

2021, **Senior Program Committee member,** International Joint Conference on Artificial Intelligence, IJCAI 2021

2021, **Area chair,** International Conference on Artificial Intelligence and Statistics, AISTATS 2021

2020, **Area chair,** International Conference on Learning Representations, ICLR 2021

2020, **Area chair,** Annual Conference on Neural Information Processing Systems, NeurIPS 2010

2020, **Area chair,** International Conference on Machine Learning, ICML 2020

2020, **Area chair,** International Joint Conference on Artificial Intelligence, IJCAI-PRICAI 2020

2019–2020, **Area chair,** International Conference on Artificial Intelligence and Statistics, AISTATS 2020

2019, **Area chair,** Annual Conference on Neural Information Processing Systems, NeurIPS 2019

2019, **Area chair,** International Conference on Machine Learning, ICML 2019

2018, **Area chair,** AISTATS 2018

2018, **Area chair (Continuous Optimization),** International Conference on Machine Learning, ICML 2018

2017, **Area chair (Continuous Optimization),** International Conference on Machine Learning, ICML 2017

2014–now, **Member of Editorial Board** of *F*rontiers in Applied Mathematics and Statistics

F. Scholarly presentations

Invited Talks/Discussions in Media

[1] *2019, July 25,* Guest in the morning news, **Slovak national TV (RTVS)**

[2] *2019, July 23,* Discuss about the future of AI with Prof. Farkaš and Vladimír Šucha (Director-General of the Joint Research Centre, the European Commission's science and knowledge service), **Slovak national TV station (TA3)**

[3] *2019, July 13,* Guest in Slovak national TV news, **Slovak national TV (RTVS)**

Invited Plenary Talks

[4] *2019, October 29,* Lehigh Valley Bite of Science (organized by Center for Excellence in Education), part of Teacher Enrichment Program (Highschool and Middleschool), Iacocca, Lehigh University

[5] *2019, July 11,* Popular lecture about the future and recent trends in machine learning, Slovakia

[6] *2017, April 26,* **INFORMS Philadelphia Chapter Semi-Annual Meeting**, Philadelphia
Talk title: *Large-Scale Machine Learning via Modern Optimization Lense*

Invited Talks at Conferences/Workshops

[7] *2019, October 14-15,* **Robot Learning Workshop**, Lehigh
Talk title: *Distributed Image Classification using Deep Reinforcement Learning*

[8] *2019, August 16,* **tecBRIDGE**, Scranton, PA
Talk title: *Reinforcement Learning in Engineering*

[9] *2019, August 5 – 8,* **ICCOPT 2019**, Berlin, Germany
Talk title: *Quasi-Newton Methods for Deep Learning: Forget the Past, Just Sample*

[10] *2018, September,* **OSIsoft PI World Conference, Analytics Track**, Barcelona
Talk title: *Introduction to Time-Series Analysis with PI System Data (**B. Davison** and M. Takáč)*
Best product talk *(one of three awarded at the Barcelona event)*

[11] *2018, August 13 – 17,* **DIMACS/TRIPODS/MOPTA Conference**, Bethlehem, USA
Talk title: *Do We Need 2nd Order Methods in Machine Learning?*

[12] *2018, July 1 – 6,* **ISMP**, Bordeaux, France
Talk title: *SGD and Hogwild! Convergence Without the Bounded Gradients Assumption*

[13] *2018, April,* **OSIsoft PI World Conference**, San Francisco
Talk title: *Introduction to Time-Series Analysis with PI System Data (**B. Davison** and M. Takáč)*

[14] *2018, February 5–7,* **Workshop on Optimization and Big Data**, Kaust, Saudi Arabia

[15] *2017, August 21 – 23,* **DIMACS Workshop on Distributed Optimization, Information Processing, and Learning**, Rutgers, USA
Talk title: *SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient*

[16] *2017, August 16 – 18,* **MOPTA 2017**, Bethlehem
Talk title: *SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient*

[17] *2017, June 1,* **2017 HPC Workshop**, Center for Innovation in Teaching & Learning for female students from Lehigh and the neighbouring universities, Lehigh University

[18] *2017, May 22 – 25 ,* **SIOPT 2017**, Vancouver, Canada
Talk title: *SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient*

[19] *2016, August 17 – 19,* **MOPTA 2016**, Bethlehem
Talk title: *A Multi-Batch L-BFGS Method for Machine Learning*

[20] *2016, August 6 – 11,* **ICCOPT 2016**, Tokyo
Talk title: *Primal-dual rates and certificates*

[21] *2016, July 3 – 6,* **EURO 2016**, Poznan, Poland
Talk title: *Distributed Optimization with Arbitrary Local Solvers*

[22] *2016, March 17 – 19,* **INFORMS optimization society conference**, Princeton, NJ
Talk title: *Distributed Optimization with Arbitrary Local Solvers*

[23] *2016, March 11,* **Symposium on Adaptive Systems**, University of Basel, Switzerland
Talk title: *The Journey from Randomized Coordinate Descent to Parallel and Distributed Setting*

[24] *2016, January 4 – 8,* **U.S.-Mexico Workshop on Optimization and its Applications**, Merida, Mexico
Talk title: *Distributed Optimization with Arbitrary Local Solvers: CoCoA+ and Beyond*

[25] *2015, July 20 – 23,* **MOPTA 2015**, Bethlehem

[26] *2015, July 12 – 17,* **ISMP 2015**, Pittsburg

[27] *2015, June, 15–17,* **17th British-French-German Conference on Optimization**, London, United Kingdom

[28] *2014, December 15 – 17,* **FoCM 2014**, Montevideo

[29] *2014, November 9–12,* **INFORMS Annual Meeting**, San Francisco

[30] *2014, May 19 – 22,* **SIAM Conference on Optimization**, San Diego

[31] *2013, July 27 – August 1,* **4th International Conference on Continuous Optimization 2013**, Lisbon

[32] *2013, June 25–28,* **25th Biennial Numerical Analysis Conference**, Glasgow

[33] *2013, June 24,* **16th IMA Leslie Fox Prize Meeting in Numerical Analysis**, Edinburgh

[34] *2012, October 14–17,* **INFORMS Annual Meeting**, Phoenix, Arizona, USA

[35] *2012, September 10–12,* **3rd IMA Conference on Numerical Linear Algebra and Optimisation**, Birmingham, UK

[36] *2012, August 19–24,* **21st International Symposium on Mathematical Programming**, Berlin, Germany

[37] *2012, May 18,* **SIAM National Student Chapter Conference**, Manchester, United Kingdom

[38] *2012, April 20–22,* **3rd Student Conference on Operational Research (SCOR 2012)**, Nottingham, UK

[39] *2011, August 30–September 2,* **International Conference on Operations Research**, Zürich, Switzerland **(invited by Yurii Nesterov)**

[40] *2011, July 1,* **24th Biennial Conference on Numerical Analysis**, Strathclyde, Glasgow

[41] *2011, April 11–13,* **LANCS Workshop on Modeling and Solving Complex Optimisation Problems**, Lancaster

Contributed Talks at Conferences/Conference Workshops

[42] *2019, December 8 – 14,* **Optimization for Machine Learning, OPT2019**, Vancouver, Canada
Talk title: *Sampled Quasi-Newton Methods for Deep Learning*

[43] *2019, December 8 – 14,* **Beyond First Order Methods in ML, NeurIPS 2019**, Vancouver, Canada
Talk title: *Accelerating Distributed Stochastic L-BFGS by sampled 2nd-Order Information*

[44] *2019, December 8 – 14,* **Beyond First Order Methods in ML, NeurIPS 2019**, Vancouver, Canada
Talk title: *Grow Your Samples and Optimize Better via Distributed Newton CG and Accumulating Strategy*

[45] *2019, December 8 – 14,* **Beyond First Order Methods in ML, NeurIPS 2019**, Vancouver, Canada
Talk title: *-Net with Auxiliary Time Steps: Fast Prediction of PDEs using Hessian-Free Trust-Region Methods*

[46] *2018, July 1 – 6,* **ICML 2018**, Stockholm Sweden
Talk title: *SGD and Hogwild! Convergence Without the Bounded Gradients Assumption*

[47] *2017, August 7–9,* **ICML 2017**, Sydney, Australia
Talk title: *SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient*

[48] *2016, June 24,* **ICML 2016 Workshop: Optimization Methods for the Next Generation of Machine Learning** , NYC, USA
Talk title: *Large Scale Distributed Hessian-Free Optimization for Deep Neural Network*

[49] *2016, June 19–24,* **ICML 2016**, NYC, USA
Talk title: *Primal-dual rates and certificates*

[50] *2016, June 19–24,* **ICML 2016**, NYC, USA
Talk title: *Stochastic Dual Newton Ascent for Empirical Risk Minimization [poster]*

[51] *2016, June 19–24,* **ICML 2016**, NYC, USA
Talk title: *Stochastic Dual Newton Ascent for Empirical Risk Minimization [talk]*

[52] *2015, July 6-11,* **ICML 2015**, Lille, France

[53] *2014, December 8-11,* **NIPS 2014**, Montreal

[54] *2013, June 17-20,* **Young Researchers in Mathematics 2013**, Edinburgh

[55] *2011, September 28–30,* **Facing the Multicore-Challenge II**, Conference for Young Scientists, Karlsruhe Institute of Technology (KIT), Germany

[56] *2011, June 27–30,* **Workshop: Signal Processing with Adaptive Sparse Structured Representations**, Edinburgh

[57] *2011, May 16–19,* **SIAM Conference on Optimization**, Darmstadt, Germany

[58] *2011, February 1,* **Edinburgh SIAM Student Chapter Conference**, Edinburgh

Invited Talks at Research Seminars

[59] *2020, October 14,* **Rensselaer Polytechnic Institute, Research Seminar**, NY

[60] *2018, June 21,* **IBM New York, Research Seminar**, NY

[61] *2018, June 21,* **IBM Zurich, Research Seminar**, Zurich, Switzerland

[62] *2018, June 19,* **EPFL Research Seminar**, Lausanne, Switzerland

[63] *2018, June 12,* **ETH Research Seminar**, Zurich, Switzerland

[64] *2018, March 26,* **Yahoo Research Lab**, NYC

[65] *2017, December 15,* **Research Seminar**, Google Research, Zurich

[66] *2017, January 19,* **Research Seminar**, University of Pennsylvania, Philadelphia

[67] *2017, January 12,* **Research Seminar**, Google Research, New York

[68] *2016, Jun 09,* **Cognitive Systems Institute Group Speaker Series**, IBM
Talk title: *Solving Large-Scale Machine Learning Problems in a Distributed Way*

[69] *2016, July 11,* **Seminar**, Comenius University in Bratislava, Slovakia
Talk title: *A Multi-Batch L-BFGS Method for Machine Learning*

[70] *2016, March 14,* **Seminar**, ETH, Switzerland
Talk title: *Distributed Inexact Damped Newton Method: Data Partitioning and Load-Balancing*

[71] *2013, October 31,* **AMPLab Seminar**, UC Berkeley, USA

[72] *2013, September 19,* **QUADS Seminar**, Imperial College, London

[73] *2013, May 1–3,* **Optimization and Big Data**, Edinburgh

[74] *2012, November 1,* **Machine Learning Seminar (TTIC/UofC Computer Science)**, Chicago, USA

Outreach and Seminar Talks in Edinburgh

[75] *2014, April 1,* **All Hands Meetings on Big Data Optimization**

[76] *2013, March 13,* **Edinburgh Research Group in Optimization (ERGO) Research Seminar**

[77] *2011, November 23,* **ERGO Reading Seminar**

[78] *2011, November 19–20,* **Science Live event**, National Museum of Scotland

[79] *2011, October 27,* **OR Society**

[80] *2011, October 27,* **PhD Colloquium**

[81] *2011, October 06,* **Numerical Analysis and Intelligent Software (NAIS) Research Forum**

[82] *2011, July 28,* **Edinburgh University Science Magazine - Seminar**

[83] *2011, June 23,* **PhD Colloquium**

[84] *2011, February 25,* **Edinburgh Compressed Sensing Reading Group**

Organized Conferences and Symposia

2019, Fall, **ISE Research Symposium**, Bethlehem
Organizer and Panel chair

2018, Fall , **ISE Research Symposium**, Bethlehem
Organizer and Panel chair

2017, January 26, **ISE Research Symposium**, Bethlehem
Organizer and Panel chair

2016, August 17 – 19, **MOPTA 2016**, Bethlehem
Conference co-chair

2015, July 20 – 23, **MOPTA 2015**, Bethlehem
Conference co-chair

2012, April 20–22, **3rd Student Conference on Operational Research (SCOR 2012)**, Nottingham, UK
Member of organization committee

Organized Conference Sessions and Minisymposia at Conferences

2019, October 20–23, **2019 INFORMS Annual Meeting**, Seattle
I co-organized one session **Distributed nonlinear optimization in machine learning**

2019, August 5 – 8, **ICCOPT 2019**, Berlin, Germany
I co-organized a few sessions

2018, August 13 – 17, **DIMACS/TRIPODS/MOPTA 2018**, Bethlehem, PA
I co-organized the conference

2018, July 1 – 6, **ISMP 2018**, Bordeaux, France
I co-organized 5 sessions

2017, May 22 – 25, **SIOPT 2017**, Vancouver, Canada
I co-organized 2 mini-symposia (20 talks)

2016, August 17 – 19, **MOPTA 2016**, Bethlehem
I organized 2 sessions

2016, August 6 – 11, **ICCOPT 2016**, Tokyo
I organized 3 sessions

2016, July 3 – 6, **EURO 2016**, Poznan, Poland
I organized 1 session

2015, July 20 – 23, **MOPTA 2015**, Bethlehem
I organized 2 sessions

2015, July 12 – 17, **ISMP 2015**, Pittsburg
I organized 3 sessions

2014, November 9–12, **INFORMS Annual Meeting**, San Francisco
I organized 2 sessions

2013, July 27 – August 1, **4th International Conference on Continuous Optimization 2013**, Lisbon
I organized 2 sessions

2013, June 25–28, **25th Biennial Numerical Analysis Conference**, Glasgow
I organized 2 sessions

G.1. Teaching

ISE 121 **Applied Engineering Statistics**
The application of statistical techniques to solve industrial problems. Regression and correlation, analysis of variance, quality control, and reliability.
Course taught: Spring 2016

ISE 172 **Algorithms in Systems Engineering**
This course will introduce students to the principles involved in designing, analyzing, and implementing basic algorithms common in systems engineering applications.
Course taught: Spring 2017, Spring 2018, Spring 2019

ISE 240 **Introduction to Deterministic Optimization Models in Operations Research**
Formulating, analyzing, and solving mathematical models of real-world problems in systems design and operations. A focus on deterministic optimization models having parameters that are known and fixed. Algorithmic approaches for linear, integer, and nonlinear problems. Solving optimization problems utilizing specialized software.
Course taught: Spring 2015, Fall 2017, Fall 2018

ISE 316 **Optimization Models and Applications**
Modeling and analysis of operations research problems using techniques from mathematical programming. Linear programming, integer programming, multicriteria optimization, stochastic programming, and nonlinear programming using an algebraic modeling language.
Course taught: Fall 2014

ISE 407 **Computational Methods in Optimization**
Introduction to a wide range of topics related to computational methods encountered in the implementation of optimization algorithms. Lectures focus primarily on theoretical aspects of computation, but with the goal of understanding computation in practice. Assigned exercises

focus on employing computational methods in real-world applications. Topical coverage will include data structures, design and analysis of algorithms (sequential and parallel), programming paradigms and languages, development tools and environments, numerical analysis, and matrix computations.
Course taught: Fall 2015, Fall 2016

ISE 395/495 **Mining of Massive Datasets**
This course explores how big data can be extracted and analyzed to discover new information that complements our existing knowledge of the system being studied. This will include a discussion of suitable algorithms for high dimensional data, graphs and machine learning. A modern distributed programming model, Map-Reduce is introduced, as well as, the Apache Spark engine for large-scale data processing.
Course taught: Fall 2015, Fall 2016, Fall 2017, Fall 2018, Fall 2019

New Courses Developed/Course Redesign at Lehigh University

ISE 172 **Algorithms in Systems Engineering**
Although, this is not new course, I completely redesign it, so it will be more project based and much more similar to the work setting.

ISE 395/495 **Mining of Massive Datasets**
I designed this new course. Data-mining has become very important for our undergrad and master program. Moreover, companies are eager to process larger datasets. The course is based on Mapreduce – a powerful distributed framework proposed by Google.

ISE 407 **Computational Methods in Optimization**
This is a PhD level course and is mandatory for our PhD students. Although, this is not new course, I completely redesign it, so it will fit more to our PhD program and to needs of our department and my colleagues. We focus more on high performance computing, including OpenMP, MPI, profiling, debugging and memory considerations.

G.2. Research Advising

Post-docs

1. *2018/09-present* **Albert S. Berahas**

Papers (14)

(a) *SONIA: A Symmetric Blockwise Truncated Optimization Algorithm*
Majid Jahani, Mohammadreza Nazari, Rachael Tappenden, Albert S. Berahas, Martin Takáč
, (2020)

(b) *Finite Difference Neural Networks: Fast Prediction of Partial Differential Equations*
Zheng Shi, Nur Sila Gulgec, Albert S. Berahas, Shamim N. Pakzad, Martin Takáč
, (2020)

(c) *Quasi-Newton Methods for Deep Learning: Forget the Past, Just Sample*
Albert S. Berahas, Majid Jahani, Peter Richtárik, Martin Takáč
, (2019)

(d) *Sampled Quasi-Newton Methods for Deep Learning*
Albert S. Berahas, Majid Jahani, Martin Takáč
Optimization and Machine Learning @ NeurIPS 2019, (2019)

(e) *A Robust Multi-Batch L-BFGS Method for Machine Learning*
Albert S. Berahas, Martin Takáč
Optimization Methods and Software, (2019)

(f) *Scaling Up Quasi-Newton Algorithms: Communication Efficient Distributed SR1*
Majid Jahani, MohammadReza Nazari, Sergey Rusakov, Albert S. Berahas, Martin Takáč
arXiv, (2019)

(g) *A Multi-Batch L-BFGS Method for Machine Learning*
Albert S. Berahas, Jorge Nocedal, Martin Takáč
NeurIPS, (2016)

(h) *Higher-Order Optimization Methods in Machine Learning*
Albert S. Berahas, Frank E. Curtis, M. Mahoney, F. Roosta-Khorasani, Martin Takáč
working paper, (2019)

(i) *A General Scheme for Accelerating First-Order Methods*
Majid Jahani, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

(j) *An Inexact Regularized Newton Method for Nonconvex Optimization Based on Probabilistic Models*
Xi He, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

(k) *Deterministic and Stochastic Sampled Quasi-Newton Methods*
Majid Jahani, Albert S. Berahas, Martin Takáč
working paper, (2019)

(l) *A Fast Adaptive sampled SR1 method for non-convex optimization*
Majid Jahani, MohammadReza Nazari, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

(m) *Learning Dynamical Systems via Deep Learning*
Zheng Shi, Nur Sila Gulgec, Neil Deshmukh, Albert S. Berahas, Shamim Pakzad, Martin Takáč
working paper, (2019)

(n) *Building Generalizable Multi-task Deep Neural Networks for Materials Science and Catalysis*
Zheng Shi, Neil Deshmukh, Albert S. Berahas, Srinivas Rangarajan, Martin Takáč
working paper, (2019)

Selected talks

- *Quasi-Newton Methods For Deep Learning: Forget The Past, Just Sample*
  INFORMS Annual Meeting 2019, Seattle, WA, 2019
- *Stochastic Quasi-Newton Methods: Past, Present and Future*
  INFORMS Annual Meeting 2018, Phoenix, AZ., 2018

- *Do we Need 2nd Order Methods in Machine Learning?*
  TRIPODS PI Workshop 2018 (poster), University of California, Santa Cruz, Silicon Valley Campus, CA 2018

Ph.D. Advisor

1. *2019-present* **Sergey Rusakov**
   funding: NSF

   Papers (2)

   (a) *Scaling Up Quasi-Newton Algorithms: Communication Efficient Distributed SR1*
   Majid Jahani, MohammadReza Nazari, Sergey Rusakov, Albert S. Berahas, Martin Takáč
   arXiv, (2019)

   (b) *Automatic subpolicies search in Hierarchical Reinforcement Learning*
   Sergey Rusakov, Hector Munoz-Avila, Martin Takáč
   working paper, (2019)

2. *2019-present* **Zheng Shi**
   funding: IBM

   Papers (4)

   (a) *Finite Difference Neural Networks: Fast Prediction of Partial Differential Equations*
   Zheng Shi, Nur Sila Gulgec, Albert S. Berahas, Shamim N. Pakzad, Martin Takáč
   , (2020)

   (b) *FD-Net with Auxiliary Time Steps: Fast Prediction of PDEs using Hessian-Free Trust-Region Methods*
   Nur Sila Gulgec, Zheng Shi, Neil Deshmukh, Shamim Pakzad, Martin Takáč
   Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

   (c) *Learning Dynamical Systems via Deep Learning*
   Zheng Shi, Nur Sila Gulgec, Neil Deshmukh, Albert S. Berahas, Shamim Pakzad, Martin Takáč
   working paper, (2019)

   (d) *Building Generalizable Multi-task Deep Neural Networks for Materials Science and Catalysis*
   Zheng Shi, Neil Deshmukh, Albert S. Berahas, Srinivas Rangarajan, Martin Takáč
   working paper, (2019)

3. *2016/09-present* **Majid Jahani**
   funding: Startup, TA, NSF, SAS

   Papers (15)

   (a) *Alternating Maximization: Unifying Framework for 8 Sparse PCA Formulations and Efficient Parallel Codes*
   Peter Richtárik, Majid Jahani, Selin Damla Ahipasaoglu, Martin Takáč
   Optimization and Engineering (OPTE), (2020)

(b) *DynNet: Physics-based neural architecture design for linear and nonlinear structural response modeling and prediction*
Soheil Sadeghi Eshkevari, Martin Takáč, Shamim Pakzad, Majid Jahani
, (2020)

(c) *SONIA: A Symmetric Blockwise Truncated Optimization Algorithm*
Majid Jahani, Mohammadreza Nazari, Rachael Tappenden, Albert S. Berahas, Martin Takáč
, (2020)

(d) *Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy*
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro, Martin Takáč
AISTATS 2020, (2020)

(e) *Quasi-Newton Methods for Deep Learning: Forget the Past, Just Sample*
Albert S. Berahas, Majid Jahani, Peter Richtárik, Martin Takáč
, (2019)

(f) *Sampled Quasi-Newton Methods for Deep Learning*
Albert S. Berahas, Majid Jahani, Martin Takáč
Optimization and Machine Learning @ NeurIPS 2019, (2019)

(g) *Grow Your Samples and Optimize Better via Distributed Newton CG and Accumulating Strategy*
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro, Martin Takáč
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

(h) *Don't Forget Your Teacher: A Corrective Reinforcement Learning Framework*
MohammadReza Nazari, Majid Jahani, Lawrence V. Snyder, Martin Takáč
arXiv, (2019)

(i) *Scaling Up Quasi-Newton Algorithms: Communication Efficient Distributed SR1*
Majid Jahani, MohammadReza Nazari, Sergey Rusakov, Albert S. Berahas, Martin Takáč
arXiv, (2019)

(j) *Underestimate Sequences via Quadratic Averaging*
Chenxin Ma, Naga Venkata C. Gudapati, Majid Jahani, Rachael Tappenden, Martin Takáč
, (2017)

(k) *"Underestimate Sequences via Quadratic Averaging with Adaptive Strongly Convex Parameter*
Majid Jahani, Sai Praneeth Karimireddy, Martin Jaggi, Martin Takáč
working paper, (2019)

(l) *Stochastic Trust-region algorithms methods using indefinite Hessian approximations*
Majid Jahani, Joshua D. Griffin, Alireza Yektamaram, Martin Takáč
working paper, (2019)

(m) *A General Scheme for Accelerating First-Order Methods*
Majid Jahani, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

(n) *Deterministic and Stochastic Sampled Quasi-Newton Methods*
Majid Jahani, Albert S. Berahas, Martin Takáč
working paper, (2019)

(o) *A Fast Adaptive sampled SR1 method for non-convex optimization*
Majid Jahani, MohammadReza Nazari, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

Selected talks

- *A Fast and Adaptive Sampled SR1 Method for Deep Learning*
  2020 INFORMS Optimization Society Conference, March 15–17, 2020
- *Quasi-Newton Methods for Deep Learning: Forget the Past, Just Sample*
  SAS, Cary, NC, USA, July 2019
- *Scaling Up Quasi-Newton Algorithms: Communication Efficient Distributed SR1*
  SAS, Cary, NC, USA, July 2019
- *Efficient Hessian Free Algorithm for Large-scale ERM*
  INFORMS , Phoenix, AZ, Nov 2018
- *Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy*
  Second TRIPODS PI Workshop, Santa Clara, CA, USA, Oct 2018
- *Underestimated Sequence via Quadratic Averaging*
  DIMACS/TRIPODS/MOPTA conference, Lehigh University, PA, USA, Aug 2018
- *A Hessian Free Algorithm for Large-scale Empirical Risk Minimization*
  12th Annual Machine Learning Symposium, NY, USA, Mar 2018
- *Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy*
  OptML, Lehigh University, PA, USA, Mar 2018
- *Accelerating Gradient Descent through Quadratic Lower Bounds*
  MOPTA Conference, Bethlehem, PA, USA, Aug 2017
- *Finite-Sum Composition Optimization Concept and algorithm*
  OptML, LehighUniversity, PA, USA, Apr 2017
- *Underestimated Sequences versus Quadratic Averaging*
  COR@L Lab Seminar Presentations, Lehigh University, PA, USA, Apr 2017
- *Underestimated Sequence*
  OptML, Lehigh University, PA, USA, Jan 2017

4. *2014/09-2018/12* **Xi He**
funding: Startup, Siemens, Other
current position: *Quantitative Researcher at J.P.Morgan, NY*
Thesis: *Distributed Algorithms in Large-scaled Empirical Risk Minimization: Non-convexity, Adaptive-sampling, and Matrix-free Second-order Methods*

Papers (6)

(a) *Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy*
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro, Martin Takáč
AISTATS 2020, (2020)

(b) *Grow Your Samples and Optimize Better via Distributed Newton CG and Accumulating Strategy*
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro, Martin Takáč
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

(c) *Dual Free Adaptive Minibatch SDCA for Empirical Risk Minimization*
Xi He, Rachael Tappenden, Martin Takáč
Frontiers in Applied Mathematics and Statistics, section Optimization, (2018)

(d) *Large Scale Distributed Hessian-Free Optimization for Deep Neural Network*
Xi He, Dheevatsa Mudigere, Mikhail Smelyanskiy, Martin Takáč
AAAI Workshop on Distributed Machine Learning, (2016)

(e) *Dual Free SDCA for Empirical Risk Minimization with Adaptive Probabilities*
Xi He, Martin Takáč
OptML@NeurIPS 2015, (2015)

(f) *An Inexact Regularized Newton Method for Nonconvex Optimization Based on Probabilistic Models*
Xi He, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

Selected talks

- *An Inexact Regularized Stochastic Newton Method for Nonconvex Optimization*
  Optimization and Big Data, KAUST, Saudi Arabia, 2018
- *Steps to Success in Training Neural Networks by Using Second-order Algorithms*
  INFORMS Annual Meeting, Houston, TX, 2017
- *Distributed Hessian-Free Optimization for Deep Neural Network*
  AAAI, San Francisco, CA, 2017
- *Large Scale Distributed Hessian-Free Optimization for Deep Neural Network*
  MOPTA, Lehigh University, 2016
- *Dual Free Adaptive Mini-batch SDCA for Empirical Risk Minimization*
  INFORMS Annual Meeting, Nashville, TE, 2016
- *Dual Free SDCA for Empirical Risk Minimization with Adaptive Probabilities*
  NeurIPS, Montréal, Canada, 2015

5. *2014/09-2018/09* **Jie Liu**
funding: TA, Siemens, IBM Fellowship, Tencent lab, Startup
current position: *Senior Deep Learning Engineer at OPPO U.S. Research Center*
Thesis: *Recent Advances in Randomized Methods for Big Data Optimization*
Awards

- Jie is a recipient of an IBM Fellowship in academic year 2017/2018

Papers (10)

(a) *Accelerating Distributed Stochastic L-BFGS by sampled 2nd-Order Information*
Jie Liu, Yu Rong, Martin Takáč, Junzhou Huang
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

(b) *On the Acceleration of L-BFGS with Second-Order Information and Stochastic Batches*
Jie Liu, Yu Rong, Martin Takáč, Junzhou Huang
, (2018)

(c) *Anomaly Detection in Manufacturing Systems Using Structured Neural Networks*
Jie Liu, Jianlin Guo, Philip Orlik, Masahiko Shibata, Daiki Nakahara, Satoshi Mii, Martin Takáč
The 13th World Congress on Intelligent Control and Automation (WCICA 2018), (2018)

(d) *A Coordinate-Descent Algorithm for Tracking Solutions in Time-Varying Optimal Power Flows*
Jie Liu, Jakub Marecek, Andrea Simonetto, Martin Takáč
20th Power Systems Computation Conference, (2018)

(e) *Hybrid Methods in Solving Alternating-Current Optimal Power Flows*
Alan C. Liddell, Jie Liu, Jakub Marecek, Martin Takáč
IEEE Transactions on Smart Grid, (2017)

(f) *Stochastic Recursive Gradient Algorithm for Nonconvex Optimization*
Lam Minh Nguyen, Jie Liu, Katya Scheinberg, Martin Takáč
, (2017)

(g) *SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient*
Lam Minh Nguyen, Jie Liu, Katya Scheinberg, Martin Takáč
ICML 2017 (34th International Conference on Machine Learning), (2017)

(h) *Projected Semi-Stochastic Gradient Descent Method with Mini-Batch Scheme under Weak Strong Convexity Assumption*
Jie Liu, Martin Takáč
Proceedings of MOPTA 2016, (2017)

(i) *Mini-Batch Semi-Stochastic Gradient Descent in the Proximal Setting*
Jakub Konečný, Jie Liu, Peter Richtárik, Martin Takáč
IEEE Journal of Selected Topics in Signal Processing, (2016)

(j) *mS2GD: Mini-batch semi-stochastic gradient descent in the proximal setting (code: mS2GD)*
Jakub Konečný, Jie Liu, Peter Richtárik, Martin Takáč
OPT 2014: Optimization for Machine Learning @NeurIPS 2014, (2014)

6. *2014/09-2018/05* **Chenxin Ma**
funding: TA, Startup, NSF
current position: *Senior Data Scientist at Walmart Labs, Mountain View, California*
Thesis: *Distributed Methods for Composite Optimization: Communication Efficiency, Load-Balancing and Local Solvers*
Awards

- 1st place at Van Hoesen Family Best Publication Competition, 2017

- Rossin Doctoral Fellowship, Lehigh University, 2017-2018
- 2nd Prize Winner in American Express Machine Learning Challenge, New York City, 2015
- Research Assistantship, Lehigh University, 2015-2016
- Deans Doctoral Assistantship, Lehigh University, 2014-2015

Papers (10)

(a) *Efficient Distributed Hessian Free Algorithm for Large-scale Empirical Risk Minimization via Accumulating Sample Strategy*
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro, Martin Takáč
AISTATS 2020, (2020)

(b) *Grow Your Samples and Optimize Better via Distributed Newton CG and Accumulating Strategy*
Majid Jahani, Xi He, Chenxin Ma, Aryan Mokhtari, Dheevatsa Mudigere, Alejandro Ribeiro, Martin Takáč
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

(c) *An Accelerated Communication-Efficient Primal-Dual Optimization Framework for Structured Machine Learning*
Chenxin Ma, Martin Jaggi, Frank E. Curtis, Nathan Srebro, Martin Takáč
Optimization Methods and Software , (2019)

(d) *CoCoA: A General Framework for Communication-Efficient Distributed Optimization*
Virginia Smith, Simone Forte, Chenxin Ma, Martin Takáč, Michael I. Jordan, Martin Jaggi
Journal of Machine Learning Research (JMLR), (2018)

(e) *Distributed Inexact Damped Newton Method: Data Partitioning and Load-Balancing*
Chenxin Ma, Martin Takáč
AAAI Workshop on Distributed Machine Learning, (2017)

(f) *Underestimate Sequences via Quadratic Averaging*
Chenxin Ma, Naga Venkata C. Gudapati, Majid Jahani, Rachael Tappenden, Martin Takáč
, (2017)

(g) *Distributed Optimization with Arbitrary Local Solvers*
Chenxin Ma, Jakub Konečný, Martin Jaggi, Virginia Smith, Michael I. Jordan, Peter Richtárik, Martin Takáč
Optimization Methods and Software, (2017)

(h) *Linear Convergence of the Randomized Feasible Descent Method Under the Weak Strong Convexity Assumption*
Chenxin Ma, Rachael Tappenden, Martin Takáč
Journal of Machine Learning Research, (2016)

(i) *Partitioning Data on Features or Samples in Communication-Efficient Distributed Optimization?*
Chenxin Ma, Martin Takáč
OptML@NeurIPS 2015, (2015)

(j) *Adding vs. Averaging in Distributed Primal-Dual Optimization*
Chenxin Ma, Virginia Smith, Martin Jaggi, Michael I. Jordan, Peter Richtárik, Martin Takáč
ICML 2015 (32nd International Conference on Machine Learning), (2015)

Selected talks

- **SIAM Conference on Optimization, Vancouver, Canada, 2017**
- **Distributed Machine Learning Workshop in AAAI Conference, San Francisco, CA, 2017**
- **2016 Informs Annual Meeting, Nashville, TN, 2016**
- **SAS Interns Expo, 2016**
- **10th Annual Machine Learning Symposium, Manhattan, NY, 2016**
- **Neural Information Processing Systems (NIPS) workshop, Montreal, Canada, 2015**
- **2015 Informs Annual Meeting, Philadelphia, PA, 2015**

Ph.D. Co-Advisor

1. *2014/09-2019* **MohammadReza Nazari**
funding: NSF, SAS, Other
current position: *SAS*
Intensive collaboration with prof. **Lawrence V. Snyder**
Thesis: *Autonomous Decision-Making Schemes for Real-World Applications in Supply Chains and Online Systems*

Papers (7)

(a) *A Deep Q-Network for the Beer Game: Deep Reinforcement Learning for Inventory Optimization*
Afshin OroojlooyJadid, MohammadReza Nazari, Lawrence Snyder, Martin Takáč
Manufacturing and Service Operations Management (accepted), (2020)

(b) *Multi-Agent Image Classification via Reinforcement Learning*
Hossein K. Mousavi, MohammadReza Nazari, Martin Takáč, Nader Motee
Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2019), (2019)

(c) *Don't Forget Your Teacher: A Corrective Reinforcement Learning Framework*
MohammadReza Nazari, Majid Jahani, Lawrence V. Snyder, Martin Takáč
arXiv, (2019)

(d) *Scaling Up Quasi-Newton Algorithms: Communication Efficient Distributed SR1*
Majid Jahani, MohammadReza Nazari, Sergey Rusakov, Albert S. Berahas, Martin Takáč
arXiv, (2019)

(e) *Reinforcement Learning for Solving the Vehicle Routing Problem*
MohammadReza Nazari, Afshin Oroojlooy, Lawrence V. Snyder, Martin Takáč
Neural Information Processing Systems (NeurIPS) 2018, (2018)

(f) *A Deep Q-Network for the Beer Game, an Approach to Solve Inventory Optimization Problems*
Afshin OroojlooyJadid, MohammadReza Nazari, Lawrence Snyder, Martin Takáč
Deep Reinforcement Learning Symposium @ Neural Information Processing Systems (NeurIPS) 2017, (2017)

(g) *A Fast Adaptive sampled SR1 method for non-convex optimization*
Majid Jahani, MohammadReza Nazari, Albert S. Berahas, Rachael Tappenden, Martin Takáč
working paper, (2019)

Selected talks

- *Optimal Control of General Dynamic Matching Systems*
  MOPTA, Bethlehem, PA, 2016
- *Reward Maximization in General Dynamic Matching Systems*
  INFORMS Applied Probability Conference, Evanston, IL, 2017
- *A Deep Q-Network for the Beer Game with Partial Information*
  INFORMS Annual Meeting, 2018
- *Reinforcement Learning for Solving the Vehicle Routing Problem*
  INFORMS Annual Meeting, 2018
- *A Deep Q-Network for the Beer Game with Partial Information*
  INFORMS Annual Meeting, 2017
- *Reinforcement Learning for Solving the Vehicle Routing Problem*
  INFORMS Annual Meeting, 2017
- *Tutorial on Policy Gradient Optimization Method in Reinforcement Learning*
  OptML Series, Bethlehem, PA, 2017
- *Machine Learning Methods for Economists*
  Rauch Business School, Bethlehem, PA, 2018

Ph.D. Research co-advisor (no formal co-advisor)

1. *2016-present* **Soheil Sadeghi Eshkevari**
   Intensive collaboration with prof. **Shamim Pakzad**

Papers (3)

(a) *DynNet: Physics-based neural architecture design for linear and nonlinear structural response modeling and prediction*
Soheil Sadeghi Eshkevari, Martin Takáč, Shamim Pakzad, Majid Jahani
, (2020)

(b) *Modal Identification of Bridges using Mobile Sensors with Sparse Vibration Data*
Soheil Sadeghi Eshkevari, Shamim N. Pakzad, Martin Takáč, Thomas J. Matarazzo
ASCE's Journal of Engineering Mechanics, (2020)

(c) *High Resolution Bridge Mode Shape Identification Via Matrix Completion Approach*
Soheil Sadeghi Eshkevari, Martin Takáč, Shamim N. Pakzad, Soheila Sadeghi Eshkevari
Structural Health Monitoring 2019, (2019)

2. *2016/09-present* **Tao Li**
   funding: NSF, TA, Siemens
   Intensive collaboration with prof. **Lawrence V. Snyder**

   Papers (3)

   (a) *Reinforcement Learning for job shop scheduling problem*
   Tao Li, Ioannis Akrotirianakis, Ted Ralphs, Lawrence Snyder, Martin Takáč
   working paper, (2019)

   (b) *Reinforcement Learning for Stochastic Vehicle Routing Problem*
   Tao Li, Ted Ralphs, Lawrence Snyder, Martin Takáč
   working paper, (2019)

   (c) *Reinforcement Learning for Stochastic Knapsack Problem*
   Tao Li, Ted Ralphs, Lawrence Snyder, Martin Takáč
   working paper, (2019)

3. *2014-2019* **Nur Sila Gulgec**
   funding: Startup, PITA, CIAMTIS, Other
   Intensive collaboration with prof. **Shamim Pakzad**
   Thesis: *Big Data Processing and Sensing Strategies for Next Generation Structural Health Monitoring*

   Papers (10)

   (a) *Uncertainty quantification in digital image correlation for experimental evaluation of deep learning based damage diagnostic*
   Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
   Structure and Infrastructure Engineering, (2020)

   (b) *Finite Difference Neural Networks: Fast Prediction of Partial Differential Equations*
   Zheng Shi, Nur Sila Gulgec, Albert S. Berahas, Shamim N. Pakzad, Martin Takáč
   , (2020)

   (c) *Structural sensing with deep learning: Strain estimation from acceleration data for fatigue assessment*
   Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
   Computer-Aided Civil and Infrastructure Engineering, (2020)

   (d) *Experimental Study on Digital Image Correlation for Deep Learning-Based Damage Diagnostic*
   Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
   Dynamics of Civil Structures, Volume 2 pp. 205-210, (2020)

   (e) *FD-Net with Auxiliary Time Steps: Fast Prediction of PDEs using Hessian-Free Trust-Region Methods*
   Nur Sila Gulgec, Zheng Shi, Neil Deshmukh, Shamim Pakzad, Martin Takáč
   Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

   (f) *Convolutional Neural Network Approach for Robust Structural Damage Detection and Localization*

Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
Journal of Computing in Civil Engineering (Volume 33 Issue 3 - May 2019), (2019)

(g) *Innovative Sensing by Using Deep Learning Framework*
Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
In Dynamics of Civil Structures, (2018)

(h) *Structural Damage Detection Using Convolutional Neural Networks*
Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
In Model Validation and Uncertainty Quantification, Volume 3 (pp. 331-337). Springer, Cham., (2017)

(i) *Structural damage diagnosis with time-varying loads using convolutional neural networks*
Nur Sila Gulgec, Martin Takáč, Shamim N. Pakzad
SMAR 2017 (the fourth International Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures), (2017)

(j) *Learning Dynamical Systems via Deep Learning*
Zheng Shi, Nur Sila Gulgec, Neil Deshmukh, Albert S. Berahas, Shamim Pakzad, Martin Takáč
working paper, (2019)

4. *2014/09-2018/09* **Lam Minh Nguyen**
Intensive collaboration with prof. **Katya Scheinberg**
Thesis: *A Service System with On-Demand Agents, Stochastic Gradient Algorithms and the SARAH Algorithm*
Awards

- 2019 P.C. Rossin College of Engineering and Applied Science Elizabeth V. Stout Dissertation Award

Papers (5)

(a) *Inexact SARAH Algorithm for Stochastic Optimization*
Lam Minh Nguyen, Katya Scheinberg, Martin Takáč
Optimization Methods and Software (GOMS), (2020)

(b) *New Convergence Aspects of Stochastic Gradient Algorithms*
Lam Minh Nguyen, Phuong Ha Nguyen, Peter Richtárik, Katya Scheinberg, Martin Takáč, Marten van Dijk
minor revision in Journal of Machine Learning Research (JMLR), (2019)

(c) *SGD and Hogwild! Convergence Without the Bounded Gradients Assumption*
Lam Minh Nguyen, Phuong Ha Nguyen, Marten van Dijk, Peter Richtárik, Katya Scheinberg, Martin Takáč
ICML 2018 (35th International Conference on Machine Learning), (2018)

(d) *Stochastic Recursive Gradient Algorithm for Nonconvex Optimization*
Lam Minh Nguyen, Jie Liu, Katya Scheinberg, Martin Takáč
, (2017)

(e) *SARAH: A Novel Method for Machine Learning Problems Using Stochastic Recursive Gradient*
Lam Minh Nguyen, Jie Liu, Katya Scheinberg, Martin Takáč
ICML 2017 (34th International Conference on Machine Learning), (2017)

5. *2014/09-2018/09* **Afshin OroojlooyJadid**
   funding: NSF, Other
   Intensive collaboration with prof. **Lawrence V. Snyder**
   Thesis: *Applications of Machine Learning in Supply Chains*

   Papers (4)

   (a) *A Deep Q-Network for the Beer Game: Deep Reinforcement Learning for Inventory Optimization*
   Afshin OroojlooyJadid, MohammadReza Nazari, Lawrence Snyder, Martin Takáč
   Manufacturing and Service Operations Management (accepted), (2020)

   (b) *Applying Deep Learning to the Newsvendor Problem*
   Afshin OroojlooyJadid, Lawrence Snyder, Martin Takáč
   IISE Transactions, (2019)

   (c) *A Deep Q-Network for the Beer Game, an Approach to Solve Inventory Optimization Problems*
   Afshin OroojlooyJadid, MohammadReza Nazari, Lawrence Snyder, Martin Takáč
   Deep Reinforcement Learning Symposium @ Neural Information Processing Systems (NeurIPS) 2017, (2017)

   (d) *Stock-out Prediction in Multi-echelon Networks*
   Afshin OroojlooyJadid, Lawrence Snyder, Martin Takáč
   , (2017)

Master's Advising - Master Thesis

1. *2020-2021* **Ved Patel** (Master Thesis)
2. *2019-2020* **Yuqing Chen** (Master Thesis)
3. *2019-2020* **Ran Ran** (Master Thesis)
4. *2019-2020* **Siner Gokhan Yilmaz** (Master Thesis)
5. *2016-2017* **Yutong Chang** (Master Thesis)
   Thesis: *Optimizing Quadratic Functions over the Set of Permutations*
   Awards
   - 1st place at the ISE UG Research Symposium 2017.

   Papers (1)

   (a) *Active Metric Learning for Supervised Classification*
   Krishnan Kumaran, Dimitri Papageorgiou, Yutong Chang, Minhan Li, Martin Takáč
   , (2018)

6. *2016-2017* **Sean Byrne** (Master Thesis)
   Thesis: *Aspect Identification and Sentiment Analysis in Text-Based Reviews*
   Awards
   - 2nd place at the ISE UG Research Symposium 2017.

7. *2014-2016* **Haoran Zhang** (Master Thesis)
   Thesis: *Automated Car Guiding System Using Reinforcement Learning*

Master's Advising - Research Project (no thesis)

1. *2018-2019* **Shihwei Wang** (Research Project)
   Awards
   - 1st place at the ISE MSc Research Symposium 2019.
2. *2016-2017* **Jingyu Liang** (Research Project)
3. *2016-2017* **Bolun Xu** (Research Project)
4. *2015-2016* **Zhou Cao** (Research Project)
5. *2015-2016* **Jiawei Zhang** (Research Project)
6. *2014-2015* **Yawei Yuan** (Research Project)
7. *2018-2018* **Sitao Zhang** (Research Project)

Master's Advising - Engineering Project

1. *2019-2019* **Sang Yun Kang** (Engineering Project)
2. *2018-2018* **Tao Zhang** (Engineering Project)
3. *2017-2018* **Diwakar Prasad** (Engineering Project)
4. *2017-2017* **Creatrol Xu** (Engineering Project)
5. *2017-2017* **Arjun Chidambaram Subbiah** (Engineering Project)
6. *2017-2017* **Kunal Salvi** (Engineering Project)
7. *2017-2017* **Nitant Pandey** (Engineering Project)

Bachelor's Advising

1. *2020-2021* **Jack Heller** (Research Project)
2. *2020-2020* **Yanzhe Ma** (Research Project)
3. *2019-2019* **Shengli Zhu** (Research Project)
4. *2019-2019* **Xiaming (Garfield) Jin** (Research Project)
5. *2019-2019* **Danmeng Xue** (Research Project)
6. *2019-2019* **Kevin T. Aspesi** (Research Project)
7. *2019-2019* **Cameron R. Shollenberger** (Research Project)
8. *2019-2019* **Demetri J. Greco** (Research Project)
9. *2019-2019* **Spencer M. Leuba** (Research Project)

10. *2019-2019* **Hui Ye** (Research Project)
11. *2019-2019* **Onur G. Ates** (Research Project)
12. *2019-2019* **Vincent Albanese** (Research Project)
13. *2019-2019* **Zachary Weinert** (Research Project)
14. *2017-2019* **Zhijian Yang** (Research Project)
    Awards
    - 2nd place at the ISE UG Research Symposium 2019.
15. *2017-2019* **Haiteng Wei** (Research Project)
16. *2017-2019* **Yuan He** (Research Project)
    Awards
    - 2nd place at the ISE UG Research Symposium 2019.
17. *2017-2019* **Judy Lu** (Research Project)
    Awards
    - 1st place at the ISE MSc Research Symposium 2019.
    - 2st place at the ISE UG Research Symposium 2018.
18. *2017-2018* **Zhenyu Li** (Research Project)
    Awards
    - 2st place at the ISE UG Research Symposium 2018.
19. *2017-2018* **Logan Herr** (Research Project)
    Awards
    - 1st place at the ISE UG Research Symposium 2018.
20. *2017-2018* **Jack Circus** (Research Project)
    Awards
    - 1st place at the ISE UG Research Symposium 2018.
21. *2017-2018* **Sam Presti** (Research Project)
    Awards
    - 1st place at the ISE UG Research Symposium 2018.
22. *2017-2018* **Tao Zhang** (Research Project)
23. *2017-2017* **Purvesh Rana** (Research Project)
24. *2015-2016* **Adam Smiechowski** (Research Project)

Mentoring of High-school Students

1. *2017-2019* **Neil Deshmukh**

Papers (3)

(a) *FD-Net with Auxiliary Time Steps: Fast Prediction of PDEs using Hessian-Free Trust-Region Methods*
Nur Sila Gulgec, Zheng Shi, Neil Deshmukh, Shamim Pakzad, Martin Takáč
Beyond First Order Methods in ML Workshop @ NeurIPS 2019, (2019)

(b) *Learning Dynamical Systems via Deep Learning*
Zheng Shi, Nur Sila Gulgec, Neil Deshmukh, Albert S. Berahas, Shamim Pakzad, Martin Takáč
working paper, (2019)

(c) *Building Generalizable Multi-task Deep Neural Networks for Materials Science and Catalysis*
Zheng Shi, Neil Deshmukh, Albert S. Berahas, Srinivas Rangarajan, Martin Takáč
working paper, (2019)

Ph.D. Committee Membership (not including Ph.D. student advisees)

- student name: **Sertalp Cay**
  advisor: *Tamas Terlaky*
- student name: **Yicheng Chen**
  advisor: *Rick Blum (Electrical and Computer Engineering)*
- student name: **Soheil Sadeghi Eshkevari**
  advisor: *Shamim Pakzad (Civil E)*
- student name: **Hiva Ghanbari**
  advisor: *Katya Scheinberg*
- student name: **Nur Sila Gulgec**
  advisor: *Shamim Pakzad (Civil E)*
- student name: **Wei Guo**
  advisor: *Frank E. Curtis*
- student name: **Mohanad Khazaali**
  advisor: *Paolo Bocchini (Civil E)*
- student name: **Minhan Li**
  advisor: *Frank E. Curtis*
- student name: **Hossein K. Mousavi**
  advisor: *Nader Motee (Mechanical E)*
- student name: **Lam Nguyen**
  advisor: *Katya Scheinberg*
- student name: **Afshin OroojlooyJadid**
  advisor: *Larry Snyder*
- student name: **Mohammadreza Samadi**
  advisor: *Frank E. Curtis*

- student name: **Mohammad Shahabsafa**
  advisor: *Tamas Terlaky*
- student name: **Shu Tu**
  advisor: *Boris Defourny*
- student name: **Wei Xia**
  advisor: *Luis Zuluaga*
- student name: **Alireza Yektamaram**
  advisor: *Katya Scheinberg*
- student name: **Yuan Zeng**
  advisor: *Xiaochen Guo (ECE)*

G.3. Hosting Research Visitors

1. *2019* **Ruben Solozabal**
   PhD student at University of the Basque Country
2. *2018* **Sai Praneeth Reddy Karimireddy**
   PhD student at EPFL
3. *2018* **Nicolas Loizou**
   PhD student at University of Edinburgh
4. *2017* **Ion Necoara**
   Faculty at University Politehnica Bucharest
5. *2014/11* **Jakub Konecny**
   PhD student at University of Edinburgh

H.1. Service - University

University Service

2019–now **Chair** of Faculty Compensation Committee

2019 Participated in hooding ceremony of PhD students

2017–now Elected Member, Faculty Compensation Committee

2017–now Elected Member, Faculty Financial Planning and Operations Committee

College Service

Fall 2018 – Spring 2019 co-organize and co-lead Interdisciplinary seminar at Lehigh (6+ departments involved)

2018 member of interdisciplinary faculty search committee

2018 participated in senior open house

2017 member of interdisciplinary faculty search committee

***F*all 2016** participated in senior open house

Department Service

2019 Qualifiers for Phd – Optimization section

2018 prepare my UG, MS and PHD student for the presentation for the advisory council

2018 Qualifiers for Phd – Optimization section

2018 organized and chair UG and master research symposium

2017 Qualifiers for Phd – Optimization section

2017 organized and chair UG and master research symposium

Fall 2016 – Spring 2017 Member of a committee search for BioE.

***S*pring 2016** Engaged in TE week

***S*pring 2016** IBE Capstone Project

***F*all 2016** Family Weekend – October 2016

2016 organized and chair UG and master research symposium

Fall 2016 I have created and offered to interested PhD students a GPU workshop, where we covered general GPU architecture, CUDA and Theno

2016 I help to prepare the talk of Haoran Zhang for the advisory council (self-driving car project)

2016 Qualifiers for Phd – Optimization section

Spring 2016 I have created and offered to our PhD students a High-performance workshop which covered C++, OpenMP, MPI

2015 Qualifiers for Phd – Optimization section

2014–now Member of Coral Cluster Admins

Other Local Service

2019 Outreach activity at local elementary school - robotics and programming

2019 Outreach activity at local high school - programming and AI

Recommendation Letters

2020 I have written 12 different recommendation letters

2019 I have written 17 different recommendation letters

2018 I have written 12 different recommendation letters

2017 I have written 16 different recommendation letters

2016 I have written 7 different recommendation letters

2015 I have written 5 different recommendation letters

2014 I have written 1 different recommendation letters

H.2. Service - Professional

Memberships

2016–now, **Member of Slovak Mathematical Society**

Journal and Conference Reviewer

2019, Reviewer for NeurIPS (16 papers)

2019, Reviewer for ICML (14 papers)

2019, Reviewer for MATPROG

2019, Reviewer for COLT (2 papers)

2018, Reviewer for NIPS (7 papers)

2018, Reviewer for SIAM

2018, Reviewer for ICML, area-chair (15 papers)

2018, Reviewer for COAP (2 papers)

2018, Reviewer for JMLR (3 papers)

2017, Reviewer for SIOPT

2017, Reviewer for NIPS (6 papers)

2017, Reviewer for ICML (16 papers)

2017, Reviewer for MAPR

2017, Reviewer for SICS

2017, Reviewer for JOMP

2017, Reviewer for ICCS

2017, Reviewer for JMLR (3 papers)

2017, Reviewer for ICLR (4 papers)

2016, program committee member of OPT2016 – NIPS Workshop on Optimization for Machine Learning

2016, program committee member – AAAI 2017 Workshop on Distributed Machine Learning

2016, Reviewer for Journal of Machine Learning Research

2016, Reviewer for International Conference on Machine Learning

2016, Reviewer for Neural Information Processing Systems

2016, Reviewer for Journal of Optimization Theory and Applications

2016, Reviewer for Computational Optimization and Applications

2016, Reviewer for Mathematical Programming, Series A

2016, Reviewer for Optimization Methods and Software

2015, Reviewer for Neural Information Processing Systems

2015, Reviewer for Journal of Optimization Theory and Applications

2015, Reviewer for IEEE Signal Processing Magazine

2015, Reviewer for Journal of Machine Learning Research

2015, Reviewer for Operations Research Letters

2015, Reviewer for International Conference on Machine Learning

2015, Reviewer for Computational Optimization and Applications

2015, Reviewer for Mathematical Programming, Series A

2015, Reviewer for SIAM Journal on Optimization (SIOPT)

2014, Reviewer for Mathematical Programming, Series A

2014, Reviewer for SIAM Journal on Optimization (SIOPT)

2013, Reviewer for Mathematical Programming, Series A

2013, Reviewer for IEEE Transactions on Cybernetics

2013, Reviewer for SIAM Journal on Optimization (SIOPT)

2012, Reviewer for Journal of Machine Learning Research

2012, Reviewer for Computational Optimization and Applications

2012, Reviewer for Optimization Methods and Software

Federal Granting Agencies

2019, Panelist for NSF, DMS

2019, Panelist for NSF, CCF

2019, Panelist for NSF, IIS - Robust Intelligence

2018, Reviewed 1 NSF proposal for IIS

2018, Reviewed 1 proposal for Swiss funding agency

2017, Reviewed 1 NSF proposal for CMMI

Other local service

*2*019, Outreach activity at high school in SVSD

*2*019, Outreach activity at elementary school in SVSD

*2*018–now, Member of financial committee of Society Hills

*2*012, Maths Busking at British National Science Festival, Aberdeen

*2*012, Officer in Edinburgh SIAM Student Chapter (`http://www.edsiamchapter.co.uk/`)

*2*012, Supervision of M.Sc. project, Christos Delivorias

*2*011/07, **Presenter**, Public Engagement with Cutting Edge Science, National Museum of Scotland

*2*011/07–08 Supervision of Summer Research Project, Edward Cumberlege

*2*011/03, **Member of Prize Committee**, Metaswitch Networks Ltd. Prize Talks Competition, Edinburgh