

TETIANA PARSHAKOVA

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parshakova.github.io

OBJECTIVE

To develop efficient algorithms for computational problems using techniques from optimization, discrete mathematics and statistics. In particular, my research interests include

- large-scale and distributed convex optimization,
- network science, learning and inference for network data,
- numerical and randomized linear algebra,
- low rank and structured optimization,
- machine learning.

EDUCATION

Stanford University	USA
Ph.D. Computational Mathematics	Sep 2019 – Jun 2024
Advisor: Prof. Stephen Boyd	
Thesis: <i>Multilevel Low Rank Matrices and Applications</i>	
M.Sc. Computational Mathematics	Jul 2022
Korea Advanced Institute of Science and Technology	South Korea
M.Sc. Electrical Engineering	Feb 2017 – Feb 2019
Thesis: <i>Latent Question Interpretation: Parameter Adaptation Using Interpretation Policy</i>	
B.Sc. Industrial Design	Sep 2012 – Feb 2017

WORK EXPERIENCE

Google Research	Jun – Sep 2022
Student Researcher Google Brain Robotics	USA
<ul style="list-style-type: none">• message passing and tree-based algorithms for fast graph field integration, towards generalization of fast multipole method to discretized manifolds	
Apple Inc.	Jun – Sep 2020, 2021
Machine Learning Research Intern Exploratory Design Group	USA
<ul style="list-style-type: none">• accelerating the training of neural networks using Hessian-vector products• constructive methods for neural networks on elementary functions	
Naver Labs Europe	Mar – Jul 2019
Machine Learning Researcher Natural Language Processing Group	France
<ul style="list-style-type: none">• global autoregressive models (GAMs) combine an autoregressive component with a log-linear component, allowing the use of global a priori features to compensate for lack of data• different approaches for approximating the normalized distribution given by GAMs for fast inference	

PATENTS

Interpolation method and apparatus for arithmetic functions	Apple Inc, 2022
William C. Athas, Zaid M. Nadeem, Tetiana Parshakova	US 17/085,971
Methods and systems for producing neural sequential models	Naver Corp, 2022
Tetiana Parshakova, Marc Dymetman, Jean-Marc Andréoli	US 17/018,754

PUBLICATIONS

Tetiana Parshakova, and Stephen Boyd. *Distributed approximate routing using multilevel low rank matrices*. In preparation. 2024.

Tetiana Parshakova, Trevor Hastie, and Stephen Boyd. *Hierarchical factor covariance models via multilevel low rank matrices*. In preparation. 2024.

Stephen Boyd, Tetiana Parshakova, Ernest Ryu, Jaewook Suh. *Distributed optimization: Analysis and synthesis via circuits*. In preparation. 2024

Tetiana Parshakova, Trevor Hastie, Eric Darve and Stephen Boyd. *Factor fitting, rank allocation, and partitioning in multilevel low rank matrices*. To appear in Optimization, Discrete Mathematics, and Applications to Data Sciences, edited by M. Rassias, A. Nikeghbali, and P. Pardalos, Springer. 2024.

Krzysztof Choromanski, Arijit Sehanobish, Han Lin, Yunfan Zhao, Eli Berger, Tetiana Parshakova, et al. *Efficient graph field integrators meet point clouds*. International Conference on Machine Learning. 2023

Tetiana Parshakova, Fangzhao Zhang and Stephen Boyd. *Implementation of an oracle-structured bundle method for distributed optimization*. Optimization and Engineering. 2023.

Tetiana Parshakova, Marc Dymetman and Jean-Marc Andreoli. *Distributional policies for energy-based sequential models*. NeurIPS Optimization Foundations of Reinforcement Learning Workshop. 2019

Tetiana Parshakova, Jean-Marc Andreoli and Marc Dymetman . *Global autoregressive models for data-efficient sequence learning*. In Proceedings of the SIGNLL Conference on Computational Natural Language Learning, ACL. 2019

Tetiana Parshakova, Francois Rameau, Andriy Serdega, Inso Kweon, and Dae-Shik Kim. *Latent question interpretation through variational adaptation*. Accepted in IEEE/ACM Transactions on Audio, Speech, and Language Processing. 2019

Tetiana Parshakova and Dae-Shik Kim. *Latent question interpretation through parameter adaptation using stochastic neuron*. In Proceedings of ICML Workshop, MRC-2018, <http://ceur-ws.org/Vol-2134/#paper07>. 2018

Tetiana Parshakova and Daniel Saakes. *UMorph: Self-change tracker to reflect yourself to the future and past*. In Proceedings of the 2018 ACM Conference Companion Publication on Designing Interactive Systems, ACM. 2018

Tetiana Parshakova, Minjoo Cho, Alvaro Cassinelli, and Daniel Saakes. *Furniture that learns to move itself*. In Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems, ACM. 2017

Tetiana Parshakova, Minjoo Cho, Alvaro Cassinelli, and Daniel Saakes. *Ratchair: Furniture learns to move itself with vibration*. In ACM SIGGRAPH 2016 Emerging Technologies, ACM. 2016

PROJECTS AND RESEARCH

Research rotations

2019 – 2021

Stanford University

USA

- with Prof. Aaron Sidford on hop constrained graph embedding onto a distribution of a dominating trees: minimax principle between probabilistic and distributional distance stretch, randomized algorithms for obtaining embeddings
- with Prof. Amin Saberi on finding optimal strategy for the card guessing game using partially observable Markov decision process
- with Prof. Eric Darve on deriving bounds for the number of neurons and layers of relu NNs necessary for approximating any analytic function arbitrarily close

Graduate researcher	2017 – 2018
Brain Reverse Engineering and Imaging Lab, KAIST	South Korea
<ul style="list-style-type: none"> latent question interpretation through variational adaptation; visual question answering via bottom-up and top-down attention; abstractive text summarizer using pointer generator with seq2seq attention that constructs hybrid vocabulary distribution; sequential decision making agent for solving Angry Birds using deep deterministic policy gradient with attention-based LSTM 	
Undergraduate researcher	2016
Brain Reverse Engineering and Imaging Lab, KAIST	South Korea
<ul style="list-style-type: none"> machine learning and reinforcement learning basics; comic style generation using NNs 	
Undergraduate researcher	2015 – 2016
My Design Lab, KAIST	South Korea
<ul style="list-style-type: none"> a strategy for displacing objects utilizing vibrations <i>Ratchair</i>; tools: Python, Java, Android, OpenCV, Arduino, Inventor, Processing-Android, Myo Armband, hardware an unobtrusive self-image capturing system for tracking self changes over time <i>UMorph</i>; tools: PyQt, Dragon Board 410c, OpenCV, Dlib, hardware 	

HONORS AND AWARDS

Oliger Memorial Fellowship	2019 – 2022
A stipend during the Ph.D. at Stanford	
Qualcomm-KAIST innovation awards 2018	2018
Paper competition awards for graduate students	
Featured at discovery daily planet Canada	2017
<i>Ratchair: Furniture that learns to move itself</i> demonstration	
KAIST breakthroughs newsletter	2017
<i>Furniture that learns to move itself</i> featured in KAIST breakthroughs newsletter	
Excellence award for Bachelor's thesis	2017
Thesis: <i>UMorph: Self-change tracker to reflect yourself to the past and to the future</i>	
First prize in Qualcomm-KAIST innovation awards	2016
Embedded systems awards	
SIGGRAPH 2016 emerging technologies DC EXPO special prize	2016
Project: <i>Ratchair: Furniture that learns to move itself with vibration</i>	
Undergraduate research program excellence award	2016
For extraordinary efforts and research outcomes	
KAIST international student scholarship	2012 – 2016, 2017 – 2019
A stipend during the B.Sc. and M.Sc. at KAIST	
Kyiv capital olympiads in mathematics	2009, 2012
Bronze medal	
Regional mathematics olympiad	2009
Silver medal	
Volyn regional mathematics olympiad	2008
Gold medal	

SKILLS

Languages: Ukrainian (native), English (fluent), Russian (fluent), Korean (elementary)
Programming: Python, Julia, Matlab, C++, Java, Torch, Tensorflow, PyTorch, Git, LaTeX, OpenCV, Unix
Prototyping: Raspberry Pi, Arduino, Processing-Android, Autodesk Inventor, Rhino 5, Adobe Photoshop, Adobe Illustrator, Adobe After Effects, Adobe Premiere Pro

SERVICE & EXTRA-CURRICULAR

Head course assistant at Stanford EE364a Convex Optimization	2024
Course assistant at Stanford EE364a Convex Optimization	2023
Reviewer Energy Based Models Workshop @ ICLR2021	2021
Tutor at KAIST EE Co-op Program Taught undergraduate students basics of ML, NLP and Tensorflow	2018 South Korea
Tutor in science and English camps Prepared schoolchildren for a science competition and taught English	2017, 2018 South Korea
Organizer of KAIST EE promotion in Ukraine Helped to organize EE Visit Camp, recruited students	2017 Ukraine/South Korea
Teaching assistant at KAIST Intro to Philosophy, English Short Stories, Philosophy of Mathematics, Logic and AI	2015 – 2016 South Korea
Volunteer at UEFA Euro 2012 Closing ceremony dance performance in Kyiv	2012 Ukraine
Candidate Master of Sports Acrobatic gymnastics	2001 – 2007 Ukraine