

TETIANA PARSHAKOVA

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parshakova.github.io

OBJECTIVE

To develop efficient algorithms for large-scale 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.

POSITIONS

Amazon

USA

Postdoctoral Scientist | SCOT

07/2024 – 07/2025

- distributed optimization algorithms for supply chain problems

Yale

07/2024 –

Visiting van Dijk Lab

USA

- methods for learning biological structures from single-cell gene expression datasets

EDUCATION

Stanford

USA

Ph.D. | Computational Mathematics

09/2019 – 06/2024

Advisor: Prof. Stephen Boyd

Thesis: *Multilevel Low Rank Matrices and Applications*

M.Sc. | Computational Mathematics

09/2019 – 09/2022

KAIST

South Korea

M.Sc. | Electrical Engineering

02/2017 – 02/2019

Thesis: *Latent Question Interpretation: Parameter Adaptation Using Interpretation Policy*

B.Sc. | Industrial Design

09/2012 – 02/2017

Thesis: *UMorph: Self-Change Tracker to Reflect Yourself to the Future and Past*

RESEARCH EXPERIENCE

Google Research

USA

Student Researcher | Google Brain Robotics

06 – 09/2022

- message passing and tree-based algorithms for fast graph field integration, towards generalization of fast multipole method to discretized manifolds

Apple

USA

Machine Learning Research Intern | Exploratory Design Group

06 – 09/2020, 2021

- accelerating the training of neural networks using Hessian-vector products
- constructive methods for neural networks on elementary functions

Naver Labs Europe

France

Machine Learning Researcher | Natural Language Processing Group

03 – 07/2019

- 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

PATENTS

Methods and systems for producing neural sequential models	Naver Corp, 2024
T. Parshakova, M. Dymetman, J.-M. Andréoli	US 17/018,754
Interpolation method and apparatus for arithmetic functions	Apple Inc, 2022
W. C. Athas, Z. M. Nadeem, T. Parshakova	US 17/085,971

PUBLICATIONS

- T. Parshakova, Y. Bai, G. van Ryzin, and S. Boyd. *Price directed distributed optimization*. In preparation. 2024
- T. Parshakova, T. Hastie, and S. Boyd. *Fitting multilevel factor models*. arXiv preprint arXiv:2409.12067. 2024. Package: github.com/cvxgrp/multilevel_factor_model
- S. Boyd, T. Parshakova, E. K. Ryu, J. J. Suh. *Optimization algorithm design via electric circuits*. Accepted (Spotlight) to Conference on Neural Information Processing System. 2024. Package: github.com/cvxgrp/optimization_via_circuits
- T. Parshakova. *Multilevel low rank matrices and applications*. PhD thesis, Stanford University. 2024
- T. Parshakova, T. Hastie, E. Darve and S. 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. Package: github.com/cvxgrp/mlr_fitting
- K. Choromanski, A. Sehanobish, H. Lin, Y. Zhao, E. Berger, T. Parshakova, et al. *Efficient graph field integrators meet point clouds*. International Conference on Machine Learning. 2023. Package: github.com/topographers/efficient_graph_algorithms
- T. Parshakova, F. Zhang and S. Boyd. *Implementation of an oracle-structured bundle method for distributed optimization*. Optimization and Engineering. 2023. Package: github.com/cvxgrp/OSBD0
- T. Parshakova, M. Dymetman and J.-M. Andreoli. *Distributional policies for energy-based sequential models*. NeurIPS Optimization Foundations of Reinforcement Learning Workshop. 2019
- T. Parshakova, J.-M. Andreoli and M. Dymetman. *Global autoregressive models for data-efficient sequence learning*. In Proceedings of the SIGNLL Conference on Computational Natural Language Learning, ACL. 2019. Package: github.com/parshakova/GAMS-for-Data-Efficient-Learning
- T. Parshakova, F. Rameau, A. Serdega, I. S. Kweon, and D.-S. Kim. *Latent question interpretation through variational adaptation*. Accepted in IEEE/ACM Transactions on Audio, Speech, and Language Processing. 2019
- T. Parshakova and D.-S. 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
- T. Parshakova and D. 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
- T. Parshakova, M. Cho, A. Cassinelli, and D. Saakes. *Furniture that learns to move itself*. In Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems, ACM. 2017
- T. Parshakova, M. Cho, A. Cassinelli, and D. Saakes. *Ratchair: Furniture learns to move itself with vibration*. In ACM SIGGRAPH 2016 Emerging Technologies, ACM. 2016

HONORS AND AWARDS

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

TALKS

<i>Price Directed Distributed Optimization and Primal Recovery</i> , INFORMS, Seattle	10/2024
<i>Multilevel Low Rank Matrices and Applications</i> , Optimization lunch, Stanford	05/2024
<i>Multilevel Low Rank Matrices and Applications</i> , Amazon, SCOT	05/2024
<i>Multilevel Low Rank Matrices and Applications</i> , van Dijk Lab, Yale	01/2024
<i>Multilevel Low Rank Matrices and Applications</i> , Krishnaswamy Lab, Yale	12/2023
<i>Fast Graph Field Integrators for Robotics & Beyond</i> , Google Brain, New York	09/2022
<i>Latent question interpretation: Parameter adaptation using interpretation policy</i> , Naver Labs Europe	01/2019
<i>Latent Question Interpretation Through Parameter Adaptation Using Stochastic Neuron</i> , ICML Workshop	07/2018

PROJECTS AND RESEARCH

Research rotations	2019 – 2021
Stanford University	USA
<ul style="list-style-type: none">• 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	

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

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