TETIANA PARSHAKOVA

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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 –

- distributed optimization algorithms for supply chain problems
  Advisor: Garrett van Ryzin

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

<u>T. Parshakova</u>, Y. Bai, G. van Ryzin, and S. Boyd. *Multiple-response agents: Fast, feasible, approximate primal recovery for dual optimization methods.* arXiv preprint arXiv:2503.12221. 2025. Package: `github.com/cvxgrp/mra_precovery`

<u>T. Parshakova</u>, T. Hastie, and S. Boyd. *Fitting multilevel factor models.* arXiv preprint arXiv:2409.12067. 2024. Package: `github.com/cvxgrp/multilevel_factor_model`

S. Boyd, <u>T. Parshakova</u>, E. K. Ryu, J. J. Suh. *Optimization algorithm design via electric circuits.* Advances in Neural Information Processing System (Spotlight). 2024. Package: `github.com/cvxgrp/optimization_via_circuits`

<u>T. Parshakova</u>. *Multilevel low rank matrices and applications.* PhD thesis, Stanford University. 2024

<u>T. Parshakova</u>, T. Hastie, E. Darve and S. Boyd. *Factor fitting, rank allocation, and partitioning in multilevel low rank matrices.* Optimization, Discrete Mathematics, and Applications to Data Sciences, Springer Optimization and Its Applications, vol. 220, Springer. 2024. Package: `github.com/cvxgrp/mlr_fitting`

K. Choromanski, A. Sehanobish, H. Lin, Y. Zhao, E. Berger, <u>T. Parshakova</u>, et al. *Efficient graph field integrators meet point clouds.* International Conference on Machine Learning. 2023. Package: `github.com/topographers/efficient_graph_algorithms`

<u>T. Parshakova</u>, F. Zhang and S. Boyd. *Implementation of an oracle-structured bundle method for distributed optimization.* Optimization and Engineering. 2023. Package: `github.com/cvxgrp/OSBDO`

<u>T. Parshakova</u>, M. Dymetman and J.-M. Andreoli. *Distributional policies for energy-based sequential models.* NeurIPS Optimization Foundations of Reinforcement Learning Workshop. 2019

<u>T. Parshakova</u>, J.-M. Andreoli and M. Dymetman. *Global autoregressive models for data-efficient sequence learning.* Conference on Computational Natural Language Learning, ACL. 2019. Package: `github.com/parshakova/GAMS-for-Data-Efficient-Learning`

<u>T. Parshakova</u>, F. Rameau, A. Serdega, I. S. Kweon, and D.-S. Kim. *Latent question interpretation through variational adaptation.* IEEE/ACM Transactions on Audio, Speech, and Language Processing. 2019

<u>T. Parshakova</u> and D.-S. Kim. *Latent question interpretation through parameter adaptation using stochastic neuron.* In Proceedings of ICML Workshop, MRC-2018. 2018

<u>T. Parshakova</u> and D. Saakes. *UMorph: Self-change tracker to reflect yourself to the future and past.* Proceedings of the 2018 ACM Conference Companion Publication on Designing Interactive Systems, ACM. 2018

<u>T. Parshakova</u>, M. Cho, A. Cassinelli, and D. Saakes. *Furniture that learns to move itself.* Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems, ACM. 2017

<u>T. Parshakova</u>, M. Cho, A. Cassinelli, and D. Saakes. *Ratchair: Furniture learns to move itself with vibration.* ACM SIGGRAPH 2016 Emerging Technologies, ACM. 2016

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
Ratchair: Furniture that learns to move itself demonstration

KAIST breakthroughs newsletter 2017

Furniture that learns to move itself featured in KAIST breakthroughs newsletter

Excellence award for Bachelor's thesis 2017

Thesis: *UMorph: Self-change tracker to reflect yourself to the past and to the future*

First prize in Qualcomm-KAIST innovation awards 2016

Embedded systems awards

SIGGRAPH 2016 emerging technologies DC EXPO special prize 2016

Project: *Ratchair: Furniture that learns to move itself with vibration*

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

TALKS

Design and Analysis of Efficient Algorithms for Large-Scale Problems, Flatiron Institute	1/2025
Price Directed Distributed Optimization and Primal Recovery, INFORMS, Seattle	10/2024
Multilevel Low Rank Matrices and Applications, Optimization lunch, Stanford	05/2024
Multilevel Low Rank Matrices and Applications, Amazon, SCOT	05/2024
Multilevel Low Rank Matrices and Applications, van Dijk Lab, Yale	01/2024
Multilevel Low Rank Matrices and Applications, Krishnaswamy Lab, Yale	12/2023
Fast Graph Field Integrators for Robotics & Beyond, Google Brain, New York	09/2022
Latent question interpretation: Parameter adaptation using interpretation policy, Naver Labs Europe	01/2019
Latent Question Interpretation Through Parameter Adaptation Using Stochastic Neuron, ICML Workshop	07/2018

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

- 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
- machine learning and reinforcement learning basics; comic style generation using NNs

Undergraduate researcher 2015 – 2016
My Design Lab, KAIST South Korea
- a strategy for displacing objects utilizing vibrations *Ratchair*; tools: Python, Java, Android, OpenCV, Arduino, Inventor, Processing-Android, Myo Armband, hardware
- an unobtrusive self-image capturing system for tracking self changes over time *UMorph*; 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