

# TETIANA PARSHAKOVA

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[parshakova.github.io](https://parshakova.github.io)

## OBJECTIVE

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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

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<b>Amazon</b>	USA
Postdoctoral Scientist   SCOT	07/2024 – 07/2025
<ul style="list-style-type: none"><li>• distributed optimization algorithms for supply chain problems</li></ul>	
<b>Yale</b>	07/2024 –
Visiting van Dijk Lab	USA
<ul style="list-style-type: none"><li>• methods for learning biological structures from single-cell gene expression datasets</li></ul>	

## EDUCATION

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<b>Stanford</b>	USA
Ph.D.   Computational Mathematics	09/2019 – 06/2024
Advisor: Prof. Stephen Boyd	
Thesis: <i>Multilevel Low Rank Matrices and Applications</i>	
M.Sc.   Computational Mathematics	09/2019 – 09/2022
<b>KAIST</b>	South Korea
M.Sc.   Electrical Engineering	02/2017 – 02/2019
Thesis: <i>Latent Question Interpretation: Parameter Adaptation Using Interpretation Policy</i>	
B.Sc.   Industrial Design	09/2012 – 02/2017
Thesis: <i>UMorph: Self-Change Tracker to Reflect Yourself to the Future and Past</i>	

## RESEARCH EXPERIENCE

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<b>Google Research</b>	USA
Student Researcher   Google Brain Robotics	06 – 09/2022
<ul style="list-style-type: none"><li>• message passing and tree-based algorithms for fast graph field integration, towards generalization of fast multipole method to discretized manifolds</li></ul>	
<b>Apple</b>	USA
Machine Learning Research Intern   Exploratory Design Group	06 – 09/2020, 2021
<ul style="list-style-type: none"><li>• accelerating the training of neural networks using Hessian-vector products</li><li>• constructive methods for neural networks on elementary functions</li></ul>	
<b>Naver Labs Europe</b>	France
Machine Learning Researcher   Natural Language Processing Group	03 – 07/2019
<ul style="list-style-type: none"><li>• 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</li></ul>	

## PATENTS

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

## PUBLICATIONS

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- 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\\_models](https://github.com/cvxgrp/multilevel_factor_models)
- 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](https://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](https://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](https://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/OSBDO](https://github.com/cvxgrp/OSBDO)
- 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](https://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

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

## TALKS

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<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 &amp; 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

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<b>Research rotations</b>	2019 – 2021
Stanford University	USA
<ul style="list-style-type: none"><li>• 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</li><li>• with Prof. Amin Saberi on finding optimal strategy for the card guessing game using partially observable Markov decision process</li><li>• 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</li></ul>	
<b>Graduate researcher</b>	2017 – 2018
Brain Reverse Engineering and Imaging Lab, KAIST	South Korea
<ul style="list-style-type: none"><li>• 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</li></ul>	
<b>Undergraduate researcher</b>	2016
Brain Reverse Engineering and Imaging Lab, KAIST	South Korea
<ul style="list-style-type: none"><li>• machine learning and reinforcement learning basics; comic style generation using NNs</li></ul>	
<b>Undergraduate researcher</b>	2015 – 2016
My Design Lab, KAIST	South Korea
<ul style="list-style-type: none"><li>• a strategy for displacing objects utilizing vibrations <i>Ratchair</i>; tools: Python, Java, Android, OpenCV, Arduino, Inventor, Processing-Android, Myo Armband, hardware</li><li>• an unobtrusive self-image capturing system for tracking self changes over time <i>UMorph</i>; tools: PyQt, Dragon Board 410c, OpenCV, Dlib, hardware</li></ul>	

## SKILLS

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**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

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