

Jingjing Zheng

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RESEARCH PROFILE

I develop efficient and trustworthy foundation models by exploiting low-rank, sparse, and tensor structure. My research combines mathematical modeling with scalable algorithms to reduce the cost of model adaptation while preserving accuracy, robustness, and reliability. I have led first-author work published at CVPR, NeurIPS, ECCV, AAAI, and ICLR, and have co-authored articles in IEEE TPAMI and IEEE TNNLS.

EDUCATION

- **University of British Columbia**, Vancouver, BC, Canada 09/2023–Summer 2028 (expected)
Ph.D. Candidate, Mathematics; Supervisor: Yankai Cao
Cumulative average: 93.9/100.
- **Memorial University of Newfoundland**, St. John's, NL, Canada 09/2020–07/2023
Doctor of Engineering (D.E.), Computer Science; Supervisors: Xianta Jiang and Xiaoqin Zhang
GPA: 4.0/4.0 (average: 91.5/100).
- **Wenzhou University**, Zhejiang, P. R. China 09/2017–06/2020
M.S., Applied Mathematics; Supervisor: Xiaoqin Zhang.

RESEARCH EXPERIENCE

- SOLID Lab, Department of Mathematics, University of British Columbia**, Vancouver, BC, Canada 09/2023–present
Doctoral Researcher; Supervisor: Yankai Cao
- Mila**, Montreal, QC, Canada 09/2026–12/2026
Research Intern; Advisor: Guillaume Rabusseau
- RIKEN Center for Advanced Intelligence Project (RIKEN AIP)**, Japan 05/2026–06/2026
Student Trainee; Advisor: Qibin Zhao
- ZERO Lab, Peking University**, Beijing, P. R. China 05/2024–09/2024
Visiting Student; Advisor: Zhouchen Lin
- Nasdaq / Verafin**, St. John's, NL, Canada 05/2022–09/2022
Research Intern; Advisor: John Hawkin

ENTREPRENEURSHIP

- GradientX Technologies Inc.**, Vancouver, Canada 2025–present
Co-Founder. Building the next generation of personalized financial intelligence.
Participant, Venture Founder, 2026–present.
Selected for the Lab2Market Validate Program, 2025; funded with CAD\$10,000.

SELECTED RESEARCH CONTRIBUTIONS

- **Efficient adaptation of foundation models.** Developed structure-aware methods for parameter-efficient fine-tuning that exploit low-rank and tensor representations to reduce trainable parameters and computational cost. Led ReFTA (CVPR 2026), a reconstruction-free tensorized PEFT framework with a tensor-algebraic generalization guarantee, and AdaMSS (NeurIPS 2025), which extends conventional low-rank adaptation from a single-subspace model to adaptive multi-subspace representations. Open-source implementations are available for [ReFTA](#) and [AdaMSS](#); AdaMSS has also been integrated into [Hugging Face PEFT](#).
- **Reliable continual adaptation.** Investigated catastrophic forgetting in low-rank PEFT and developed methods for sequential adaptation that preserve previously acquired capabilities while efficiently learning new tasks. This work connects parameter efficiency with a broader question in trustworthy foundation models: how to adapt models repeatedly without sacrificing reliability or prior knowledge (arXiv:2603.09684).
- **Structured recovery and mathematical foundations.** Developed optimization and recovery methods that exploit low-rank, tensor, and sparse structure, including learnable tensor norms, permutation-aware tensor recovery, and nonconvex structured-

sparsity models. Established convergence and recovery guarantees and demonstrated these methods across inverse problems and high-dimensional data, resulting in publications at ECCV, AAAI, IEEE TPAMI, and IEEE TNNLS.

PUBLICATIONS

*Jingjing Zheng is shown in bold. Supervisors are marked †; corresponding authors are marked *.*

Conference Papers.

1. Ruixin Song, **Jingjing Zheng**.
In a Grove, Again: Optimizing over Feasible Event Histories for Incentive-Driven Testimony. NeurIPS@Creative AI Track, 2026.
2. **Jingjing Zheng**, Anda Tang, Qiangqiang Mao, Zhouchen Lin*, Yankai Cao*,†.
ReFTA: Breaking the Weight Reconstruction Bottleneck in Tensorized Parameter-Efficient Fine-Tuning. CVPR, 2026. [\[paper\]](#)
3. **Jingjing Zheng**, Wanglong Lu, Yiming Dong, Chaojie Ji, Yankai Cao*,†, Zhouchen Lin*.
AdaMSS: Adaptive Multi-Subspace Approach for Parameter-Efficient Fine-Tuning. NeurIPS, 2025. [\[paper\]](#)
4. Qiangqiang Mao, Jiayang Ren, Yixiu Wang, Chenxuanyin Zou, **Jingjing Zheng**, Yankai Cao*,†. **Differentiable Decision Tree via “ReLU+Argmin” Reformulation.** NeurIPS (spotlight), 2025. [\[Scholar\]](#)
5. **Jingjing Zheng**, Wanglong Lu, Wenzhe Wang, Yankai Cao*,†, Xiaoqin Zhang, Xianta Jiang. **Handling the Non-Smooth Challenge in Tensor SVD: A Multi-Objective Tensor Recovery Framework.** ECCV, 2024. [\[paper\]](#)
6. Ziang Wu, Xianta Jiang, **Jingjing Zheng**, Bin Zheng, Stella Atkins. **Measuring Motor Task Difficulty using Low/High Index of Pupillary Activity.** ETRA, 2024. [\[Scholar\]](#)
7. **Jingjing Zheng**, Yankai Cao*,†. **Bayesian-Driven Learning of a New Weighted Tensor Norm for Tensor Recovery.** ICLR@Tiny Paper Track, 2024. [\[paper\]](#) [\[code: archive\]](#) [\[code: TR-BO\]](#)
8. **Jingjing Zheng***, John Hawkin, Charles Robertson, Alexander Howse, Yuanzhu Chen, Xianta Jiang†. **Unsupervised Financial Fraud Detection Using Low-Rank Recovery.** Canadian Conference on Artificial Intelligence, 2023. [\[Scholar\]](#) [\[code: fraud detection\]](#) [\[code: Outlier Pursuit\]](#)
9. Xianta Jiang, Ziang Wu, **Jingjing Zheng**, Bin Zheng, M. Stella Atkins. **Index Pupil Activity Echoing with Task Difficulty in Fitts’ Law Setting.** Eyes4ICU Workshop at ETRA, 2023. [\[Scholar\]](#)
10. **Jingjing Zheng**, Xiaoqin Zhang*,†, Wenzhe Wang, Xianta Jiang. **Handling Slice Permutations Variability in Tensor Recovery.** AAAI, 2022. [\[paper\]](#) [\[code\]](#)
11. Mengqing Sun, Li Zhao*, **Jingjing Zheng**, Jiawei Xu. **A Nonlocal Denoising Framework Based on Tensor Robust Principal Component Analysis with ℓ_p Norm.** IEEE International Conference on Big Data, 2020. [\[Scholar\]](#)
12. Xiaoju Lu, Guiying Tang, Di Wang, Xiaoqin Zhang, **Jingjing Zheng***. **Structural Dictionary Learning Based on Non-Convex Surrogate of $\ell_{2,1}$ Norm for Classification.** IEEE International Conference on Big Data, 2019, 5056–5061. [\[Scholar\]](#)
13. Yufang Yan, Xiaoqin Zhang*, **Jingjing Zheng**, Li Zhao. **Weighted Tensor Schatten p-norm Minimization for Image Denoising.** China Intelligent System Conference, 2019. Recipient of the 2018 Outstanding Paper Award. [\[Scholar\]](#)

Published Journal Articles.

1. Xixiang Chen, **Jingjing Zheng**, Min Li, Xiaoqin Zhang. **Robust Tensor Recovery under Structural Disorder via Learnable Structural Transforms.** Signal Processing, 249: 110727, 2026. [\[paper\]](#)
2. Xiaoqin Zhang†, Ziwei Huang, **Jingjing Zheng***, Shuo Wang, Xianta Jiang. **DennGrasp: Towards Accurate Grasp Pattern Recognition with Adaptive Regularizer Learning.** Science China Information Sciences, 2024. [\[Scholar\]](#)
3. Xixiang Chen, **Jingjing Zheng**, Li Zhao, Wei Jiang, Xiaoqin Zhang. **Orthogonal Tensor Recovery Based on Non-Convex Regularization and Rank Estimation.** IEEE Access, 2024. [\[Scholar\]](#)
4. Zhiwei Huang, **Jingjing Zheng**, Li Zhao*, Huiling Chen, Xianta Jiang, Xiaoqin Zhang. **DL-Net: Sparsity Prior Learning for Grasp Pattern Recognition.** IEEE Access, 2023. [\[Scholar\]](#)
5. Xiaoqin Zhang*,†, **Jingjing Zheng**, Di Wang, Guiying Tang, Zhengyuan Zhou, Zhouchen Lin. **Structured Sparsity Optimization with Non-Convex Surrogates of $\ell_{2,0}$ -Norm: A Unified Algorithmic Framework.** IEEE TPAMI, 2023. [\[Scholar\]](#) [\[code\]](#)
6. Xiaoqin Zhang*,†, **Jingjing Zheng**, Li Zhao, Zhengyuan Zhou, Zhouchen Lin. **Tensor Recovery With Weighted Tensor Average Rank.** IEEE TNNLS, 2022. [\[paper\]](#) [\[code\]](#)
7. Shuo Wang, **Jingjing Zheng**, Bin Zheng, Xianta Jiang*. **Phase-Based Grasp Classification for Prosthetic Hand Control Using sEMG.** Biosensors, 2022. [\[Scholar\]](#)
8. Shuo Wang, **Jingjing Zheng**, Ziwei Huang, Xiaoqin Zhang, Vinicius Prado, Bin Zheng, Xianta Jiang*. **Integrating Computer Vision to Prosthetic Hand Control with sEMG: Preliminary Results in Grasp Classification.** Frontiers in Robotics and AI, 2022. [\[Scholar\]](#)

9. Wenzhe Wang, **Jingjing Zheng**, Li Zhao*, Huiling Chen, Xiaoqin Zhang. **A Non-Local Tensor Completion Algorithm Based on Weighted Tensor Nuclear Norm**. Electronics, 2022. [Scholar]
10. Xiaoqin Zhang^{*,†}, **Jingjing Zheng**, Di Wang, Li Zhao. **Exemplar-Based Denoising: A Unified Low-Rank Recovery Framework**. IEEE TCSVT, 2020, 30(8): 2538–2549. [Scholar]
11. Xiaoqin Zhang[†], **Jingjing Zheng**, Yufang Yan, Li Zhao*, Runhua Jiang. **Joint Weighted Tensor Schatten p-Norm and Tensor l-p-Norm Minimization for Image Denoising**. IEEE Access, 2019. [Scholar]

Preprints.

1. Muhammad Ahmad, **Jingjing Zheng**, Yankai Cao^{*,†}. **On Catastrophic Forgetting in Low-Rank Decomposition-Based Parameter-Efficient Fine-Tuning**. arXiv:2603.09684, 2026. [paper]
2. **Jingjing Zheng**, Yankai Cao^{*,†}. **Adaptive Principal Components Allocation with the $\ell_{2,g}$ -Regularized Gaussian Graphical Model for Efficient Fine-Tuning Large Models**. arXiv:2412.08592, 2024. [paper]
3. **Jingjing Zheng**, Wenzhe Wang, Xiaoqin Zhang^{*,†}, Xianta Jiang^{*,†}. **A Novel Tensor Factorization-Based Method with Robustness to Inaccurate Rank Estimation**. arXiv:2305.11458, 2023. [paper]

Manuscripts in Preparation.

1. **Jingjing Zheng**, Anda Tang, Qiangqiang Mao, Zhouchen Lin*, Yankai Cao^{*,†}. **QReFTA^{pth}+: Higher-Order Quantized Reconstruction-Free Tensor Adaptation with Tensor-Rank Selection**. Manuscript in preparation for IEEE TPAMI; a journal extension of ReFTA (CVPR 2026) adding higher-order tensor sharing (ReFTA^{4th}), loss-constrained tensor-rank selection (ReFTA+), and a matched-4-bit quantized family.
2. **Jingjing Zheng**, Wanglong Lu, Yiming Dong, Chaojie Ji, Yankai Cao^{*,†}, Zhouchen Lin*. **QAdaMSS-TRS: Quantized Adaptive Multi-Subspace Fine-Tuning with Tensor-Rank Selection**. Manuscript in preparation for IEEE TPAMI; a journal extension of AdaMSS (NeurIPS 2025) adding a genuinely low-bit quantized base with residual absorption (QAdaMSS), a masked-GEMM implementation, and provably minimum-error tensor-rank selection (TRS) that fixes the subspace count and per-subspace ranks under a total budget.

GRANTS AND PATENTS

- Mitacs Business Strategy Internship (BSI) with GradientX, CAD\$10,000, 2025.
- Mitacs Accelerate Award with Verafin, “Unsupervised Financial Fraud Detection Using Low-Rank Recovery,” CAD\$15,000, 2022.
- Science and Technology Innovation Program for College Students in Zhejiang Province, “Image Classification Based on New Norm and Its Generalization,” Principal Investigator, RMB\$10,000, 2018–2020.
- Xiaoqin Zhang[†], Jingjing Zheng, Yufang Yan. “Image Denoising Method Based on Novel Norm.” Patent No. 201810233460.7, filed 2018-03-21.
- Li Zhao, Xiaoqin Zhang[†], Jingjing Zheng, Wenzhe Wang. “A Nonlocal Denoising Framework Based on Generalized Non-Convex Tensor Robust Principal Component Analysis for Color Image and Video.” Patent No. CN202110010629.4, filed 2021-01-06.

TEACHING EXPERIENCE

University of British Columbia

2023–2025

- Teaching Assistant, MATH V 340 101: Introduction to Linear Programming, Winter 2025 Term 1.
- Teaching Assistant, MATH V 340 201/202: Introduction to Linear Programming, Winter 2025 Term 2.
- Teaching Assistant, MATH V 340 101: Introduction to Linear Programming, Winter 2024 Term 1.
- Teaching Assistant, Abstract Linear Algebra, Winter 2024 Term 2.
- Teaching Assistant, Matrix Algebra, Winter 2023 Term 1.
- Tutor, Math Learning Center, 2023–2025.

Memorial University of Newfoundland

Teaching Assistant, Computer Science 2002: Data Structures and Algorithms, Winter 2022.

Teaching portfolio: seven teaching assignments across UBC and Memorial University, including three terms of linear programming, abstract linear algebra, matrix algebra, data structures and algorithms, and two years of mathematics learning-center tutoring.

Courses prepared to teach: linear algebra; data structures and algorithms; linear and convex optimization; machine learning; matrix and tensor methods for data science; efficient and reliable large models.

MENTORING EXPERIENCE

- Suleman Ahmad, Engineering, University of British Columbia, 08/2025–present.
- Wenzhe Wang, Zhiwei Huan, Xixiang Chen, College of Computer Science and Artificial Intelligence, Wenzhou University, 2019–2023.
- Mengqing Sun, College of Mathematics and Physics, Wenzhou University, 2018–2021.

AWARDS AND HONORS

- President’s Academic Excellence Initiative PhD Award, UBC, 2023–2026.
- Faculty of Science PhD Tuition Award, UBC, 2023–2026.
- International Tuition Award, UBC, 2023–2026.
- BPOC Graduate Excellence Award, 2024.
- The Borealis AI Fellowship, awarded to ten AI researchers across Canada, 2023.
- Government Award for Outstanding Self-financed Students Abroad, 2023.
- Fellow of the School of Graduate Studies, 2023.
- MUN Outstanding Research Award, 2022.
- National Scholarship, China, 2019.
- Outstanding Graduates of Zhejiang Province, China, 2019.
- CISC Outstanding Paper Award, China, 2018.
- National Post-Graduate Mathematical Contest in Modeling, China, Second Prize and Team Leader, 2017.

Academic Service.

- Organizing Committee, Women and Gender-diverse Mathematicians at UBC, 2025–2026.
- Academic Committee, UBC Green College, 2025–2026.
- Reviewer / Program Committee: NeurIPS (2025, 2026); CVPR (2026); ECCV (2026); ICCV (2025); ICLR (2026, 2027); WACV (2026); AAAI (2026, 2027, Program Committee); Canadian AI; IEEE Transactions on Industrial Informatics.
- Organizer, UBC Applied Mathematics Meeting, 2025.

Selected Presentations.

1. UBC Math Graduate and Postdoc Seminar, Vancouver, 2025.
2. CAN-CWiC West, poster, Vancouver, 2025.
3. UBC-hosted event collocated with ICML, poster, Vancouver, 2025.
4. RIKEN Center for Advanced Intelligence Project, oral presentation, Japan, June 2026.
5. ECCV, poster, Milan, Italy, 2024.
6. Canadian Conference on Artificial Intelligence, oral and poster, Montreal, 2023.
7. AAAI, poster, Vancouver (remote), 2022.
8. First Annual SEA Conference, poster, Newfoundland, 2022.
9. AARMS CRG Workshop, oral, Newfoundland, 2022.