Daniel Miao

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Education

University of Minnesota Twin Cities, Ph.D. in Mathematics, *Advisor: Gilad Lerman* *Expected: May 2027*

- Research Focus: Computer Vision, Optimization, Robust Estimation, Machine Learning, Data Science

University of Minnesota Twin Cities, M.S. in Mathematics Dec 2024

University of Minnesota Twin Cities, B.S. in Mathematics, B.S. in Computer Science. *Summa Cum Laude* and *High Distinction* May 2022

Publications

1. Miao, D., Lerman, G., & Kileel, J. (2024) Tensor-Based Synchronization and the Low-Rankness of the Block Trifocal Tensor. *Advances in Neural Information Processing Systems* 37, 69505 – 69532.
2. Sang, S., Xu, C., Fan, J., Miao, D., Side, C., & Wang, Z. (2023). Accurate Prediction of Microstructure of Composites using Machine Learning. *Advanced Theory and Simulations*, 6(2), 2200674.
3. Sang, S., Xu, C., Wang, Z., Side, C., Fowler, B., Fan, J., & Miao, D. (2023). Accurate prediction of topology of composite plates via machine learning and propagation of elastic waves. *Composites Communications*, 37, 101465.

Work Experience

Teaching/Research Assistant, University of Minnesota Sept 2020 – Present

- Graduate TA for Multivariable Calculus, Differential Equations and Linear Algebra, Calculus I.
- Lead several 30 people discussions weekly. Host weekly office hours. Write and grade weekly quizzes and exams.
- Conduct original research in computer vision and optimization under the guidance of Prof. Gilad Lerman and Prof. Joe Kileel.

Data Science Intern, 3M – Maplewood, MN May 2022 – Aug 2022

- Wrote Python code to automatically transfer data through two internal data storage systems.
- Developed a trade secret pipeline including 3D printing devices, building a convolutional neural network for classification, and developing a dash app for deployment.
- Validated code and translated Matlab Code and Python Code for a trade secret model.
- Developed an image processing algorithm for a trade secret using OpenCV.
- Contributed to 3 invention submissions (3M internal project final reports).

Projects

Global Structure from Motion with Trifocal Tensors May 2023 - Present

- Developed the first global synchronization algorithm for trifocal tensors.
- Developed theoretical constraints and an algorithmic framework for tensor optimization.

Sparse Regression for Best Subset of Spectral Bands Aug 2021 - May 2022

- Investigated spectral band selection using sparse regression techniques with a new modeling technique of spectral bands and regressor pool construction.
- Produced publishable results and reported all results in undergraduate honors thesis.

Reviewing and Service

Reviewer: NeurIPS 2025

Technologies

Programming Languages: Python(Advanced), Matlab(Advanced), C++(Beginner), Java(Beginner), R(Beginner), Julia(Beginner), SQL(Beginner).
Techniques: Data Analysis, Machine/Deep Learning, Large Language Models, Generative Modeling, Time Series Analysis, Computer Vision, 3D Computer Vision, Numerical Linear Algebra and Tensor Decompositions, Optimization, Statistical Analysis, Software Development.

Awards and Scholarships

DSI-MnDrive Graduate Assistantship Award	June 2025 - May 2026
Vanky Men Memorial Fellowship	Spring 2025
Thank a Teacher note	Fall 2024, Spring 2025
NSF GRFP Honorable Mention	April 2024
University of Minnesota National Scholarship	May 2018 - May 2022
Ella Thorp Undergraduate Math Scholarship	May 2021

Patents

"Trifocal Block Tensor-Based Synchronization in Computer Vision and Sensor Systems", G. Lerman, J. Kileel, D. Miao. USA Provisional Patent, Appl. No.: 63/694,595. Application date: September 13, 2024

Leadership and Community Engagement

AMS Student Chapter Secretary at UMN	Aug 2023 - Present
SIAM Student Chapter Officer at UMN	Aug 2022 - May 2023
Anselm House Fellow	Sept 2023 - Aug 2024
IMA Industrial Problem Seminar Student Organizer	Sept 2022 - Present

Workshop and Presentations

Math and Data Seminar, University of Missouri, Columbia, MO	Oct 2025
Nonstationary time series analysis for biomedical artificial intelligence International Summer School 2025, Academia Sinica, Taipei	Jun-Jul 2025
Student Seminar of Mathematical Applications & Computations, UMN	Mar 2025
NeurIPS Poster Presentation, Vancouver, CA	Dec 2024
Data and Algebra Seminar, UT Austin (virtual)	Nov 2024
NSF ATD/AMPS PI Workship, Alexandria, VA	Oct 2024
IMA Data Science Lab Meeting Presentation, UMN	Jan,Oct 2024, Apr 2023
Winter Program in Machine Learning, Austin, TX	Jan 2024
Undergraduate Math Honors Thesis Presentation, UMN	May 2022