Jiayu Zhang

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Summary

Second-year PhD student in Operations Research at Columbia University with experience in machine learning for real-world problem-solving, large-scale optimization, and stochastic methods.

Education

09/24 - present PhD in Operations Research at **Columbia University** New York, NY
09/20 - 06/24 BS in Mathematics at **Shanghai Jiao Tong University** Shanghai, China

Experience

Student Researcher Intern at Cardinal Operations Shanghai, China, Feb 2023 - Sep 2023

- Demonstrated that stochastic first-order methods reduce computation time by ∼90% for large-scale (>10,000 nodes) sensor network localization problems by benchmarking first-order and semi-definite programming based methods with commercial solvers.
- Developed theories on the geometry of the sensor network localization problem, establishing the foundation for a co-authored research paper.

Projects

Layer-wise Learning Rates in Neural Network Pretraining Jul 2025 - present

- Designed and implemented adaptive layer-wise optimizers within PyTorch, leveraging large-scale computing resources (NSF Access H100/V100 GPUs).
- Demonstrated improved performance (up to 0.8%) over baselines (e.g., SGD, Adam, and KFAC) when training VGG16 and ResNet32 on CIFAR-10/100 datasets and extended evaluation to language models (e.g., NanoGPT).

Publications

Lei, Mingyu, Jiayu Zhang, and Yinyu Ye (2023). "Blessing of high-order dimensionality: from non-convex to convex optimization for sensor network localization". In: *arXiv preprint arXiv:2308.02278*.

Goldfarb, Donald, Lexiao Lai, Tianyi Lin, and Jiayu Zhang (2025). "Non-Convex Self-Concordant Functions: Practical Algorithms and Complexity Analysis". In: *arXiv preprint arXiv:2511.15019*.

Skills

Coding Python (PyTorch, NumPy, SciPy, Pandas), Linux, Latex, Julia, Matlab
Languages English (fluent), Mandarin (native speaker)

Awards

2024 Fall Boyle Fellowship from Columbia University