Zachary Frangella

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zfrangella.github.io

Education

Stanford University **Ph.D.**, Management Science & Engineering	2022–25
Cornell University, **M.Sc.**, Applied Mathematics	2019-2022
Rensselaer Polytechnic Institute, **B.Sc.**, Mathematics, *Magna Cum Laude*	2015-2018

Awards & Honors

Dean's Honors List, Rensselaer Polytechnic Institute	2015-2018
Max Hirsch Prize, Rensselaer Polytechnic Institute *This Prize is awarded to a Senior in the Department of Mathematical Sciences who has demonstrated outstanding ability in his or her academic work and also gives promise of outstanding success in a career in mathematical sciences.*	2019

Publications   ([Google Scholar](#))

† → Equal contribution

Journal Articles

J1. **Frangella, Zachary**, Tropp, J. A. & Udell, M. Randomized Nyström Preconditioning. *SIAM Journal on Matrix Analysis and Applications* **44,** 718–752 (2023).

J2. **Frangella, Zachary**, Rathore, P., Zhao, S. & Udell, M. Promise: Preconditioned Stochastic Optimization Methods by Incorporating Scalable Curvature Estimates. *Journal of Machine Learning Research* **25,** 1–57 (2024).

J3. **Frangella, Zachary**, Rathore, P., Zhao, S. & Udell, M. SketchySGD: Reliable Stochastic Optimization via Randomized Curvature Estimates. *SIAM Journal on Mathematics of Data Science* **6,** 1173–1204 (2024).

Peer-reviewed Conference Proceedings

C1. Stephenson, W., **Frangella, Zachary**, Udell, M. & Broderick, T. *Can We Globally Optimize Cross-Validation Loss? Quasiconvexity in Ridge Regression* in *Advances in Neural Information Processing Systems* (2021), 24352–24364.

C2. Zhao[†], *S.*, **Frangella, Zachary**[†] & Udell, M. *NysADMM: faster composite convex optimization via low-rank approximation* in *International Conference on Machine Learning* (2022), 26824–26840.

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*Expected.

C3. Rathore, P., Lei, W., **Frangella, Zachary**, Lu, L. & Udell, M. *Challenges in Training PINNs: A Loss Landscape Perspective* in *International Conference on Machine Learning* (2024), 42159–42191. **Oral, Top 1.5% of submissions**.

C4. Feng, M., **Frangella, Zachary** & Pilanci, M. *CRONOS: Enhancing Deep Learning with Scalable GPU Accelerated Convex Neural Networks* in *Advances in Neural Information Processing Systems* (2024).

In the pipeline

P1. Diamandis, T., **Frangella, Zachary**, Zhao, S., Stellato, B. & Udell, M. GeNIOS: an (almost) second-order operator-splitting solver for large-scale convex optimization. *Submitted* (2023).

P2. **Frangella, Zachary**, Diamandis, T., Stellato, B. & Udell, M. On the (linear) convergence of Generalized Newton Inexact ADMM. *Submitted* (2023).

P3. Díaz[†], *M.*, Epperly[†], *E.N.*, **Frangella, Zachary**[†], Tropp, J. A. & Webber[†], *R.J.*. Robust, randomized preconditioning for kernel ridge regression. *Submitted* (2024).

P4. Fazliani, S., Frangella, Z. & Udell, M. Enhancing Physics-Informed Neural Networks Through Feature Engineering. *Submitted* (2025).

P5. Rathore, P., **Frangella, Zachary**, Yang, J., Dereziński, M. & Udell, M. Have ASkotch: A Neat Solution for Large-scale Kernel Ridge Regression. *Submitted* (2025).

P6. Rathore, P. *et al.* Turbocharging Gaussian Process Inference with Approximate Sketch-and-Project. *Submitted* (2025).

P7. Sun, J., **Frangella, Zachary** & Udell, M. SAPPHIRE: Preconditioned Stochastic Variance Reduction for Faster Large-Scale Statistical Learning. *Submitted* (2025).

Talks and Posters

ICME Seminar on Linear Algebra and Optimization, Stanford   2024
Faster Convex Optimization via Randomized Numerical Linear Algebra

MILA Tensor Network Reading Group, Montreal   *2024*
SketchySGD: Reliable Stochastic Optimization via Randomized Curvature Estimates

International Congress of Industrial and Applied Mathematics, Tokyo   2023
Faster Convex Optimization via Randomized Numerical Linear Algebra

ICME Xpo, Stanford   *2023*
SketchySGD: Reliable Stochastic Optimization via Randomized Curvature Estimates

SIAM Conference on Optimization, Seattle   2023
Low-rank Approximation for Faster Optimization

International Conference on Machine Learning, Baltimore   2022
NysADMM: Faster Composite Convex Optimization via Low-Rank Approximation

SciMLCon, Virtual   2022
Speeding up A\b with Randomized Preconditioners

Technical Skills

Programming Languages & Frameworks :

- *Proficient:* Python, Jax, PyTorch, NumPy, Cython, MATLAB, LaTeX

- *Familiar:* Pandas, C/C++, Julia

Academic Mentoring

Graduate

Jingruo Sun, M.Sc. Stanford MS&E   *Summer 2024 – Spring 2025*
Stochastic Proximal Preconditioning

Weimu Lei, M.Sc. Stanford ICME   *Fall 2023 – Fal 2024*
Optimization for PINNs, GPU Acclerated Optimization Software

Undergraduate

Yingxi Li, B.Sc. Cornell ORIE   *Spring 2022*
Faster Sparse Composite Optimization via SAFE coordinate selection

Teaching

Rensselaer Polytechnic Institute

MATH 2400: Differential Equations   *Spring 2019*
Teaching Assistant

Cornell University

MATH 1910: Calculus for Engineers   *Fall 2019, 2020*
Teaching Assistant

MATH 1920: Multivariable Calculus for Engineers   *Spring 2021*
Teaching Assistant

MATH 2930: Differential Equations for Engineers   *Spring 2020, 2022*
Teaching Assistant

Stanford University

CME 307/MS&E 311: Optimization   *Spring 2023, Winter 2024, Fall 2024*
Teaching Assistant, Guest Lecturer

Academic Service

Organized Sessions

ICME Seminar on Linear Algebra and Optimization, Stanford *Winter 2024*
with Michael Saunders

INFORMS: Advances in Optimization for Machine Learning, Seattle *2024*
with Pratik Rathore and Madeleine Udell

Conference Reviewer

International Conference on Artificial Intelligence and Statistics (AISTATS)	*2022, 2024*
Advances in Neural Information Processing Systems (NeurIPS)	*2024, 2025*
International Conference on Learning Representations (ICLR)	*2024*

Journal Reviewer

Journal of Machine Learning Research	*2021, 2022*
SIAM Journal on Mathematics of Data Science	*2022*
SIAM Journal on Matrix Analysis	*2023, 2025*
Automatica	*2024*
Optimization and Engineering	*2025*
Statistics & Computing	*2024*

Relevant Courses

Numerical Computing, Numerical Ordinary Differential Equations, Numerical Partial Differential Equations, Matrix Computations, Data-sparse Matrix Computations, Numerical Methods for Data Science, Reinforcement Learning, Probability Theory, Quantum Physics I-II

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