

Ya Shi Zhang

MACHINE LEARNING RESEARCHER

Location: Cambridge, U.K. Citizenship: Canada

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Research Interests

I am passionate about the interplay between theory, empirics, and application. Currently, my interests are in generative models, scientific machine learning, high-dimensional statistics, and their applications.

Education

Faculty of Mathematics, University of Cambridge

Cambridge, UK

M.A.ST. IN MATHEMATICS (PART III OF THE MATHEMATICAL TRIPOS), WITH HONORS

Oct. 2023 - Jun. 2024

- Courses in Statistical Methods, Statistical Theory, Information Theory, Probability Theory, Statistical Learning, Concentration Inequalities, Stochastic Processes, Convex Optimization, Robust Statistics.
- Thesis: Sampling from High-dimensional Distributions ([Link](#)). Advised by Randolph Altmeyer.

Courant Institute, New York University

New York, USA

B.A. IN MATHEMATICS (WITH HIGH HONORS), B.A. IN COMPUTER SCIENCE (WITH HIGH HONORS)

Sep. 2019 - May. 2023

- Thesis: Computing Interval Range Approximations for Smooth Real Functions with Applications in Real-root Isolation ([Link](#))

Experiences

Toyota Technical Institute at Chicago, affiliated with University of Chicago

Chicago, USA

RESEARCH ASSISTANT

Jun. 2024 - now

- Advisor: Jinbo Xu
- Working on protein language and diffusion models for biology.

Center for Data Science, NYU

New York, USA

RESEARCH ASSISTANT

Jun. 2023 - Dec. 2023

- Advisors: Tim G. J. Rudner, Julia Kempe, Andrew G. Wilson.
- Designed family of data-driven priors that yielded state-of-the-art results on numerous benchmarks. Wrote code for and deployed experiments on the NYU high-performance computing cluster. Engaged in extensive literature review, experimentation, illustrating, and writing.
- Accepted as oral presentation (2% acceptance rate) at AISTATS 2024.

Center for Data Science, NYU

New York, USA

RESEARCH ASSISTANT

Sep. 2022 - May. 2023

- Advisor: Julia Kempe.
- Discovered relationships between neural collapse and adversarially robust neural networks. Devised and implemented experiments to observe the 'cluster leaping' phenomenon.
- Basis of U.S. Dept. of Defense Air Force proposal (Topic Number AF24B-T002).
- Accepted as short-paper at NeurIPS workshop, full paper published in TMLR.

Courant Institute of Mathematical Sciences, NYU

New York, USA

RESEARCH ASSISTANT

Feb. 2022 - Jan. 2023

- Advisors: Chee Yap, Kai Hormann.
- Introduced a generalization of the Cornelius-Lohner framework for range functions. Implemented and experimented with novel state-of-the-art range functions.
- Accepted to CASC (Computer Algebra in Scientific Computing) and published in LNCS.

Government of Canada, Natural Resources Canada

Ottawa, Canada

MACHINE LEARNING ENGINEER

May. 2021 - Aug. 2021

- Developed random forest and CNN models for heating load estimation in remote Canadian communities. Presented model, conclusions, and suggestions to the minister of the department.
- Work was performed remotely due to pandemic.

China International Capital Corporation

Beijing, China

QUANTITATIVE RESEARCH INTERN

May. 2020 - Jul. 2020

- Researched macroeconomic indicators and stocks to sieve and test algorithmic trading strategies. Correlated market fluctuations to monetary policies. Developed annualized volatility models to contrast index funds.
- Work was performed remotely due to pandemic.

Papers

- 2024 **Mind the GAP: Improving Robustness to Subpopulation Shifts with Group-Aware Priors**, Tim G. J. Rudner, Ya Shi Zhang, Andrew G. Wilson, Julia Kempe. *AISTATS Oral (2%)*
- 2023 **On the Robustness of Neural Collapse and the Neural Collapse of Robustness**, Jingtong Su, Ya Shi Zhang, Nikolaos Tsilivis, Julia Kempe. *NeurIPS Workshop, TMLR*
- 2023 **Range Functions of Any Convergence Order and their Amortized Complexity Analysis**, Kai Hormann*, Chee Yap*, Ya Shi Zhang* (Equal Contribution). *CASC, LNCS*

Honors & Awards

- 2024 **College Travel Award (£1,000)**, Hughes Hall, University of Cambridge *Cambridge, UK*
- 2024 **Alumni Award (Excellence in Research)**, New York University *New York, USA*
- 2023 **University Honors Scholar**, New York University *New York, USA*
- 2023 **Dean's List (Awarded 8x)**, New York University *New York, USA*
- 2022 **Courant Institute SURE Fellowship (\$3,500)**, New York University *New York, USA*
- 2022 **Dean's Undergraduate Research Fund Recipient (Awarded 3x, \$3,000)**, New York University *New York, USA*
- 2019 **International Baccalaureate Further Mathematics Examination Prize (Top 30 / 180,000+)**, High School *Vancouver, Canada*
- 2018 **Univ. of California, Berkeley Pre-Collegiate Scholar**, High School *Berkeley, US*
- 2018 **National Team Mathematics Contest (2 / 30+)**, High School *Vancouver, Canada*

Teaching & Service

- 2023 **Ethics Reviewer**, Neural Information Processing Systems (NeurIPS) *New Orleans, USA*
- 2023 **Courant Tutor**, Courant Institute of Mathematical Sciences *New York, USA*

Extracurricular Activity

- 2023-2024 **Cambridge Canadian Club**, Member, Former Event Organizer *Univ. of Cambridge*
- 2023-2024 **The Archimedean**, Member *Univ. of Cambridge*
- 2021-2023 **Mathematical Finance Group**, Former Academic Team Co-lead *New York University*
- 2020-2023 **Quantitative Finance Society**, Former Quant Trading Team Analyst *New York University*
- 2019-2023 **Phi Chi Theta Business Fraternity**, Alumni Member, Former Treasurer *New York University*
- 2019-2023 **Mathematics Society**, Alumni Member *New York University*

Skills & Interests

Programming: Python (PyTorch, JAX), R, C/C++, MATLAB, HPC (Slurm, Singularity, CUDA), Unix, Git, LaTeX

Languages: English (Native), Mandarin (Native), Japanese (Intermediate)

Interests: Golfing, Snowboarding/Skiing, Pickleball, Weight Training, Traveling, Pour-over Coffee