Jingruo (Fiona) Sun

Phone: 650-485-9437 | Email: jingruo@stanford.edu | Web: jingruo.github.io

EDUCATION

Stanford University (GPA: 4.04/4.00) <div align="right">Stanford, CA</div>
Master in Management Science & Engineering <div align="right">*Sep 2023 - Apr 2025(E)*</div>

University of Michigan (GPA: 3.98/4.00, Summa Cum Laude) <div align="right">Ann Arbor, MI</div>
Bachelor of Science, High Honors in Mathematics and High Honors in Statistics <div align="right">*Aug 2020 - Apr 2023*</div>
- Selected to speak at the Graduation Ceremony as the representative of the Department of Mathematics

RESEARCH EXPERIENCE

Wait-Less Offline Tuning and Resolving for Online Decision Making <div align="right">Stanford University</div>
Independent Research, Mentored by Professor Yinyu Ye and Ellen Vitercik, Department of MS&E <div align="right">*Sep2023-*</div>

- Designed an innovative online linear programming (OLP) algorithm for sequential decision-making in resource allocation. Introduced a feedback loop to integrate resolving and subgradient methods with dynamic updates based on frequency f.
- Established a cohesive mathematical framework for algorithm analysis adaptable to all OLP methods. Proved the algorithm achieves the logarithmic worst-case regret of $\mathcal{O}(\log T / f + \sqrt{f})$ as the best-known result in online decision-making.
- Achieved an optimal synergy that enhanced decision optimality 20-fold over subgradient method and boosted computation speed 100-fold over resolving method in large-scale experiments.

Preconditioned Stochastic Variance Reduction for Faster Large-Scale Statistical Learning <div align="right">Stanford University</div>
Independent Research, Mentored by Professor Madeleine Udell, Department of MS&E <div align="right">*Apr2024-*</div>

- Designed a robust algorithm to solve ill-conditioned, non-smooth, and large-scale convex optimization problem arising in regularized empirical risk minimization (ERM), leveraging sketching-based preconditioning and scaled proximal mapping.
- Constructed mathematical analysis to demonstrate that under quadratic regularity, our algorithm significantly reduced the stochastic variance and achieved a linear convergence to the true optimum both locally and globally.
- Outperformed commonly used methods by achieving a 50% improvement in convergence rate and a 100-fold enhancement in optimality. Extended the algorithm implementation to a GPU-compatible version for large-scale experiments.

Convergence of Deep Galerkin Method for Mean Field Control Problems <div align="right">University of Michigan</div>
Independent Research, Mentored by Professor Asaf Cohen, Department of Mathematics <div align="right">*May2022-Dec2023*</div>

- Implemented the deep galerkin method (DGM) to solve high-dimensional non-linear PDEs in mean field control problem using neural networks. Proved the numerical approximator converges uniformly to the true solution.
- Selected to present the work at departmental summer research (REU) seminar and the INFORMS 2024 Annual Conference.

Importance-Weighted Sampling Enhanced VAE for MIRT Model <div align="right">University of Michigan</div>
Independent Research, Mentored by Professor Gongjun Xu, Department of Statistics <div align="right">*Sep2022-Apr2023*</div>

- Developed a novel training method for multidimensional item response theory (MIRT) model estimation of large and sparse data, incorporating the techniques of importance-weighted sampling and enhanced variational auto-encoding (IWVAE).
- Gave a talk of this work at the departmental seminar. Recognized as the thesis with High Honors in Statistics.

PREPRINTS

1. **Jingruo Sun**, Wenzhi Gao, Ellen Vitercik, and Yinyu Ye, *Wait-less Offline Tuning and Resolving for Online Decision Making*, In Submission, [arXiv: 2412.09594]
2. **Jingruo Sun**, Zachary Frangella, and Madeleine Udell, *SAPPHIRE: Preconditioned Stochastic Variance Reduction for Faster Large-Scale Statistical Learning*, In Submission, [arXiv: 2501.15941]
3. William Hofgard, **Jingruo Sun**, and Asaf Cohen, *Convergence of the Deep Galerkin Method for Mean Field Control Problems*, INFORMS 2024 Annual Conference, [arXiv: 2405.13346]

PROJECTS

The Development of Facticity: from Preliminary Findings to Accepted Implicit Knowledge Stanford University
Project of Natural Language Processing with Deep Learning, Department of Computer Science *Jan2024-Apr2024*

- Constructed the transformer model (DistilBERT) for key-phrase extraction, LLM model for sentiment analysis, and citation network modularity metrics to track the evolution of scientific concepts from 1.9M manuscripts.
- Selected for the presentation at IC2S2 2024 Conference and ICSSI 2024 Conference.

A Greener Future Beyond Profits: Sustainability as a Driver of Market Stanford University
Project of Machine Learning, Department of Computer Science *Sep2023-Dec2023*

- Constructed regression, XGBoost, and ensemble neural networks with parameters tuned by cross validation and Lasso regularization. Transformed ESG predictors into random Fourier features and standardized variables with robust scaling.
- Achieved the highest score in final report (ranked 1/172) and earned the Best Project Award.

HONORS AND AWARDS

2023	Best Project Awards of Machine Learning	Stanford University
2023	High Honors in Mathematics, High Honors in Statistics	University of Michigan
2023	High Distinction (Summa Cum Laude)	University of Michigan
2022	M.S. Keeler Department of Mathematics Merit Scholarships	University of Michigan
2020 - 2023	James B. Angell Scholar	University of Michigan
2020 - 2023	University Honor	University of Michigan
2020 - 2023	Dean's Honors List	University of Michigan
2017	Second Prize of National Mathematics Olympics	Chinese Mathematics Olympiad

TALKS

1. **Deep Galerkin Method for Mean-Field Control Problem**
   INFORMS 2024 Annual Conference Oct2024
   REU Summer Research Seminar, Department of Mathematics June2022

2. **The Development of Facticity - from Preliminary Finding to Accepted Implicit Knowledge**
   International Conference on Computational Social Science (IC2S2) 2024 July2024
   International Conference on the Science of Science and Innovation (ICSSI) 2024 July2024

COURSEWORK

Graduate-level coursework is indicated by *
Mathematics

- Honors Real Analysis I *
- Honors Real Analysis II *
- Complex Analysis *
- Functional Analysis *
- Probability Theory *
- Stochastic Processes *
- Optimization *
- Stochastic Methods in Engineering *
- Numerical Methods *

Computer Science & Statistics

- Machine Learning *
- Machine Learning for Optimization *
- Causal Machine Learning *
- Natural Language Processing *
- Foundations of Reinforcement Learning *
- Programming & Data Structure
- Regression Analysis
- Computational Methods in Statistics
- Theoretical Statistics

LEADERSHIP AND SKILLS

Women in Mathematics, Women in Engineering Stanford & UMich
Vice President of Professional Events *Sep2021-*

- Organized regular academic seminars and lunch panels to encourage communication and inclusivity in STEM community.

In-vehicle Child Detection Device Dalian No.24 High School
Designer and National Patent Holder *May2017*

- Designed an alert system to detect children left in cars using a dual sound-and-touch sensor for real-time notification.

Languages: Mandarin (Native); English (Fluent), GRE (335/340 + 4.5), TOEFL (113/120)
Skills: Python, C++, R, MATLAB, LaTeX