Ziliang (Samuel) Zhong

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Education

New York University — New York/Shanghai

Ph.D in Data Science, Overall GPA 3.77/4 — *May 2021- Present*

- Advisor: Prof. Shuyang Ling
- Research interests: high dimensional statistics, machine learning theory, deep learning theory, signal processing
- Coursework: Deep Learning, Advanced Statistical Inference, Big Data, Computer Vision, Scientific Computing, Fundamental Algorithms, Convex and Nonconvex Optimization

New York University — New York/Shanghai

B.S. in Mathematics and Data Sciecne, Major GPA 3.96/4 — *Sep. 2017 – May 2021*

- Thesis: Exact recovery in stochastic coblock models
- Coursework: Machine Learning, Databases, Forecasting Times Series Data, Fluid Dynamics, Partial Differential Equations, Abstract Algebra, Complex Variables, Stochastic Process, Mathematical Statistics, Honors Theory of Probability, Honors Linear Algebra, Honors Analysis

Work Experience

Machine Learning Engineer (Intern) — Jun. 2024 – Oct. 2024

ByteDance (TikTok) — *Shanghai, China*

- Enhanced the bidding strategy for brand advertising by refining the calculation methods for click/convert density and acceleration coefficients. Achieved a 4% increase in CTR (click-through rate) during A/B test through improved PID control performance.
- Contributed to the development of a MPC (Model Predictive Control) bidding algorithm. Utilized least squares and cross-validation to accurately model relationships between (bid/ctr_thresold) and send/click/pvr, establishing a robust prior for the control algorithm.
- Derived the optimal bidding formula in the context of brand advertising by modifying the linear programming constraints and analyzing the KKT (Karush-Kuhn-Tucker) conditions.

Research Projects

Uncertainty Quantification for Orthogonal Group Synchronization — Oct. 2023 – Aug. 2024

New York University, advised by Prof. Shuyang Ling. — *New York, NY*

- Derived the asymptotic distribution for the Maximum Likelihood Estimator (MLE) and the spectral estimator via second-order Riemannian Taylor expansion.
- Derived state-of-the-art min-max risk bounds as a by-product of the theoretical analysis, providing insights applicable to various statistical inference problems with manifold constraints, supported by numerical experiments.

Feature representation learning algorithm robust to distribution shifts — Jan. 2023 – Oct. 2023

New York University, advised by Prof. Qi Lei. — *New York, NY*

- Introduced a novel framework for feature representation that identifies approximately shared features across diverse domains.
- Proposed and analyzed a learning algorithm that captures invariant and approximately shared features in source tasks, followed by fine-tuning for target tasks.
- Our generalization bound on teh target task presents better and more interpretable rates than prior work. Our algorithm outperforms SOTA on various domain adaptation benchmark datasets such as VLCS, OfficeHome and DomainBed.

Near-optimal statistical ranking via spectral method — Jan. 2022 – Oct. 2023

New York University, advised by Prof. Shuyang Ling. — *New York, NY*

- Proposed a spectral algorithm to estimate the rankings of items from (both unnormalized and normalized) pairwise differences between them (for example, sports data).
- Proved that this algorithm achieve $\Omega(n\log(n))$ sample complexity (information-theoretically near-optimal), beating the state-of-the-art result $\Omega(n^{4/3}\log^{3/2}(n))$.

Semi-supervised video prediction and segmentation Jan. 2023 – May. 2023

New York University, advised by Prof. Yann LeCun and Alfredo Canziani *New York, NY*

- Proposed a multi-stage semi-supervised framework based on the technique of pseudo label.
- Novelly integrated video prediction and segmentation into a single framework to make end-to-end segmentation.
- Empirically verified that our algorithm succeeded on tasks requiring video prediction and segmentation simultaneously.

Publications and Preprints

[4] **Z. S. Zhong**, S. Ling, "Uncertainty Quantification of Spectral Estimator and MLE for Orthogonal Group Synchronization," *In submission*, 2024. *arXiv* version.

[3] **Z. S. Zhong**, S. Ling, "Improved theoretical guarantee for rank aggregation via spectral method," *Information and Inference: A Journal of the IMA*, Volume 13, Issue 3, 2024. DOI 10.1093/imaiai/iaae020.

[2] **Z. Zhong**, X. Pan, Q. Lei, "Bridging Domains with Approximately Shared Features," *In submission*, 2023. *arXiv* version.

[1] **Z. Zhong**, M. Zheng, H. Mai, J. Zhao, X. Liu, "Cancer image classification based on DenseNet model," *Journal of Physics: Conference Series (Vol. 1651)*, presented at The 2020 2nd International Conference on Artificial Intelligence Technologies and Applications (ICAITA 2020). DOI 10.1088/1742-6596/1651/1/012143.

Awards and grants

- National Key R&D Program of China, 2021-2026
- NYU Shanghai Doctoral Fellowship, 2021-2026
- Dean's List Award for 2017-2018 and 2019-2020
- Kaggle bronze medal: SIIM-ISIC Melanoma Classification, 2020

Teaching Experience

- MATH-SHU 234 Mathematical Statistics, 2023 Fall (NYU, TA, undergraduate)
- Mentored 10+ undergraduate and high school students on (under)graduate application
- Mentored 1 global Honourable Mentions awardee in S.T. Yau High School Science Award, 2023.