HONGBO LI

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EDUCATION

Michigan State University East Lansing, MI Aug 2025 – Present
Doctoral Program in Statistics, College of Natural Science

- Selected Courses: Linear Model Methodology (PhD), Theory of Probability I (PhD)

Johns Hopkins University Baltimore, MD Aug 2023 – May 2025
Master of Science in Financial Mathematics, Whiting School of Engineering
Major GPA in Math: 3.96/4.0

- Selected Courses: Nonlinear optimization (PhD), Advanced Financial Theory (PhD), Applied Statistics & Data Analysis, Stochastic Process, Monte Carlo, Machine Learning in Finance, Time Series, Bayesian Statistics

Huazhong University of Science and Technology Wuhan, China Sep 2018 – Jun 2022
Bachelor of Science in Statistics, School of Mathematics and Statistics
Major GPA in Math and CS: 3.8/4.0

- Selected Courses: Real Analysis, Probability Theory, Modern Algebra, Mathematical Statistics, Multivariate Statistics, Operations Research, Optimization Method, Partial Differential Equations, Advanced Numerical Methods
- Thesis: "Robust Facial Recognition based on CNN"

PUBLICATIONS

[1] Hongbo Li and James C. Spall. "Zeroth-Order Langevin Monte Carlo via SPSA under Noisy Function Measurements," manuscript in final polish; planned submission in Dec 2025; 1-page brief and view-only draft available upon request

[2] Hongbo Li and Helyette Geman. "Fine-tuning FinBERT with Few-Shot Weak Supervision for Financial News Sentiment," manuscript in preparation, 18 pages completed

RESEARCH EXPERIENCE

Zero-Order Langevin Monte Carlo via SPSA under Noisy Function Measurements Jan 2025 – Present
Supervised by Prof. James Spall, Johns Hopkins University

- **Motivation & method:** Bridged **gradient-based** samplers and **gradient-inaccessible** settings in practice (simulation-based inference, model-free reinforcement learning, and stochastic control) by proposing Langevin Monte Carlo-Simultaneous Perturbation Stochastic Approximation (**LMC-SPSA)** in noisy settings–gradient-free Langevin sampler with only **two noisy function** queries per iteration (dimension-independent)
- **Convergence:** Proved Wasserstein-2 convergence of LMC-SPSA under noise and resolved **open step size question** by deriving **diminishing-step size window** ensuring convergence, extending prior constant-step size analysis
- **Sharper dimension dependence:** Improved the **theoretical dominant dimension dependence** of the Wasserstein-2 error bound under standard smoothness/noise conditions, with numerical results supporting the theory
- **Empirical results under equal budgets:** LMC-SPSA attains the **lowest, most stable MSE** and **moment errors** (mean/variance/kurtosis), outperforming LMC-Finite Difference Stochastic Approximation and LMC-Random direction Stochastic Approximation

Fine-tuning FinBERT with Few-Shot Weak Supervision for Financial News Sentiment Aug 2024 – Feb 2025
Supervised by Prof. Helyette Geman, Johns Hopkins University

- **Motivation & method:** Applied **few-shot in-context labeling** with gold examples to generate **weak labels** at scale, using consistency voting and confidence filtering for **denoising**; then **fine-tuned FinBERT (LoRA)** with temporal splits and probability calibration. The fine-tuned model outperformed the baseline FinBERT in accuracy
- **Multi-ticker disambiguation:** Designed three datasets for multi-ticker articles (single-ticker**,** most-mentioned**,** and mention-share weighting); **most-mentioned** gave the highest accuracy and strongest 2-day Granger-prediction
- **Exploratory identification:** Applied Difference-in-Differences around pre-specified shocks and Regression Discontinuity Design at set thresholds, uncovering potential **causality** between sentiment factors and stock returns

Causal Inference on High-Dimensional Time Series using LLM-Guided Discovery Oct 2024 – Feb 2025

Supervised by Prof. Helyette Geman, Johns Hopkins University

- Developed novel framework leveraging causal order priors generated by LLMs to constrain discovery algorithms, enabling efficient learning of sparse structures and mitigating the curse of dimensionality
- Designed and implemented soft constraints, conflict checks, and multi-round prompting, to minimize impact of spurious directions from imperfect LLM outputs, ensuring robustness and reliability of the inferred graphs

TEACHING EXPERIENCE

Teaching Assistant — Michigan State University — Aug 2025 – Present

Teach three weekly sections of STT 200 (Statistical Methods)

PRESENTATION

Statistics and Data Science Workshop, Universidad de los Andes — Bogota, Colombia — Dec 2025

Presentation accepted for: Zeroth-Order Langevin Monte Carlo via SPSA under Noisy Function Measurements

Financial Mathematics Seminar, Johns Hopkins University — Baltimore, MD — Oct 2024

Presentation for summer intern as Quantitative Researcher

INTERN EXPERIENCE

China Merchants Securities Co., Ltd. — Beijing, China — Jul 2024 – Nov 2024

Quantitative Researcher

- **Applied Kalman filter** to denoise intraday signals and enhance accuracy of trading decisions, improved win rate, profit–loss ratio, and full-period information ratio vs. out-of-sample baseline
- **Built cointegration-based** statistical arbitrage framework: screened economically linked FX pairs, **tested cointegration** (Engle–Granger, Johansen), estimated hedge ratios and mean-reversion **half-life**, then **validated out-of-sample** with rolling retests

SCHOLARSHIPS & AWARDS

- Dean's Scholarship, Huazhong University of Science and Technology 2018
- National Innovation Training Program for Undergraduate Research 2022

COMPUTER SKILLS

- Programming Skills: Python (NumPy, Pandas, Scikit-learn, Pytorch), MATLAB, R, C++, MySQL
- Machine Learning: Transformer, Diffusion, Informer