

ZHENGYI GUO

Homepage: <https://zhengyiguo2002.github.io/>

Email: zg2525@columbia.edu

EDUCATION

Columbia University

New York, NY

M.S. in Financial Engineering (GPA: 4.08/4.00, **Top 5%**)

Sep 2024 - May 2026

Advanced Masters Research (AMR) track, supervised by Prof. Wenpin Tang and Prof. David D. Yao

University of Liverpool

Liverpool, UK

B.S. in Mathematics (GPA: 93/100, **Ranked 1/325**)

Sep 2020 - Jun 2024

Supervised by Dr. Youness Boutaib

RESEARCH INTEREST

Probabilistic ML, especially Score & Flow-based Models and LLMs

Mathematical Finance, Financial Engineering and FinTech

RESEARCH EXPERIENCE

Wenpin Tang, Renyuan Xu, Zhengyi Guo. *A Stochastic Analysis Approach To Conditional Diffusion Guidance.*

- Developed a probabilistic framework for fine-tuning pretrained diffusion models through **Conditional Diffusion Guidance (CDG)**, connecting Doob's h-transform and stochastic analysis concepts such as martingales and quadratic variation
- The proposed method circumvents the designing an explicit reward function in conventional classifier guidance by leveraging intrinsic data-driven guidance sets, offering a new paradigm for post-training
- Established theoretical convergence and error bounds for the proposed conditional guidance method
- Applied the framework to generate financial time series for risk management and scenario analysis, and extended the methodology to supply chain management optimization

Zhengyi Guo*, Jiatu Li, Wenpin Tang, David D. Yao. *Diffusion Generative Models Meet Compressed Sensing, with Applications to Imaging and Finance.* *arXiv:2509.03898*.

- Developed an integrated **Compressed Sensing + Diffusion Model (CSDM)** pipeline that first linearly encodes high-dimensional data into a low-dimensional latent space, trains the diffusion model there, and then decodes samples back to the ambient space via Fast Iterative Shrinkage-Thresholding Algorithm (FISTA)-based sparse recovery, enabling generation under strong sparsity assumptions
- Performed a joint complexity analysis of diffusion inference and compressed-sensing recovery, deriving dimension-dependent convergence bounds and showing that the latent dimension can be chosen optimally to achieve provable speedups over standard diffusion in the ambient space
- Validated the CSDM pipeline on diverse datasets, including Optical Coherence Tomography (OCT) images, ERA5 climate fields, and financial time series for stress testing, showing that it preserves sample fidelity while substantially reducing wall-clock generation time

Zhengyi Guo and Youness Boutaib. *Analysis of Sequential Deep Learning Models and Application to Finance.*

- Developed and evaluated Recurrent Neural Network (RNN), Long Short-Term Memory (LSTM), and Echo State Network (ESN) architectures for stock index prediction leveraging PyTorch
- Conducted comprehensive literature reviews and correlation analyses, designed technical and fundamental indicators from Yahoo Finance and FRED for S&P 500 index prediction
- Derived a 7-page paper on the Backpropagation Through Time (BPTT) algorithm in RNN and LSTM models, including advanced mathematical proofs involving matrix operations and multi-variable calculus

PROFESSIONAL EXPERIENCE

Goldman Sachs

New York, NY

Quantitative Strategist Summer Analyst

Jun 2025 - Aug 2025

- Engineered an end-to-end balance sheet and PnL generation pipeline in Slang; designed a new On-The-Fly (OTF) valuation module that precomputed stable trade valuations into a Lakehouse cache, serving as a reusable and consistent data source for downstream processes
- Achieved significant improvements in journal generation speed and data consistency by introducing daily-updated deterministic valuation layers, reducing dependency on real-time recalculation under unstable market conditions

WonderWiz Investment

Shanghai, CN

Quantitative Research Intern

Jun 2024 - Sep 2024

- Restructured a Deep Momentum Network deploying PyTorch to generate trading signals and to predict stock market movements, and constructed Gaussian Process (GP) Regression to capture volatile stock price movements during Covid-19, lifting sharpe ratio by 8%
- Led a group of 6 to modify the LOT-Mixed estimator for Bid-Ask spread, applying ridge regression techniques, succeeding a 30% increase in accuracy and a 35% reduction in standard error

AWARDS

Benjamin Miller Memorial Fellowship (**Top 5%**), Columbia University

May 2025

Sampford Memorial Prize (**Best Final Year Student**), University of Liverpool

Jun 2024

Brownlow Hill Prize (**Top 1%**), University of Liverpool

Jun 2023

Exchange Program Excellence Scholarship (**Top 1%**), University of Liverpool

Jun 2022

University Academic Excellence Award (**Top 1%**), Xi'an JiaoTong-Liverpool University

Jun 2021

INTERESTS

Basketball and football, working out, hiking, and exploring new places through travel