

Xuechen ZHANG

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EDUCATION

Columbia University

MA in Mathematics of Finance

New York, NY

09/2024 - 12/2025(Expected)

- **Courses:** Stochastic Process, Stochastic Methods, Numerical Methods, Partial Differential Equations, Advanced Machine Learning for Finance
- **GPA: 4.00/4.00**

University of Michigan--Ann Arbor

BS in Statistics, Minor in Computer Science and Mathematics

Ann Arbor, MI

08/2020 - 05/2024

- **Courses:** Data Structures and Algorithms, Algorithms for ML & DS, Intro to Computer Organization, Applied Regression Analysis, Data Mining and Machine Learning, Bayesian Data Analysis, Linear Algebra, Multivariable Calculus
- **GPA: 4.00/4.00;** Graduated with Highest Distinction; James B. Angell Scholar 2024; University Honors 2020 - 2024

PROFESSIONAL EXPERIENCE

TD Securities

Global Markets Quantitative Summer Associate

New York, NY

06/2025 - Present

- **High-Dimensional PDE Modeling:** Developed deep learning frameworks (Deep BSDE, DGM, MDN) using PyTorch to solve high-dimensional Fokker–Planck and Kolmogorov PDEs, enabling fast and scalable modeling of vol–forward dynamics under stochastic volatility
- **Option Pricing:** Trained parameterized neural networks to price options and compute Greeks (Δ , Γ , Vega) via automatic differentiation, allowing amortized inference and real-time risk monitoring across market regimes
- **Risk Estimation:** Replaced costly Monte Carlo simulations with differentiable neural density estimators to approximate joint distributions of multi-asset stochastic processes, significantly accelerating risk assessment workflows
- **Model Benchmarking:** Benchmarked neural PDE solvers against Monte Carlo and closed-form methods, achieving $<0.1\%$ pricing error and demonstrating superior numerical stability in high-dimensional settings
- **Python Dashboard Upgrade & Market Data Visualization:** Upgraded a Python dashboard to visualize option market data (implied volatility, dividends, forward), enabling pricing validation and strategic volatility analysis. Automated the workflow and generated daily reports to support timely, data-driven decisions across trading teams.
- **Risk Mapping with Vega Profiles:** Built a desk-level tool to visualize Vega maps and Gamma profiles for structured notes by applying area-based bumps on the underlying assets' volatility surface, enabling traders to assess risk sensitivities and key Greeks exposure.

Sparken Capital

Quantitative Analyst Intern

New York, NY

05/2024 - 07/2024

- **Machine Learning for Auto-coding:** Created a workflow using Microsoft's Autogen Studio to autonomously generate and refine Python code, improving code efficiency and accuracy by 30%. Utilized machine learning algorithms for error correction and robustness
- **Autonomous Data Retrieval & Reporting:** Trained an autogen workflow via Python to autonomously gather a specific company's trading history and related news from the internet and automated the generation of annual reports, including visualizations of share performance, company situation analysis, and risk assessments

Tencent

Data Research Intern

Shenzhen, China

05/2023 - 08/2023

- **SQL Optimization & System Design:** Improved data retrieval by 20% with optimized SQL queries and designed a feature scoring system, boosting user engagement by 5%
- **XGBoost Modeling & Data Imbalance:** Built and fine-tuned an XGBoost model with sentiment analysis, achieving 0.86 accuracy and enhancing customer contact classification for targeted strategies

RESEARCH EXPERIENCE

AI Fairness in Financial Decision-Making Systems, University of Michigan

03/2024 - 08/2024

- **Fairness Testing:** Utilized a bank loan dataset, varying applicant attributes such as race and gender to examine the impact of sensitive factors on approval rates
- **Bias Detection:** Revealed that the model displayed a bias, approving a higher percentage of applicants from a specific race group, even when all other variables were held constant
- **Ethical AI:** Highlighted potential risks of bias in AI-driven decision-making processes, providing insights for developing fairer and more equitable machine learning models

Temporal Leakage Evaluation in LLMs, University of Michigan

11/2023 - 07/2024

- **Temporal Evaluation:** Designed and implemented a dual-pipeline evaluation framework to analyze temporal information leakage in LLMs (GPT-4o, Claude-3.5, Gemini-1.5), revealing an 80% leakage rate in financial predictions
- **RAG System Development:** Developed a Retrieval-Augmented Generation (RAG) validation system leveraging Google Custom Search API to collect 3,000+ news articles per S&P 500 company, automating the detection of future information usage in LLMs' reasoning
- **Reinforcement Learning:** Applied reinforcement learning to fine-tune LLMs toward temporally consistent behavior, reducing future-information leakage by discouraging reliance on post-publication cues during training
- **Automated Verification:** Built automated verification workflows integrating historical financial data from Yahoo Finance to assess the accuracy and temporal consistency of LLMs' stock price predictions

TECHNICAL SKILLS

- **Computer Programming:** C++, Python, R, Matlab, SQL, Deep Learning, MS Office Suite
- **Mathematics & Statistics:** Statistical Modeling, Probability, Regression Analysis, Numerical Method, Monte-Carlo Simulations, Time Series Analysis, Bayesian Inference, Hypothesis Test
- **Interests:** Chess, Football, Skiing, Surfing, Hiking, Horse Riding, Piano, Traveling