ZIJING (SCARLETT) ZHAO

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EDUCATION

Columbia University (CU), *Graduate School of Arts and Sciences, New York* *Sep 2023-Dec 2024*

M.A. in Mathematics of Finance

- Coursework: model & trade derivatives, high dimensional probability, interest rate models, algorithms for data science

Xi'an Jiaotong University (XJTU), *Jinhe Center for Economic Research, Xi'an* *Aug 2019- Jul 2023*

B.Econ. in Mathematical Economics and Finance, GPA 88 (Rank: 4/35).

- Coursework: Multivariate Calculus, Probability, Intermediate Micro/Macro, Python, Database, Econometrics, Game Theory, Intro to Math of Finance, Stochastic Processes, Numerical Methods/PDEs**,** ODE, etc.
- Online Courses: Coursera-Machine Learning, Deep Learning
- Experience: Columbia University Visiting Student, Leader of the National Innovation Program, TA of Introduction to Finance

INTERNSHIP EXPERIENCE

Quant Technologies *Xi'an, China*

Quantitative Research Intern *Jun 2022-Sep 2022*

- ***Factor Mining:*** Re-engineered the company-wide minute-level data preprocessing process. Added functions of missing value handlings using Random Forest and alternative data outlier diagnosis with Python and SQL. Formed synthesized factors from Barra's value, sentiment, momentum and volatility factors using PCA, Lasso & Adaboost, leading to Sharpe ratio of 1.96.
- ***Model Development:*** Tracked machine learning methods to resolve non-linearity prediction problems. Carried out research on commodities under the high-volatility window and refined the price forecasting models with seasonality adjustments.
- ***Performance Attribution:*** Conducted factor analysis by Python Aphalens and crafted visualization tools.

China Industrial Securities *Shanghai, China*

Quantitative Research Intern *Apr 2022-Jun 2022*

- ***Strategy Optimization:*** Implemented Nelson-Siegel model for term structure forecasting while considering interest rate jumps. Applied dynamic programming to optimize the bond positions of yield curve arbitrage, generating 6.3% excess return.
- ***Risk Management:*** Redesigned the databases to improve the automation and visualization of credit spreads, yields and biases. Developed new VaR model incorporating default risk and conducted stress testing and scenario analysis.
- ***Credit Analysis:*** Engineered features from news and financial data to predict default probability with SVM, reaching 86.7% accuracy. Reduced 90% manual screening time of 30000+ credit defect classifications with KNN.

RESEARCH & PROJECTS

Index Rebalancing Strategy in US Equity Markets *Columbia University: Sep.2023-Dec.2023*

Columbia University, GSAS, Instructor: Prof. Eric Yeh

- ***Data Processing & Preparations:*** Concentrated on indices (Russell 1000, Russell 2000) and leveraged coding tools to automate data cleaning. Predicted the dividend futures with ARIMA and studied the trigger and order flows of index changes.
- ***Optimization & Evaluation:*** Created a multi-factor regression model with Python to predict participation incorporating capital structures and index treatments, improving the annualized return by 15%. Visualized the P&L and other quantitative metrics.

Decentralized exchange and cryptocurrency research *XJTU: Sep.2022-May.2023*

Xi'an Jiaotong University, Instructor: Prof. Yingxue Li (Graduation Thesis, Grade A)

- ***Microstructure Research:*** Compared mechanism of Nasdaq and crypto DEX. Built game theory model of 3-participant-type constant product AMM and analyzed the impact of the impermanent loss for market makers, investors and arbitragers
- ***Simulations and Analysis:*** Simulated anomaly loss surface under hybrid function formations. Modeled the correlation of different crypto assets and carried out TCA to incorporate blockchain-based gas fees and network congestion.

Comparison of different numerical methods in option pricing *Columbia University: Jan.2022-May.2022*

Columbia University, APAM, Instructor: Kyle Mandli

- ***Performance Comparison:*** Derived SDEs and PDEs for European and American options and implemented numerical methods (Explicit, Implicit, Crank-Nilcoson, Monte Carlo). Compared the stability and plotted the convergence behaviors.
- ***Application Extension:*** Explored the structures and pricing of light exotic options and path-dependent multi-asset products by super-replication and hybrid model. Simulated hedging positions to analyze exit risk and overhedging.

SKILLS & HOBBIES

Skills: Python (NumPy, Pandas, Sklearn, Tensorflow), SQL, C++, Stata, R, Matlab, LaTeX, Bloomberg, VBA, Kdb+/Q

Hobbies*:* Piano (17 years), Bel Canto (heroine of musical dramas at XJTU), Swimming, Calligraphy, Surfing, Diving