Orange(Yingzhi) Ao

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ABOUT ME

Cultivated by past related experiences, my keen interest in FBSDEs and stochastic control optimization has led me to pursue a PhD, where I aim to develop innovative methodologies to enhance risk management strategies in dynamic financial environments.

References available upon request.

EDUCATION

Columbia University Visiting Student 2024

- ✓ **GPA**: 4.17 (Straight-A)
- ✓ **Related Courses**
  - **Programming** **Predictive Modeling (with R)(A), **DS in Finance And Insurance (with Python) (A+), Statistical ML (with Python) (A)
  - **Math** **Applied Stochastic Processes(A+)
  - **Integrated Project** Insurance Pricing with ML(A+)

Nanjing University Bachelor of Economics (Financial Engineering) 2021-2025

- ✓ **GPA**: 92
- ✓ **Related Courses**
  - **Programming** Python, Numerical Analysis and Application Software (with MATLAB), *Financial Engineering, Applied Statistics II: Time Series (with Python), *Financial Time Series (with R), *AI
  - **Math And Stats** Probability Theory and Mathematical Statistics, Calculus I & II, Discrete Mathematics, Linear Algebra, ODE, *PDE, *Mathematics Finance
  - **Economics And Finance** Econometrics, Financial Risk Management, Securities Investment, *Options Investing Theories And Practices, Corporate Finance, Microeconomics, Macroeconomics, Accounting, International Finance, International Trade

** is added before courses in progress.*
*** is added before grad-level courses.*

RESEARCH EXPERIENCES AND PUBLICATIONS

Multi-Period Compliance MFG-FBSDEs in REC Market RA 2024
Columbia University Stats Department

Under prof Campbell's supervision, I worked as an RA on the extended topic of his work *"Deep learning for principal-agent mean field games."* [1] and its application in REC markets. Here are the major things I did.

- ✓ Built up the FBSDE-MFG model and NN framework with PyTorch to reproduce the results of 1-Period-2-Agent Model in [1].
- ✓ Added additional period to the previous model and framework: Joint Optimization Model, considering current and future quotas.
- ✓ Proposed 3 numeric tricks to improve the model stability in seek of desired convergence: *clamp*, *sigmoid approximation*, and *logit transformation*.
- ✓ Experimented with different combos of NN model settings (e.g. optimizer, scheduler, layers, etc.), parameters (e.g. lr), numeric tricks, and loss functions.
- ✓ Proposed a benchmark model - Separate Optimization Model - by running the 1P2A model twice, which gives a better view of differences made by long/short-sighted perspectives.
- ✓ Wrapped up codes into well-defined packages, published to **my GitHub repository** together with README instructions.
- ✓ Wrote a *Report-Overview* for big pictures and *Report-Stepwise* for detailed math and algorithm illustrations.

Low-carbon Transition of China's Power System RA 2023
Tsinghua-CTG Joint Center for Climate Governance and Low-carbon Transformation

Under the supervision of main researcher Yang Qu, I assisted TCJCGLT in composing the research report series "Low-carbon Transition of China's Power System". My major works are as follows.

- ✓ Focused on 2 sections as a major researcher and author of the report series.
  - Construction of the national carbon market in China: key problems in market mechanism design and policy recommendations.
  - Offshore wind industry in low-carbon transition: bottleneck and future.
- ✓ Visualization - made all figures and tables for the report series.
- ✓ Collected references for other sections of the report series.
- ✓ Assisted in completing and proofreading the draft versions.

PROJECT EXPERIENCES

Machine Learning In Insurance Pricing And Risk Modeling 2024.05 - 2024.08
Columbia University Actuarial Department

- ✓ **Team Collaboration** Collaborated with a team under the supervision and mentoring of Carlos (Arocha Association) to carry out an innovative model for a data-driving insurance pricing strategy.
- ✓ **Risk Modeling In Python** Innovatively leveraged unsupervised learning (K-Means, PCA, etc.) to identify risk levels based on policy data. Developed exposure rating methods to estimate risk premiums and policy prices in each risk level.
- ✓ **Professional Reporting And Presenting** Delivered professional Statement of Work and Reports. Presented findings and consulting advice to clients.

Innovated Paired Trading Optimization with Genetic Algorithm 2023.09
Self-Motivated Personal Project

- ✓ **Innovation** Replaced traditional single-belt with double-bound, which leads to fewer fluctuations and greater stability.
- ✓ **Genetic Algorithm** Learned GA from scratch and applied it to parameter optimization (i.e. coefficient, bandwidth), and customized fitness functions(e.g. Sharpe-based to Return-based).

WorldQuant Brain Consultant | Alphathon (Gold) 2023
Remote

- ✓ **Participate in NJU Alphathon 2023** Won the gold medal with monetary rewards by submitting qualified alphas. (11th place out of more than 200 candidates)
- ✓ **Contracted Consultant** Submitted qualified alphas and received allowances.

INTERNSHIP EXPERIENCES

TrexQuant Investment GAR Alpha Researcher 2024.06 - 2024.08
Remote

- ✓ **Market Psychology And Behavioral Investing** Focused on behavioral finance, refining ideas from papers and research and transforming ideas into alphas. Examined and submitted alphas through the internal system(Trex Pysim).

Chongwen Quantitative Quantitative Strategy Researcher (Stock) 2023.09 - 2024.02
Remote

- ✓ **Optimization of "Whitney George" Strategy** Optimized the strategy parameters w.r.t. A-stock market, leading to an excess of 29% to the annual return of the SSE 300 Index (2018-Q1 to 2023-Q4). The strategy is expected to be used for real trading from 2024-Q4 on.
- ✓ **Construction And Maintenance of Trading System** Daily simulated the trading and generated formatted trading documents including strategy performance and re-balancing instructions.

EXTRACURRICULAR ACTIVITIES

Presendent of NFEA External Relations Department 2023-now
As a self-managed non-profit association, we aim to broaden members' career opportunities and potential through reaching out to companies and recruiters. I am responsible for leading the core members and am in charge of the reach-out affairs.

Core Member of Columbia College VESC 2024
I took the lead in organizing "Eastern Egg Hunting" and assisted in organizing other 3 monthly activities, which helped to bring international students together and cultivate a sense of belonging.

SKILLS

Programming

- ✓ **Python | PyTorch, Pandas, Numpy, sklearn, etc.** Constructed DL models in the Summer Research, 2024 with Pytorch, familiar with common bugs and resolutions; advanced my DS and ML knowledge through intership, projects experiences, and courses *(school and coursera)*.
- ✓ **R | LM, GLM, tree models.** Accomplished course assignments in PM and FinTS; also achieved A in PM (rank 1 in the midterm exam).
- ✓ **Other less proficient languages | C++, MATLAB** Earned CCF CSP-S 2nd Class Certificate in high school; accomplished coursework and exams with MATLAB.

Academic Writing And Professional Typesetting

- ✓ **LaTeX| Academic Report Writing** I used Overleaf for purposes ranging from research reports to CV, which improved my LaTeXskills.
- ✓ **MicroSoft | Professional Report Writing** My real-world experiences from internships and mentorship of Carlos equipped me with professional typesetting skills, like meeting agendas, minutes as well as Statement of Work.

English

- ✓ **Proficiency Tests | TOEFL - 111/120 | GRE 333/340**
- ✓ **Overseas Experiences** Lived in NY for 8 months and made a bunch of native friends who helped me get rather good at daily communication.

Team Working And Communicating

- ✓ **Responsibility** I managed to take leading roles in extracurricular activities, responsible for core decision-making and planning, which required me to be assertive and open at the same time.
- ✓ **Collaboration** My diverse experiences in research, internship, course projects, as well as in student associations required me to: 1) navigate my specific role in the team (assistant, mentee, or peer/teammate); 2) ask questions and listen; 3) share constructive and respectful feedback.

CERTIFICATIONS & AWARDS

- ✓ **Qualifications And Competitions**
  - CCF CSP-S 2nd Class (C++)
  - Brain Alphathon 2023 11th Place
  - *ACCA *(Passed 7 Out of 13)*
- ✓ **Scholarships**
  - Jiangsu Huihong Livestock High Scholarship
  - People's Scholarship
  - Guotai Life Scholarship
- ✓ **Others**
  - Piano *(professional level 10)*
  - Sketch *(professional level 8)*
  - Running: The 20th Jiangsu Provincial Games Women's Group 5KM Silver, 10KM Silver *(National 2nd Class Athletes Standard)*; Half-Marathon *(Personal Best 1:27:19)*

APPENDIX

Abbreviations

- ✓ NN: Neural Network
- ✓ ML: Machine Learning
- ✓ DS: Data Science
- ✓ NFEA: Nanjing University Financial Engineering Association
- ✓ VESC: Visiting And Exchange Student Council
- ✓ TCJCGLT: Tsinghua-CTG Joint Center for Climate Governance and Low-carbon Transformation
- ✓ CCF CSP-S: China Computer Federation Certified Software Professional-Senior

Citation(s)

[1] S. Campbell, Y. Chen, A. Shrivats, and S. Jaimungal, *Deep learning for principal-agent mean field games*, 2021. arXiv: 2110.01127 [cs.LG]. [Online]. Available: https://arxiv.org/abs/2110.01127.