

# KUAN YANG

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## EDUCATION

### Mathematical Institute, University of Oxford

Oxford, UK

MSc in Mathematical and Computational Finance

Sept. 2021 - Jul. 2022

- **Coursework:** Financial derivatives, Statistics and Financial data analysis, Asset pricing, Quantitative risk management, Fixed income, Market microstructure and Algorithmic trading, Deep learning, Financial computing with C++

### Cuiying Honors College, Lanzhou University

Lanzhou, China

BSc with Honors in Mathematics and Applied Mathematics

Sept. 2017 - Jun. 2021

- **GPA & Honors:** 91.63/100 (1/184), **Scholarship:** National Scholarship (<1%), University Merit (<1%)
- **Coursework:** Martingales, Markov processes, Brownian motion, Mathematical modelling and simulation, Measure theory, Probability theory, C & C++ programming, ODEs, Numerical analysis, Optimisation

### School of Mathematics, University of Leeds

Leeds, UK

Exchange, nominated by Ministry of Education and Lanzhou University with full scholarship and stipend

Sept. 2019 - Feb. 2020

- **GPA** 90.43/100, **Coursework:** Statistics, Python, R, Functional analysis, PDEs, Numerical methods

## INDUSTRIAL EXPERIENCE

### Trading Department, Tailong Bank

Shanghai, China

Quantitative Researcher, Market Modelling and Trading Strategy Developing for Bonds

Aug. 2021 - present

- **Model:** Based on Per-5-sec High frequency data, 6% more accurate, and 23% faster, compared to the XGBoost model, by
  - Non-parametric Random Forest model, returning binary data marking price up and down, instead of the actual value
  - Take Path Signature of stock price as predictors. Path Signature could compress stream of data, but reflect its critical dynamics
  - Embed the bond price with the issuer's stock price and extract the correlation between two assets by Signature method
- **Strategy:** Achieve an annual return of 22.7% and a max draw-down of 9.3% for 400 typically selected bonds, by
  - Incorporate short-term alpha to respond to sudden market fluctuations, and to avoid adverse selection risks
  - Model long-term reversion process by using historical data

## PROJECTS

### Study on stochastic and machine-learning modelling for application in physics Chun-Tsung Fellowship (<1%, 1st in competition)

Highest Grant, Value: GBP 4,000, Sponsored by Nobel Laureate Dr. Tsung-Dao Lee & Lanzhou University

Sept. 2018 - present

- Mathematical modelling study targeted at cross-disciplinary application; incorporated stochastic systems for physics mechanism
- Apply Markov random fields to simulate evolution of massive correlated particles and to reduce the memory usage for simulation
- Selected peer-reviewed papers & conference presentations
  - Modelling the RS Behavior in Titanium Oxide Based RRAM Device, (SCI Q1, IF: 3.9), First author (modelling), Minor revision
  - A Markov Random Field Simulation for Functional Information Storage, Plenary talk, 22nd. Chun - Tsung Annual Conference

### Signature method in analysis and prediction of stock markets

China Plateau Plan Innovative Project (Distinction)

Value: GBP 1,500 with 10,000 CPU hours, Sponsored by Lanzhou University

Dec. 2020 - Jun. 2021

- Extending predictions: 20% more accurate than Regression model when using produced predictions as the next training set
- Reduce reliance on timeliness: accuracy is over 68% when training set (12 mo data) has a time gap of 3 mo with test set
- Cross training and prediction: accuracy of 74% if data is trained on one stock but tested on a correlated one

### Analysis of dynamical systems: An Eigenvalue method from Spectral theory

Invited Project with Prof. Alex Strohmaier

Supported by School of Mathematics, University of Leeds

Jul. 2020 - present

- Use Eigen-features that are easy to compute to characterize complicated dynamical systems; method extends to stock markets
- Apply Finite Element method to solve and predict evolution of dynamical systems with singularities and special boundaries
- Conference presentation: Eigenvalue Problems on Manifold and Changes of Mesh, MESH Generation and Applications Symposium

### Mathematical Contest of Modelling: Optimal strategy to cross the desert

Led a team of 3, National Prize winner

Need to: Cross the desert in unknown weather, earn money by mining in desert to cover food cost, and maximize remaining money

- C++ based Dynamical Programming for route plan; prune for computational efficiency; transform the problem by Graph theory
- Use simulations to numerically solve the high-dimensional gaming problem, and compute the expected revenues

## LEADERSHIP & VOLUNTARY WORK

### Changzhou Regional COVID-19 Epidemic Prevention Headquarter

Voluntary Technician for Modelling

- Construct SIR based model; reduce error of R ratio from small samples; optimise COVID test workflow by operational research

### Quest on William Hotel Pty

Voluntary Analyst for Market Strategy and Revenue

- Design stochastic model to simulate market reactions; propose pricing strategy under COVID-19; win donation for my University

## INTEGRATED SKILLS

- Coding: Proficient: C/C++, Linux/UNIX,  $\text{\LaTeX}$ , Python, MATLAB; Intermediate: R, HTML, Markdown, Freefem++, CUDA
- Language: Chinese (Native in Mandarin and Shanghainese), English (Fluent, IELTS:8)