Zezhun Chen

Tel: +44 (0)7421138355 | Email: zezhun.chen@outlook.com

Education

2019 – 2023 (Expected) **PhD in Statistics, Department of Statistics, London School of Economics, UK**

- My research focuses on discrete stochastic processes, mainly in the cluster point processes.
- Collected the covid-19 data from different countries, implemented cluster point processes to fit the data in **R** and predicted the epidemic size and expected epidemic duration. (1st publication)
- Investigated the theoretical structures of the cluster point processes, proved that these cluster point processes are discrete versions of Integer-value Autoregressive Moving Average (INARMA) models. This would potentially facilitate the parameter estimation on these cluster point processes. (3rd publication)
- Developed and applied integer-value Autoregressive (INAR) models on financial count data, e.g. market order, insurance claims. (Other publications)
- All research projects involve **R** programming for data cleaning and analysis, model implementation, inference, and simulation.

2018 – 2019 **MSc (Distinction) in Quantitative Methods for Risk Management, London School of Economics, UK**

Relevant Courses: Computational Methods in Finance and Insurance (95%), Stochastic Process (91%), Applied Stochastic Processes (85%), Stochastic for Derivative Modelling, Machine learning and data mining

- Top in the programme and awarded 'The Rajendra Bhansali Prize for best overall performance'.
- **R** project on selected numerical methods to price various options: Dynamic programming approach for American put option and its barrier version, Crank-Nicholson scheme for digital option, Monte Carlo simulation for exchange option (with strike K >=0) and European Call under stochastic volatility models. Presented solution was thought highly of by lecturer. (Computational Methods in Finance and Insurance)
- Involved in Machine learning Group Project with a team of 4. Assigned the project tasks to team members.
    - Referred to the 'Coordinate Decent Algorithm' (CDA) for solving Lasso Regression, developed a different version of CDA solve Elastic-Net regression without using any existing R packages.
    - Scripted both algorithms using **R**, ran simulation under different scenarios, carried out comparison performance on Elastic-Net regression and Lasso regression. Concluded superiority of Elastic-Net under the condition of variable selection and prediction accuracy over Lasso regression in the case where the number of observations is far less than the number of predictors. (n << p)

2016 – 2018 **BSc (Hons) Actuarial Science (First Class Honours average 86%), Heriot-Watt University, UK**

Relevant Courses: Statistical Models (84%), Time series (87%), Optimisation (98%)

- Completed in two years on required courses to obtain exemptions CS1, CS2, CM1, CM2, CB1 and CB2 from Institute Faculty of Actuaries.
- Applied and selected to participate in the tuning program between Heriot-Watt University and Tianjin University of Finance and Economics.

2014 – 2016 **BSc Financial Statistics and Actuarial Science, Tianjin University of Finance and Economics, China**

- Top in class (average 95%) and awarded scholarship sponsored by government, China Scholarship Council. (CSC)

Experience

2020 – present **Graduate Teaching Assistant, London School of Economics, UK**

- **ST309 Elementary Data Analytics:** Conducted tutorial session on **R** essentials (data types, control flows, writing functions), statistical models and data manipulation and help students conduct their own analysis in R.

- **ST330 Stochastic and Actuarial Methods in Finance:** Conducted tutorial session on Utility Theory, Stochastic Dominance and portfolio selection, Mean-variance portfolio theory, Single and Multi-factors Model and the Capital Asset pricing Model and help student better understanding of subjects.
- **ST102 Elementary Statistical Theory**: Conducted tutorial session on probability theories, random variables, sampling distribution, estimation, hypothesis testing, linear regression, Analysis of Variance (ANOVA) and help student better understanding the statistics concepts.

2021 (Jan - March) **Off-Cycle Research Internship with Carbon Cap Management LLP, London, UK**

- Carried out empirical analysis on the daily Carbon Prices data from selective Carbon markets. (Europe, North American, New Zealand)
- Verified that the 'green' index constructed by extracting the fossil related companies out from the market index, provides little power in hedging the portfolio in Carbon market and reported to CEO.
- Constructed in house green index with reference to published literature, Brown minus Green (BMG) index, tackled identified issue and provided information to CEO on hedging the carbon market.

Extracurricular activities

2019 (June) **Financial Mathematics Team Challenge, UCL & Cape Town University, South Africa**

- Carried out empirical analysis on EURLIBOR daily Cap prices, computed the implied volatilities based on Log Normal and Normal model and identified that the implied volatilities would depend on underlying when there was an increment or decrement, so-called 'level dependence'.
- Reviewed literature and selected the Constant elasticity of variance (CEV) model that can potentially minimize 'level dependence' by tunning the elasticity parameters.
- Developed and implemented delta hedging algorithm in **R** and calibrated the elasticity parameter of CEV model.

2019 (April) **Practitioner challenge, Department of Statistics, London School of Economics, UK**

- Carried out empirical analysis on daily S&P500 (2006 - 2019) index and its corresponding VIX index. Implemented regime-switching model (Hidden Markov Model) in **R** and identified different Market regimes based on its fitted volatility values.
- Applied a simple investment strategy: long more indices in predicted low-risk regime and long more bonds in predicted high-risk regime. Compared the performance against benchmark, the buy and hold strategy (50% index and 50% bonds) under historical data as well as out of sample data, Sharpe ratio (1.32 vs 0.97).

Language and IT skills

- Languages: Chinese Mandarin (native), Cantonese (native in speaking), English (Professional working proficiency)
- IT skill: R, Python, Outlook, Word, Excel, Texmaker, TexStudio, Overleaf

Publications:

- Zezhun Chen, et al. "A two-phase dynamic contagion model for COVID-19." Results in Physics 26 (2021): 104264. https://doi.org/10.1016/j.rinp.2021.104264
- Zezhun Chen, Angelos Dassios, and George Tzougas. "A first-order binomial-mixed Poisson integer-valued autoregressive model with serially dependent innovations." Journal of Applied Statistics (2021): 1-18. https://doi.org/10.1080/02664763.2021.1993798
- Zezhun Chen, and Angelos Dassios. "Cluster point processes and Poisson thinning INARMA." Stochastic Processes and their Applications (2022). https://doi.org/10.1016/j.spa.2022.02.002
- Zezhun Chen, Angelos Dassios and George Tzougas "EM Estimation for the Bivariate Mixed Exponential Regression Model." Risks (2022). https://doi.org/10.3390/risks10050105
- Zezhun Chen, Angelos Dassios and George Tzougas "Multivariate mixed Poisson Generalized Inverse Gaussian INAR(1) regression" Computational Statistics (2022) Multivariate mixed Poisson Generalized Inverse Gaussian INAR(1) regression | SpringerLink