Junshen Mai

Webpage: https://ezz118.github.io/
Email: ezz118@connect.hku.hk Phone: +852 9670 9903

Research Interests

Bayesian Inference, Spatio-temporal Statistics, Machine Learning

Education

The University of Hong Kong (HKU) Sep 2022 – Present
BSc. in Statistics, minor in Mathematics and Computer Science **Cumulative GPA: 4.05 / 4.3**
Member of HKU Young Scientist Scheme **Major GPA: 4.13 / 4.3**

National University of Singapore (NUS) Jan 2025 – May 2025
Exchange Semester **GPA: 5.0 / 5.0**

Guangzhou No.2 High School Sep 2019 – Jun 2022
Olympiad in Informatics Team (C++, Algorithms, Graph Theory, Dynamic programming, Data structures, Combinatorics, Computational geometry etc.)

Research Experience

Mitacs Globalink Research Intern, UBC May 2025 – Present
Supervisor: Prof. Yankai Cao

- Reviewed literature on **diffusion model** and its different varieties and formulations
- Inspired by **ShiftDDPMs**, performed guidance on the forward process by the image category for image **counterfactual explanations** generation
- Controlling the semantic shift in the **latent space** with a designed loss function to fit into the **model-agnostic counterfactual explanations** settings

Research Assistant, NUS Feb 2025 – Present
Supervisor: Prof. Cheng Li

- Reviewed the-state-of-the-art methods to circumvent the high time complexity of matrix inverse in **Gaussian Process** model
- Developing a scalable tree-partitioned **Gaussian Process** model with approximation approach

Research Assistant, HKU Geography Apr 2023 – Jun 2023
Supervisor: Prof. Peter K. Koh

- Clusterred geographic areas with **Self-Organizing Map** by COVID-19 infection cases time series

- Reviewed different **spatial interpolation** methods. Performed interpolation with Python-controlled ArcGIS Pro
- Acknowledged in: *Tang, K.C. et al. (2025). Cities, 158, 105600.* DOI: 10.1016/j.cities.2024.105600

Industry Experience

Data Science Intern, Carnot Innovations Ltd. Jun 2024 – Aug 2024

- Optimized air-conditioning energy systems by chiller operation arrangement with a **greedy algorithm**
- Developed a chiller performance prediction model using **tree-boosting**.
- Transformed a data index matching problem into a **minimum-cost flow problem** during data cleaning process. Used the **Ford–Fulkerson algorithm** to complete the task.

Honors and Awards

- Ho Kam Chiu Lo Lai Ching Memorial Scholarship – Department of Statistics, HKU (2025)
- Dean's Honours List – Faculty of Science, HKU (2024)
- Dean's Honours List – Faculty of Science, HKU (2023)
- HKU Worldwide Undergraduate Exchange Scholarship (2023)
- First Prize – CCF Certified Software Professional (Senior Level), 2019

Coursework

- **Statistics:** Probability theory (STAT2601, self-learned STAT7610 and S. I. Resnick's *A probability path*), Statistical inference (STAT2602, STAT3602), Time series analysis (STAT4601), Bayesian statistics (NUS ST4234), Stochastic process (self-learned, following NUS EE5137)
- **Mathematics:** Linear algebra (MATH2101), Multivariable calculus (MATH2211), Discrete mathematics (COMP2121), Real analysis (self-learned, following MATH7505), Functional analysis (self-learned, following MATH4404)
- **Computer Science:** Algorithm and data structure (COMP2119), Machine learning (STAT3612, NUS ST4248), Database management systems (COMP3278)

Courses to be taken in my final year: Nonparametric statistics (STAT3620), Survival analysis (STAT3655), Multivariate data analysis (STAT4602), Differential equations (MATH3405)

Skills

Languages: Cantonese (native), Mandarin (native), English (advanced, IELTS 8)
Programming and software: Python, C++, R, JavaScript, LaTeX, SQL, ArcGIS Pro