Zhonglin Liu

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 Liu-Zhonglin (Joe)

EDUCATION

• **The University of Hong Kong** *Sept 2022 - Aug 2026 (Expected)*
Bachelor of Science, major in Mathematics and Economics Hong Kong SAR, China
  ◦ Young Scientist Scheme (YSS): An elite program offering early research training, mentorship, and international research opportunities for outstanding science students.
  ◦ Cumulative GPA: 3.88 / 4.3

• **National University of Singapore** *Jan 2025 - May 2025*
HKU Worldwide Undergraduate Student Exchange Programme Singapore
  ◦ Semester GPA: 4.9 / 5.0

RESEARCH INTERESTS

• Modelling of Complex Systems, Operations Research, Computational Biology, Decision Making under Uncertainty, Applied Artificial Intelligence.

RESEARCH EXPERIENCE

• **Mechanism Design for Rewarding User Data Generation for Improving LLMs** 2025
Supervisor: Dr. Hong Ming Tan & Prof. Jussi Keppo (NUS)
Proposed a mechanism design framework for incentivizing high-quality LLM feedback. Characterized optimal reward–penalty and verification strategies, validated through simulations revealing penalty dominance and an inverted-U relation between user quality and platform profit.

• **A PBN-RL-XAI Framework for Therapeutic Discovery in Melanoma** 2025
Independent Research
Developed an integrated PBN-RL-XAI framework to discover therapeutic strategies for immunotherapy-resistant melanoma, identifying a novel 'hit-and-run' inhibition therapy. [⊕]

• **Inferring Progressive Disconnection in Alzheimer's Disease with PBNs** 2025
Supervisor: Prof. Zhang Louxin (NUS) & Prof. Ching Wai Ki (HKU)
Developed a novel Probabilistic Boolean Network (PBN) framework to model effective connectivity in fMRI data, identifying a progressive disconnection of DMN-to-MTL pathways in Alzheimer's disease. [⊕]

• **A Comparative Study of Algorithms for the Travelling Salesman Problem** 2024 - 2025
Supervisor: Prof. Zang Wenan (HKU)
Compared classical heuristics against hybrid reinforcement learning models for the Euclidean TSP, demonstrating that an Actor-Critic agent integrated with classical methods achieves competitive performance. [⌂]

• **Machine Learning Methods in Prediction of Online Portfolio Selection Problems** 2023 - 2024
Supervisor: Prof. Ching Wai Ki (HKU)
This project investigated the integration of machine learning models, specifically LSTM and XGBoost, to predict asset prices for Online Portfolio Selection strategies. [⊕]

PUBLICATIONS AND MANUSCRIPTS

[1] Liu, Z. (2025). **A PBN-RL-XAI Framework for Discovering a "Hit-and-Run" Therapeutic Strategy in Melanoma**. arXiv preprint arXiv:2507.10136. Accepted by the IEEE International Conference on Bioinformatics and Biomedicine (BIBM).

[2] Liu, Z., Zhang, L., & Ching, W. K. (2025). **Inferring Progressive Disconnection in Alzheimer's Disease with Probabilistic Boolean Networks**. To be published in the *Proceedings of the 2025 International Conference on Bioinformatics and Bioengineering (ICBBE)*. DOI: https://doi.org/10.1101/2025.07.10.664143

[3] Liu, Z., Zhao, Y., Lyu, B., & Ching, W.-K. (2025). **Integrating Machine Learning Methods for the Prediction in Online Portfolio Selection Problems**. In *Proceedings of the International Conference on Applied Research in Business, Management and Economics, Vol. 2*, pp. 17-28. Diamond Scientific Publishing. DOI: 10.33422/bmeconf.v2i1.1015.

[4] Liu, Z. (2024). **A Comparative Study of Classical and Reinforcement Learning Algorithms for the Travelling Salesman Problem**. Unpublished capstone project report.

WORK/PROJECT EXPERIENCE

- **Enhancing Mathematical Understanding via Manim [🌐] [🔗]** *2022 - Present*
  Team Leader & Main Producer Hong Kong
  - Utilized Manim to create animated educational videos illustrating mathematical concepts. In charge of managing workflows and distributing tasks.
  - Served as the main producer for videos that were broadcast across the HKU campus via U-Vision, enhancing mathematical understanding for the university community. Example of my work: Maths in a minute – 2025 - A very mathematical year.

- **Bank of China, Dongying Sub-branch** *Aug – Sep 2024*
  Lobby Manager Assistant Intern Dongying, China
  - Supported daily branch operations and client services, earning commendation for adaptability and a proactive work ethic.

- **Department of Mathematics, The University of Hong Kong** *Oct 2023 - Dec 2023; Feb 2024 - May 2024*
  Student Teaching Assistant Hong Kong
  - Assisted in teaching fundamental concepts of mathematics and multivariable calculus, conducting revision classes to improve student performance.
  - Developed video tutorials using Manim to visually simplify and explain complex mathematical concepts.

- **Essence Brilliant Limited** *August 2023*
  Education Content Developer Hong Kong
  - Created dynamic educational videos using Python and Manim to explain complex topics.
  - Managed team task distribution and facilitated communication between internal and external stakeholders.

HONORS AND AWARDS

- **Undergraduate Research Fellowship Programme with Research Internship Awards** *2025 - 2026*
  The University of Hong Kong [🌐]
- **Wong Yung Chow Prize in Mathematics** *2024 - 2025*
  The University of Hong Kong [🌐]
  - Awarded to the best 3rd year student in Mathematics, on the recommendation of the Head of Mathematics.

- **Hong Kong Chiu Chow Chamber of Commerce Rayson Huang Memorial Student Enrichment Award** *2024 - 2025*
  The University of Hong Kong [🌐]
- **HKU Recognition Award for Distinguished Service to the Community** *2024 - 2025*
  The University of Hong Kong [🌐]
  - Awarded for the "Enhancing Mathematical Understanding: A Students as Partners (SAP) Project in Animation and Engagement" group project, which enhanced mathematical understanding through animated videos made using Manim.

- **C.V. Starr Scholarships** *2024 - 2025*
  The University of Hong Kong [🌐]
- **Summer Research Fellowship** *2023 - 2024*
  The University of Hong Kong [🌐]
- **Dean's Honours List** *2022 - 2023, 2023 - 2024, 2024 - 2025*
  The University of Hong Kong

EXTRACURRICULAR

- **Lead for Life Character Leadership Programme** *2022 - 2025*
  The University of Hong Kong [🌐]
  - A multi-year programme focused on character leadership, mentorship, and service-learning. Participated in workshops on resilience and mindset, and completed a service project with the Mission for Migrant Workers.

- **Volunteer** *2023 – Present*
  Mission for Migrant Workers (MFMW) [🌐]
  - Organized and supported community events, including charity raffles and free health service initiatives for migrant workers in Hong Kong. You may click the link on the right to view my sharing under my preferred name, Joe.

ADDITIONAL INFORMATION

Languages: Native Mandarin; Fluent English (TOEFL 112/120)
Interests: Teaching, Photography, Fitness, NBA