Zecheng (Aaron) Qiu

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Personal Website | Google Scholar | ORCID | GitHub

RESEARCH INTERESTS

Natural Language Processing (NLP), Multi-Agent Systems, Text-to-SQL / Text-to-Visualization, Trajectory Data Analysis, Data Visualization.

EDUCATION

Macau University of Science and Technology (M.U.S.T.) Macao S.A.R.
Bachelor of Science in Computer Science *Sep. 2023 – Aug. 2027 (Expected)*

- **CGPA:** 3.74 / 4.00 | **2024-2025 GPA:** 3.85 / 4.00 (Rank: 14/429)
- **Honors:** Dean's Honor List (2024-2025); Entrance Scholarship (Outstanding Category).

PUBLICATIONS

- **Z. Qiu**, V. J. Wei, C. J. Zhang, H. Yang, R. C.-W. Wong, Y. Song, "Text2TrajVis *(Title omitted during review)*", *Submitted to a top-tier conference*. (Under Review)
- **Z. Qiu**, Y. Wu, J. Yang. "Phase-field modeling and simulation of two- and three-dimensional curvature-dependent tissue growth on surfaces." *Submitted to Physica D: Nonlinear Phenomena*. (Under Review, JCR Q1 Top 10%) [Paper] [Code]
- Y. Wu, **Z. Qiu**, J. Yang. "A three-dimensional multi-phase-field vesicles model and its practical finite difference solver." *Computer Physics Communications (CPC)* 321 (2026) 110053. (JCR Q1 Top 10%) [Paper] [Code]

RESEARCH EXPERIENCE

Research Group of Prof. Victor Junqiu Wei M.U.S.T.
Research Assistant *Mar. 2025 – Present*

- **Conversational Text-to-Trajectory Visualization (Text2Traj).**
  - Developed a dialogue-centric visualization system on **PostgreSQL** and **PostGIS**, integrating Text-to-SQL paradigms to process complex spatio-temporal queries.
  - Implemented an **LLM-based semantic reasoning layer** to autonomously detect and resolve query ambiguities (e.g., spatial granularity conflicts, underspecified visualization types) and identify unanswerable requests.
  - Constructed a large-scale benchmark dataset containing adversarial examples to evaluate the robustness of Large Language Models in handling spatial constraints and administrative boundary logic.

PF-CFD Team (Prof. Junxiang Yang) M.U.S.T.
Research Assistant *Feb. 2024 – Present*

- **3D Phase-Field Simulation for Tissue Growth**
  - Developed a proprietary **C++** simulation framework from the ground up, implementing a novel **Implicit ADI scheme** to overcome the stability bottlenecks of traditional explicit methods.
  - Achieved **second-order temporal accuracy**, enabling **high-fidelity** long-term simulations that were previously infeasible.
  - Extended the theoretical model from 2D surfaces to **3D volumetric geometries**, enabling precise prediction of tissue evolution in realistic porous structures.
- **Multi-Phase-Field Vesicle Simulation**
  - Implemented a hybrid numerical solver for 3D fluid vesicle dynamics in **C++**, integrating phase-field models into an existing simulation framework.
  - Applied a semi-implicit finite difference scheme to evolve phase-field equations, ensuring rigorous numerical stability and energy conservation.
  - Optimized memory management and data storage strategies, significantly reducing computational overhead for multi-vesicle interaction simulations.

INTERNSHIP EXPERIENCE

CoCreative Information Technology Co., Ltd. Shenyang, China
Java Software Engineer *Jun. 2025 – Aug. 2025*

- Assisted in the development and maintenance of software modules and web applications using **Java** and **JavaWeb** technologies.
- Wrote and refined **SQL** queries for data extraction and supported senior developers in basic database performance tuning.
- Collaborated with the engineering team to conduct bug fixing and feature testing, gaining practical experience in standard software development workflows.

ACADEMIC SERVICES

- **Review Service under Prof. Victor Junqiu Wei**
  - External Reviewer, Conference on Language Modeling (COLM) 2026
  - Secondary Reviewer, ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) 2026
  - External Reviewer, IEEE International Conference on Data Engineering (ICDE) 2026
- **FIE Ambassador**, Hong Kong Institution of Engineers (HKIE) Accreditation Interview.
  - Served as one of the student representatives during the HKIE accreditation interview to support the validation of the BSc in Computer Science program.

TECHNICAL SKILLS

- **Languages:** C/C++ (High Proficiency), Python, SQL (PostgreSQL), Java, LaTeX.
- **Technologies:** PyTorch, PostGIS, MATLAB, Linux, Git, Docker.
- **English:** IELTS 7.0 (Professional Working Proficiency).

EXTRACURRICULAR COURSES

The University of Hong Kong (HKU) Summer Institute Hong Kong S.A.R.
Course: AI Engineer: Gen-AI and Virtual Worlds *Jul. 2024*