Chonghao Qiu

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Pittsburgh, PA | Department of Computer Science | University of Pittsburgh

BIOGRAPHY

I am currently a second-year master's student in the Department of Computer Science at the University of Pittsburgh, advised by Prof. Xiaowei Jia. Prior to that, I got my B.S. from the National Taipei University of Technology(NTUT). My research interests lie in the fields of data mining and machine learning.
Currently applying for PhD programs for Fall 2025

EDUCATION

• **University of Pittsburgh**   *Aug 2023 - May 2025*
Master of Science in Computer Science   Pittsburgh, US

  - GPA: 3.80/4.00

  - Supervisor: Prof. Xiaowei Jia and Dr. Runlong Yu

• **National Taipei University of Technology**   *Sep 2019 - Jun-2023*
Bachelor of Science in Electronic Engineering   Taipei, Taiwan

  - GPA: 3.91/4.00

  - Dean's List Award for Fall 2019, Fall 2020, Spring 2021, and Spring 2022(Ranked in the top 1%)

  - Outstanding Graduate Award 2023(Top 1 in class)

  - Supervisor: Prof. Lih-Jen Kau

PUBLICATIONS

[1] **In Submission**: Runlong Yu, **Chonghao Qiu**(**first** student author), Robert Ladwig, Paul Hanson, Yiqun Xie, Xiaowei Jia (2024).
Physics-Guided Foundation Model for Scientific Discovery: An Application to Aquatic Science

[2] Runlong Yu, **Chonghao Qiu**(**first** student author), Robert Ladwig, Paul Hanson, Yiqun Xie, Yanhua Li, and Xiaowei Jia (2024).
Adaptive Process-Guided Learning: An Application in Predicting Lake DO Concentrations
ICDM 2024, Abu Dhabi, December 2024

[3] Tao Chen, Yongjie Yang, **Chonghao Qiu**, Xiaoran Fan, Xiuzhen Guo, Longfei Shangguan (2024).
Enabling Hands-Free Voice Assistant Activation on Earphoness.
MobiSys 2024 , Tokyo, Japan, June 2024

PROFESSIONAL EXPERIENCE

• **Research Assistant - University of Pittsburgh**   *Jun2024 - present*
Advisor: Prof. Xiaowei Jia and Dr. Runlong Yu   Pittsburgh, US
  ◦ Building algorithms for integrating physics-guided relation into machine learning and deep learning models for simulating dynamical systems.

• **Research Assistant - University of Pittsburgh**   *Jan2024 - June2024*
Advisor: Prof. Longfei Shangguan   Pittsburgh, US
  ◦ Worked on the software and hardware development of earable mobile devices related to health applications.

• **National Taipei University of Technology**   *May 2022 - Feb 2023*
Advisor: Prof. Lih-Jen Kau   Taipei, Taiwan
  ◦ Developed a smart mouse that can measure physiological parameters such as body temperature and heart rate

• **China United Network Communications Group Co., Ltd., Zhejiang, China**   *Jul 2021 - Aug 2021*
Software Engineering Intern   Zhejiang, China
  ◦ Composed APIs and conducted corresponding online unit testing. Developed and maintained the user management system of the security center and the backend management platform for streaming

Selected Projects

- **Physics-Guided Foundation Model for Scientific Discovery: An Application to Aquatic Science** *May2024 - Aug2024*
  Index Terms: foundation model, feature interaction, physics-guided learning, knowledge integration, ecosystem modeling
  - Proposed a Physics-Guided Foundation Model (PGFM) that combines pre-trained ML models and physics-based models and leverages their complementary strengths to improve the modeling of multiple coupled processes.
  - To effectively conduct pre-training, we construct a simulated environmental system that encompasses a wide range of influencing features and various simulated variables generated by physics-based models. The model is pre-trained in this system to adaptively select important **feature interactions** guided by multi-task objectives.
  - To facilitate the process of feature interactions, we use an embedding layer to convert input phenological features into a series of multifield feature embeddings. Using these embeddings, the aim of evolution-based feature selection can be formally described as identifying the most informative feature interactions to improve the prediction of target objectives.

- **Adaptive Process-Guided Learning: An Application in Predicting Lake DO Concentrations** *Jan2024 - June2024*
  Index Terms: physics-guided learning, knowledge integration, adaptive learning, ecosystem modeling [🔗]
  - Proposed a Process-Guided Learning (Pril) framework that integrates physical models with recurrent neural networks (RNNs) to enhance the prediction of dissolved oxygen (DO) concentrations in lakes, which is crucial for sustaining water quality and ecosystem health.
  - Developed a physics-based loss function incorporating daily oxygen mass variance for both well-mixed and stratified conditions of the lake, leveraging domain expertise in aquatic ecosystem dynamics.
  - Propose a generator-discriminator framework with adaptive timestep adjustments to address large day-to-day fluctuations in stratified conditions. The generator captures rapid variations, while the discriminator ensures predictions align with physical characteristics, improving stability and accuracy

- **Enabling Hands-Free Voice Assistant Activation on Earphones** *Aug2023 - April2024*
  Index Terms: ubiquitous and mobile devices, emerging technologies.
  - Designed and implemented EarVoice, a lightweight mobile service that enables hands-free voice assistant activation on commodity earphones.
  - Designed and conducted extensive experiments with 23 participants in both controlled and uncontrolled scenarios.
  - Developed firmware for a 4-layer PCB using the low-power ESP32 MCU, achieving low power consumption and high-speed performance to meet design requirements

- **Physiological Monitoring Intelligent Computer Mouse** *May2022 - Sep2022*
  Index Terms: mobile devices, embedded system, health. [▶]
  - Developed a smart mouse that can measure physiological parameters such as body temperature and heart rate.
  - Developed a sensor board equipped with: MAX30205, BME280, and MAXM81616. Sensors are responsible for retrieving raw physiological parameters and communicating with the main board via the I2C protocol.
  - Conducted filtering and standardization on the original Photoplethysmography (PPG) signal with Butterworth IIR filter, Moving Average, and sButterworth to calculate SpO2 and heart rate.
  - Developed its supporting Windows desktop software system using Windows Presentation Foundation (WPF).

Skills

- **Programming Languages:** Python, JavaSE, C, C#, SQL, MATLAB, JavaScript
- **Tools:** Pytorch, TensorFlow, Linux, AWS, Keil5, SpringBoot, Windows Presentation Foundation, Vue.js, Git

Additional Information

- **Volunteer Work:** I am a registered volunteer in Taipei city, teaching primary and secondary school students basic subjects, organizing companionship activities for left-behind children, and providing services at elderly care centers in community welfare organizations
- **Relevant courses** Principles of data mining, Advanced Topics in AI: AI for Social Good, Foundations of artificial intelligence, Introduction to natural language processing, Algorithm design, Compiler design, Wide area networks