

Ruoxi Zhao

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Education

University of California, Riverside
Riverside, CA

September 2023 - Present

- **Ph.D. in Mathematics** (In Progress), current GPA: 3.63/4.0
- **Master of Science in Applied Mathematics**, awarded in June 2025, GPA: 3.61/4.0

University of California, Merced
Merced, CA

August 2019 - May 2023

Bachelor of Science in Applied Mathematical Sciences, emphasis in Computational and Data Science, minoring in Management Business and Economics (MBE), GPA: 3.80/4.0

- Chancellor's Honor List (Spring 2020-2023)
- Outstanding Graduating Student in Applied Mathematics, 2023

Research Experience

Graduate Research Assistant

April 2025 – Present

University of California, Riverside

Riverside, CA

- Developed AI agents integrating QuantLib and OpenBB for automated financial data analysis and quantitative modeling
- Implemented iterative control loops enabling GPT API interaction with user input, including tool-calling functions for file read/write, Python execution, and code editing
- Automated financial modeling workflows by connecting real-time data sources with quantitative libraries, and actively extending the agent framework toward reinforcement learning-based decision-making and adaptive strategy optimization

Research Assistant

June 2024 – September 2024

Lawrence Berkeley National Laboratory, Mathematics Department

Berkeley, CA

- Analyzed and preprocessed heterogeneous X-Ray Diffraction (XRD) datasets to enable quantitative materials optimization
- Developed objective functions and evaluated synthesis outcomes using statistical metrics
- Applied correlation analysis to identify key factors in material discovery
- Automated data processing and analysis workflows using Python and Pandas

Research Assistant

June 2023 – September 2023

Argonne National Laboratory

Lemont, IL

- Surgical tool localization and detection in robotic surgery based on frames of endoscopic videos
- Utilized Segment Anything Model (SAM) to detect and localize surgical tools with text and box prompts
- Worked with various data types such as COCO and JSON and training with YOLO v8 model
- Presented research poster at the Argonne Lab's Learning on the Lawn event in-person
- Team ANL-Surg finished third place in 2023 MICCAI SrugToolLoc challenge

Research Assistant

September 2022 – May 2023

University of California, Merced

Merced, CA

- Quantifying how the transcription factor binding kinetics depend on sequence
- Using statistical methods and building data frames and dictionaries to learn how the binding kinetics depend on sequence
- K-mer analysis of the subsequences in different datasets

Research Internship

June 2022 – August 2022

Lawrence Berkeley National Laboratory, Joint Genome Institute

Berkeley, CA

- Integrate the single-cell dataset and spatial dataset using Tangram and PyTorch in Python
- Predict the cell type locations in spatial voxels
- Cell segmentation using Cellpose and image classification toolkits in Scikit-image
- Present final presentation to scientists at the Berkeley Lab during the final symposium

Data Science Challenge

May 2022 – June 2022

Lawrence Livermore National Laboratory

Livermore, CA

- Learned how to import and process 2D and 3D datasets (hfd5) using Pandas and NumPy
- Building binary classifications of test compounds with molecular descriptors and 3D atomic representations to find antivirals against COVID-19
- Explored and experimented with different machine learning classifiers in scikit-learn, 3D voxelization, and 3D Convolutional Neural Networks with PyTorch
- Presented results to LLNL scientists and UC Merced faculty during the final student briefing

Data Science Challenge

May 2021 – June 2021

Lawrence Livermore National Laboratory

Livermore, CA

- Work with scientists to solve problems in astronomy for planetary defense
- Use image classifiers to differentiate stars from galaxies, report accuracy with ROC curve
- Experienced PyTorch to capture asteroids in the sky with data from Palomar Observatory
- Added noise to the background to increase the predicted accuracy in capturing asteroids
- Participate in research and challenge problem evaluation discussions
- Present results to scientists, engineers, and technical staff during final student briefing

Professional Experiences:

Teaching Assistant

September 2023 - Present

Mathematics Department, UC Riverside

Riverside, CA

- Assisted instruction for undergraduate courses including precalculus, calculus, discrete mathematics, differential equations, and linear algebra
- Led discussion sections and office hours to support students' understanding of math
- Graded assignments and exams, provided constructive feedback to enhance learning outcomes

Data Science Consultant

September 2023 - January 2024

Graduate Quantitative Methods Center (GradQuant) at UC Riverside

Riverside, CA

- Led workshop on data science fundamentals, enhancing the quantitative skills of UCR graduate students and postdoctoral scholars.
- Provided tailored coding assistance and quantitative analysis support through 20- and 50-minute one-on-one remote consultations.
- Advocated for ethical data management practices and adapted instructional methods to diverse learner needs within the graduate community.

Skills

- Python - proficient, MATLAB, R - moderate
- Machine Learning techniques (classifiers, CNN, computer vision, image segmentation, object detection)
- Libraries: PyTorch, NumPy, Pandas, Matplotlib, YOLOv8, SAM
- Chinese (proficient in speaking, reading, and writing)

Conference

Southern California Applied Mathematics Symposium (SOCAMS) at UC Riverside

April, 2025

Riverside, CA

- Presented poster *Optimization Formulations for Self-Driving Inorganic Materials Design*

SIAM Conference on Mathematics of Data Science (MDS24)

September, 2024

Atlanta, GA

- Presented poster *AI Foundation Models for Surgical Tool Localization*

14th annual World Congress of Robotic Surgery held by the Clinical Robotic Surgery Association

September, 2023

Chicago, IL

- Presented poster *AI Foundation Models for Surgical Tool Localization*

SIAM Conference on Mathematics of Data Science (MDS22)

September, 2022

San Diego, CA

- Presented poster *Integrating Single Cell data with Spatial Transcriptomics using machine learning*

Women in Data Science (WiDS)

March, 2020

Livermore, CA