Tairan Song

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Education

Michigan State University, East Lansing, MI, USA   Aug 2023 – Present
Ph.D. Student in Computational Mathematics, Science and Engineering
Advisor: Dr. Adam Alessio

King's College London, London, United Kingdom   Sep 2021 – Sep 2022
M.Sc. in Applied Statistical Modelling & Health Informatics
Advisors: Dr. Ioannis Bakolis, Dr. Amy Ronaldson; **Graduated with Distinction**

University of Liverpool, Liverpool, United Kingdom   Sep 2018 – Jun 2021
B.Sc. in Mathematics and Statistics; **Second Class Honours (Upper Division)**

Publications

Zhang, T., Jia, H., **Song, T.**, Lv, L., Gulhan, D. C., Wang, H., . . . & Shen, N. (2023). De novo identification of expressed cancer somatic mutations from single-cell RNA sequencing data. *Genome Medicine*, 15(1), 115.

Conference Submissions

Song, T., Noyes, S. L., Muterspaugh, R., Munavar Ali, M. A., Zhou, S., Tobert, C., Lane, B. R., Lim, E., Alessio, A. *Predicting Kidney Cancer Grade from Highly Variable Contrast Timing CT*. Submitted to SIIM 2026, under review.

Research Experience

Kidney Cancer Grade from Highly Variable Contrast Timing CT
Advisor: Dr. Adam Alessio   Michigan State University   Jan 2025 – Dec 2025

- Developed a radiomics-based modeling framework for renal mass grading from heterogeneous abdominal CT with highly variable contrast timing, addressing protocol-induced intensity shifts beyond phase-specific imaging pipelines.

- Designed a reference-region–aware feature representation that augments tumor radiomics with quantitative descriptors from surrounding anatomical regions (normal kidney, aorta, inferior vena cava), enabling contrast-timing–robust classification without explicit phase normalization or labeling.

- Implemented and evaluated an end-to-end pipeline including automatic multi-organ segmentation (nnU-Net, TotalSegmentator), high-dimensional radiomics extraction, supervised feature reduction, and cross-validated classification, demonstrating consistent performance gains over tumor-only models for multi-class and binary grading tasks.

De Novo Identification of Expressed Cancer Somatic Mutations from scRNA Sequencing Data
Advisor: Dr. Ning Shen   Zhejiang University   Sep 2022 – Mar 2023

- Contributed to the development and evaluation of the RESA (Recurrently Expressed SNV Analysis) computational framework for high-precision de novo identification of expressed somatic mutations from scRNA-seq data, which consistently outperforms existing methods across multiple benchmark

datasets.

- Implemented and validated the joint logistic regression component (RESA-jLR) within the RESA pipeline to expand the pool of detectable somatic variants and improve mutation calling performance.

- Performed extensive data preprocessing, mutation calling workflows, and empirical performance evaluation, and generated publication-ready figures supporting sensitivity and precision benchmarking against other methods reported in the study.

Teaching Experience

Teaching Assistant   Michigan State University   Jan 2025 – May 2025

- CMSE 202: Computational Modeling and Data Analysis II

Professional Experience

Research Assistant   Zhejiang University   Sep 2022 – Mar 2023

- Contributed to the RESA project for de novo identification of expressed somatic mutations from single-cell RNA sequencing data, supporting sequencing data analysis and model validation efforts.

- Provided sequencing data analysis support for collaborative mouse studies, including single-cell RNA sequencing and bulk RNA-seq experiments.

Awards

NSF NRT-IMPACTS Fellowship   Michigan State University   Awarded Sep 2023
One-semester fellowship funded by the National Science Foundation Research Traineeship Program (NSF DGE-1828149).

Skills

Programming: Python, R, SQL
ML & AI: Scikit-learn, PyTorch, TensorFlow, NLP, Transformers
MLOps & Systems: SLURM, Git, High Performance Computing, CI/CD
Research: Statistical Analysis, Translational Science, Interdisciplinary Research, Biomedical Image Analysis