Zhuosheng Liu

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*June 2025 graduate seeking internship/full-time opportunities in ML & AI (**Pending 485**)*

Experience

Information Fusion and Mining Lab, *Graduate Research Assistant co-advised by Dr. Jiawei Zhang*   *May 2023 - Now*
- Developed and optimized **classic machine learning and deep learning** models for microbial pangenome, achieving rapid and accurate pathogenicity assessment of pathogenic bacteria.
- Drove advanced solutions and compared different **parameter efficient-fine-tuning** methods for **vision language model**.

Data-intensive Biology Lab: *Graduate Research Assistant co-advised by Dr. Titus Brown*   *March 2021 - Now*
- Conducted and analyzed large-scale transcriptomics data of microbial-system by building **high-throughput and fully automatic bioinformatics pipelines**
- Organized and maintained large scientific projects on **High Performance Computer** over the cloud and kept **git version control** up-to-date

Food Microbiology Lab: *Graduate Research Assistant advised by Dr. Luxin Wang*   *June 2020 - Now*
- Conducted experiments using both culture-dependent and **next-generation sequencing biotechnology** to characterize fitness and behaviors of pathogenic foodborne pathogens

UC Davis FST, MIC and ECS department *Graduate Teaching Assistant*   *June 2020 - Now*
- **Graduate tutor for ECS 122A algorithm analysis and design**, holding two hours office hours/week to answer undergraduate questions regarding course material
- **Graduate TA for MIC 103L and FST 104L**, teaching students in microbiology lab practice and guiding students in journal club

Education

3.97/4.0	**PhD. in Food Science**, *UC Davis* | California, USA	*2020-25*
3.93/4.0	**Master's degree in Computer Science**, *UC Davis* | California, USA	*2023-25*
3.84/4.0	**Master's degree in Biotechnology**, *Columbia University* | New York, USA	*2019-20*

Research Focus: Food Microbiology | Microbial Genomics & Transcriptomics | Applied Bioinformatics | Applied ML/AI
International Publications: Microbiology Spectrum(**IF9.1**) | Food Research International (**IF8.1**) | Food Control (**IF6.1**) | LWT (**IF6.0**) | CVPR 2024 (Submitted) | PNAS (ready to submit)
Courses: ECS 271 **Advanced Machine Learning (A+)** | ECS **174 Computer Vision (A)** | ECS 122A **Algorithm Analysis and Design (A)** | ECS 124 Bioinformatics Theory and Practice (A) | STA 141 Advanced Statistical Computing A-B-C (A) | ECS 201A Computer Architecture

Skills

Programming	Python (NumPy, SciPy, pandas, Matlotlib, Jupyter), C/C++, Java, Perl, R, CUDA, CMake, Git, Bash Scripting, LaTeX
Software	Linux, Tensorflow, Pytorch, OpenCV, Snakemake, scikit-learn,
Bioinformatic skills	Automatic workflow construct using Snakemake, 16s rRNA-sequencing analysis, RNA-sequencing analysis, Whole-genome sequencing analysis, Pangenome construction and analysis

Projects

Virulence prediction of pathogenic foodborne pathogens using ML/DL based on Pangenome   *June 2023 - Now*
Manuscript in preparation
- Constructed pangenome (100,000 unique gene feature) using **fully integrated and scalable bioinformatics pipeline** (automation achieved using Snakemake)
- Visualized high-dimensional pangenomic gene feature using **dimensional reduction PCA**
- Trained, optimized, validated and statistically compared fundamental **unsupervised and supervised machine learning model** performance, including **Kmean, GMM, KNN, SVM, RF, Naive Baye**
- Trained and validated **deep neural network (MLP and CNN)** and achieved 93% virulence prediction accuracy

Parameter-Efficient Fine-Tuning for Vision-Language Models   *June 2023 - Now*
Preliminary report available at *Here*
- Conducted an extensive study on the application of **Parameter-Efficient Fine-Tuning** (PEFT) methods to vision-language models, particularly focusing on the **CLIP** .
- Conducted comprehensive empirical analysis across various datasets, such as VTAB-1K, to understand the adaptability and effectiveness of PEFT methods in different scenarios.
- Investigated the effectiveness of **prompt engineering** and **adapter technique such as LoRA** in improving model performance
- Implemented and optimized various hyperparameters through **systematic grid search** methods to ascertain the most effective settings for the models.
- Demonstrated the potential of PEFT in vision-language models through empirical studies, highlighting the need for enhanced approaches in complex multimodal scenarios.

Transcriptomic analysis of pathogenic *Vibrio parahaemolyticus*   *June 2021 - June 2023*
Paper has been accepted and published in Microbiology Specterum *Here*
- Obtained biological insights of *Vibrio parahaemolyticus* using **RNA-seq data analysis** (genome reference-free Salmon pipeline)
- Python-oriented web-script extracting essential information gene annotation from **JSON**-based KEGG database
- Conducted **statistical differential expression gene analysis** over 4000 unique genes using Deseq2