Elaine Zhu

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EDUCATION

University of California, Irvine 2023 - current
Bachelor of Science, Computer Science Cumulative GPA: 3.67
Skills: Python | C++ | Software Architecture | Java | JavaScript | HTML | R | Object-Oriented Design | Data Structures | Algorithms | MySQL | CSS | Node.js | API | Databases | Pytorch | Data Analysis | Machine Learning | React | Tailwind CSS | Flask | MongoDB | Website Development | Fullstack Development | Database Design | Vite | Docker | Git
Honors: Honoree of Valedictorian | National Charity League Scholarship Recipient | Mary Ellen Balmer Scholarship Recipient

PROFESSIONAL EXPERIENCE

Exozymes | Bioinformatics Intern June 2024 - Present
Database Development for Enzyme Engineering (ThermoDB):
- Developed a protein sequence database containing >1000 thermophiles to investigate molecular determinants of heat tolerance.
- Queried sequences with BLAST and aligned them with MAFFT to identify conserved residues linked to thermostability.
- Annotated conserved positions using BLOSUM scoring, generating >5000 candidate residue modifications for enhanced heat tolerance.
- Predicted structural and functional impacts of modifications in silico, and validated top candidates experimentally in the lab, leading to identification of promising protein variants with improved thermal resistance.

Computational Tools Development (MERN Stack):
- Designed and implemented an internal computational platform to modernize access to a Python-based bioinformatics script.
- Built a full-stack web application (MongoDB, Express, React, Node.js) with a responsive React/Tailwind CSS front end to improve usability for colleagues.
- Engineered a secure file management system with RESTful APIs and MongoDB, enabling private uploads to a local server and ensuring data integrity.
- Delivered a streamlined, user-friendly platform that significantly improved accessibility, efficiency, and data security for internal teams.

Machine Learning for Protein Stability (ESM2 Finetuning):
- Curated, cleaned, and rebalanced protein sequence datasets to reduce bias in underrepresented conditions.
- Finetuned the ESM2 protein language model to predict activity scores after 20/30/75 min heat treatments.
- Achieved >97% prediction accuracy for the 20-min condition and improved generalization on unseen data from 33% to 37%.
- Demonstrated the potential of transformer-based models for practical protein engineering applications.

Code Path | Tech Fellow – Algorithms & Interview Prep June, 2024 - Present
- Mentored students through algorithm challenges in Python
- Led weekly sessions and code reviews, providing guidance on time and space complexity optimization.
- Supported 100+ students in enhancing problem-solving and technical interviewing skills.

WORK EXPERIENCE

MATHNASIUM | Lead Instructor April 2023 - December 2024
UCI ICS Informatics Department | Student Assistant October 2023 - current

LEADERSHIP EXPERIENCE

CareTech | Outreach Committee Head October 2024 - current
CUCS | Academic Department Content Developer June 2024 - current