James Song

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Education

University of Michigan Expected May 2026
B.S.E. Computer Science and Engineering, B.S. Mathematics GPA: 3.982/4.000

- CS Coursework: Machine Learning • Data Structures and Algorithms • Computer Organization • Theory of Computation
- Mathematics: Real Analysis • Linear Algebra Theory • Multivariable Calculus • Probability Theory • Discrete Mathematics • Differential Equations

Experience

Research Assistant, UM Transportation Institute – Ann Arbor, MI May 2023 – Aug 2024

- Refined 3D Meshes of human bone structures using Principal Component Analysis, Iterative Closest Point Algorithm, and KD TreeSearcher in order to predict human geometry, in particular rib cages.
- Designed a Point Cloud Registration algorithm to automate mesh morphing between target models and baseline models in MATLAB to increase Mesh Morphing's efficiency and accuracy in 3D Spinal Structures. (Video Presentation, Poster)
- Created a remeshed and refined 3D T-Spine baseline model through Radial Basis Function and Non-Rigid Iterative Closest Point Algorithm in MATLAB.

Strategist, University of Michigan Solar Car Team – Ann Arbor, MI Sept 2022 – April 2024

- Built a mobile app that uses GPS information to calculate optimal pointing angles for the solar array to maximize energy production in Swift.
- Designed a real-time Cloud Coverage and Precipitation Radar with real-time weather data from weather APIs using Python Flask with a group of 4 strategists.
- Implemented a dynamic drive-by-sec simulator in C++ to support the development of race strategy software to train parameter control for race strategists.

Personal Projects

Linear Mode Connectivity (LMC) Experiment June 2024 – July 2024

- Replicated LMC in the LeNet and ResNet20 models using Pytorch based on the paper "Linear Mode Connectivity and the Lottery Ticket Hypothesis" by Frankle et al. (2020).
- Reimplemented the GPT-2 architecture and training details from scratch in pytorch to investigate whether LMC exists in decoder-only transformers.

VidBite June 2024 – July 2024

- Implemented a video generator that creates 30-second clips visualizing user queries on mathematical or scientific concepts using Retrieval-Augmented Generation (RAG) with Claude Sonnet 3.5 and Google Gemini LLMs in Langchain to generate Manim code.
- Scraped Manim Documentation for a vectorDB and implemented a vector search during RAG.

Note-Mesh Nov 2023 – Nov 2023

- Compiled Students' lecture notes into a Supernote using Computer Vision with fPDF and Llama2. Measured similarity in students' notes by k-means clustering in scikit-learn. Hosted in Flask.

Skills

Programming Languages: Python, MATLAB, C++, C, JavaScript, Java, Swift

Tools and Frameworks: Pytorch, Llama2, Flask, FastAPI, Git, Docker, Langchain, Scikit-Learn