

EDUCATION

Carnegie Mellon University, Pittsburgh, PA 08/2025 - 05/2027 (Expected)
Master of Science in Machine Learning

- **Courses:** Probability and Mathematical Statistics, Advanced Introduction to Machine Learning

University of Southern California (USC), Los Angeles, CA 08/2022 - 05/2025
Bachelor of Science in Computer Science (GPA: 3.98/4.0)

- **Courses:** Artificial Intelligence, Machine Learning, LLMs in Natural Language Processing, Probability, Statistics

PUBLICATIONS

- 🔗 [1] **Liu, J.**, Nam, Y., Cui, X., & Swabha, S. (2025). Evaluation Under Imperfect Benchmarks and Ratings: A Case Study in Text Simplification. *arXiv:2504.09394*
- 🔗 [2] Chen, J., Zhu, X., Wang, Y., Liu, T., Chen, X., Chen, Y., Leong, C., Ke, Y., **Liu, J.**, Yuan, Y., McAuley, J., & Li, L. (2025). Symbolic Representation for Any-to-Any Generative Tasks. *CVPR 2025*.
- 🔗 [3] Chen, X.* , Yuan, Y.* , **Liu, J.*** , Leong, C., Zhu, X., & Chen, J. (2024). Generative Models in Protein Engineering: A Comprehensive Survey. *NeurIPS 2024 Workshop FM4Science*. (Poster)
- 🔗 [4] Smith, R., Patel, A., Soraisam, M.D., Guhathakurta, P., Tadepalli, P., Zhu, S., **Liu, J.**, et al. (2024). Variable Stars in M31 Stellar Clusters from the Panchromatic Hubble Andromeda Treasury. *The Astrophysical Journal*, 974(2), p.292.
- 🔗 [5] He, K.* , Li, M.* , & **Liu, J.*** (2023). Enhancing Debugging Skills of LLMs with Prompt Engineering. *Technical report*.
- 🔗 [6] **Liu, J.** (2023). Predicting Game Popularity from Steam Descriptions. *Technical report*.
- 🔗 [7] Patel, A., Mukherjee, S., Soraisam, M., Guhathakurta, P., **Liu, J.**, & Tadepalli, P. (2022). Variable Stars in M31 Stellar Clusters using the Panchromatic Hubble Andromeda Treasury. *Bulletin of the AAS*, 54(6).

RESEARCH EXPERIENCE

Fine-tuning Long Context Multimodal Models for General Tasks, NeuLab, CMU, Pittsburgh, PA 08/2025 - Present
 Advised by [Prof. Graham Neubig](#)

Text Simplification Evaluation [1], DILL Lab, USC, Los Angeles, CA 01/2024 - 08/2025
 Mentored by [Xinyue Cui](#) and [Yoonsoo Nam](#), advised by [Prof. Swabha Swayamdipta](#)

- **Existing Metrics:** Evaluated existing text simplification metrics on a novel silver standard dataset showing a significant mismatch between expected and actual scores.
- **Synthetic Samples and Dataset:** Developed a dataset generation method involving successively larger language models with LLM scoring; a human pilot demonstrates a high correlation with human ratings.
- **Evaluation:** Ran experiments with a diverse set of parameters such as model family, temperature, and prompts to show that language model judges are significantly better than previous metrics on newer simplification systems.

Learning Heuristics for Multi-Agent Pathfinding, IDM Lab, USC, Los Angeles, CA 05/2024 - 05/2025
 Mentored by [Yimin Tang](#), advised by [Prof. Sven Koenig](#)

- **Trainable Heuristic Environment:** Developed an RL environment to train heuristics for multi-robot path planning, leveraging 4D representations to capture spatial-temporal relationships between robot paths and environmental constraints.
- **Two-Phase Training Strategy:** Crafted a two-phase training strategy, initially replicating traditional heuristics and subsequently enhancing search efficiency with a node expansion reward system.
- **Search Efficiency Assessment Tool:** Implementing a quantitative evaluation system based on node expansion metrics, enabling direct measurement of search efficiency improvements for the learned heuristic function.

Symbolic Representation for Any-to-Any Generative Tasks [2] 09/2024 - 12/2024

- **Symbolic Any-to-any Paradigm:** Introduced a symbolic language with functions, parameters, and topologies, enabling flexible representation of any-to-any generative tasks (e.g., image-to-video, image-to-3D, image merging, etc.).
- **Training-free Inference:** Developed a training-free inference engine that transforms natural language task descriptions into executable symbolic flows, allowing seamless task execution as a program.

Generative Models in Protein Engineering [3] 08/2024 - 12/2024

- **Protein Model Classification:** Systematically categorized protein generative models through a multi-dimensional framework, encompassing inference methodologies (diffusion-based/autoregressive) and modeling targets (sequence/structure), establishing a structured overview of this emerging field's technical landscape.

- **Protein Diffusion Model Comparison:** Established a comparison framework for protein diffusion models across two fundamental dimensions: the mathematical representation level and the structural invariance level, revealing how modeling choices affect protein structure design.
- **Future Directions in Protein Modeling:** Identified critical challenges and future opportunities in protein generative models, emphasizing the transition from data limitations to large-scale datasets and hybrid modeling approaches.

Enhancing Debugging Skills of LLMs with Prompt Engineering [5]

09/2023 - 01/2024

Advised by *Prof. Swabha Swayamdipta*

- **Debugging Prompt Engineering:** Used prompt engineering with pretrained LLMs to boost performance in debugging tasks through few-shot learning and chain-of-thought prompting.
- **Multidimensional Evaluation Metrics:** Developed and implemented a comprehensive set of evaluation metrics, both similarity-based and executable, to quantitatively assess LLM debugging performance.
- **Real-World Error Dataset Construction:** Constructed a dataset of Java Leetcode solutions to replicate real-world programming bugs for dynamic analysis.

Wildfire Spread Prediction, Computation and Data Driven Discovery Group, USC, Los Angeles, CA

08/2023 - 12/2023

Mentored by *Bryan Shaddy*, advised by *Prof. Assad Oberai*

- Worked on physics-informed machine learning techniques to model wildfire spread using diffusion and GAN models.

Variable Stars in Andromeda Galaxy [4][7], UC Santa Cruz, Santa Cruz, CA

06/2020 - 08/2021

Mentored by *Sagnick Mukherjee*, advised by *Prof. Puragra Guhathakurta*

- **Data Cleaning and Collection:** Organized, filtered, and cleaned datapoints of millions of stars, including work in database query optimization, parallelization, and computational geometry.
- **Variable Star Census and Classification:** Established a catalog of 86 luminous variables in M31 clusters, with comprehensive characterization of their evolutionary phases and initial masses based on theoretical isochrones.

TEACHING EXPERIENCE

Teaching Assistant, University of Southern California, Los Angeles, CA

05/2024 - 07/2024

- Teaching Assistant for CSCI-201: Principles of Software Development for *Prof. Victor Adamchik*
- Assisted the professor in preparing computer lab exercises and coached students in the lab for their coding assignments.

Grader, Santa Clara University, Santa Clara, CA

03/2022 - 06/2022

- Grader for CSCI 163: Theory of Algorithms for *Prof. Nicholas Tran*
- As a freshman, graded homework and exams for a course primarily taken by sophomores and juniors.

INDUSTRY EXPERIENCE

Data Science Intern, Stellantis N.V., Auburn Hills, MI (Remote)

05/2023 - 08/2023

- **Pipeline Optimization:** Led end-to-end optimization of ML sales prediction pipeline, achieving 86% reduction in interruptions, 30% faster runtime, and 25% cost savings while improving data quality by fixing critical bugs affecting 60% of the dataset.
- **Research Leadership:** Spearheaded feature engineering initiatives and performance optimization research, presenting findings to 80+ stakeholders including directors and VPs.
- **Performance Recognition:** Demonstrated exceptional performance resulting in return offer for Summer 2024.

Machine Learning Intern, iKala Interactive Media Inc., Taipei, Taiwan

06/2022 - 08/2022

- **Video Analysis Research:** Researched state-of-the-art methodologies in Computer Vision (CV) and Natural Language Processing (NLP) for video analysis.
- **Audio-Video Embedding:** Designed and implemented a Transformer-based model for multimodal (video and audio) embedding generation with PyTorch, achieving 60% precision on AudioSet dataset.

AWARDS

- USC Provost's Undergrad Research Fellowship: Fall 2024 (\$1,000)
- USC Center for Undergraduate Research in Viterbi Engineering Fellowship: Fall 2023; Spring, Summer 2024 (\$5,500)
- USC Viterbi Dean's List: Spring, Fall 2023; Spring 2024
- SCU Dean's Scholarship: 2021-2022 (\$8,100)

SKILLS

Languages: Python, Java, C++, C#, SQL, JavaScript, x86-64 Assembly

Frameworks/Tools: PyTorch, Pandas, NumPy, Git, AWS

Environments: Unix/Linux, Windows

Areas of Expertise: Machine Learning, Natural Language Processing (NLP), Large Language Models (LLMs), Data Structures & Algorithms