

Contact Information

Salvatori Computer Science Center
Los Angeles, CA, 90089

✉ [ollieliu](mailto:me@ollieliu.com)
✉ me@ollieliu.com

Research Interests

I'm broadly interested in multimodal foundation models. These days, I'm exploring their potential as agents of complex reasoning and scientific discovery. I'm particularly excited about:

- Designing and understanding architectures and algorithms that are applicable to scientific modalities, such as (meta)genomics, protein, physics, chemistry, and material sciences.
- Developing post-training and inference-time methods that enable FMs to solve complex reasoning and decision making problems.

Education

University of Southern California 08/2022 - Present
Ph.D. in Computer Science
Advisor(s): Dani Yogatama, Willie Neiswanger

Northwestern University 09/2019 - 06/2021
Master of Science in Industrial Engineering and Management Sciences
Advisor(s): Jorge Nocedal

Carnegie Mellon University 08/2013 - 08/2019
Master of Science in Machine Learning
Bachelor of Science in Statistics and Mathematics (with Honors)

Preprints

*: equal contribution; α - β : equal contribution, alphabetical order

Ollie Liu*, Deqing Fu*, Dani Yogatama, Willie Neiswanger “DeLLMa: Decision Making Under Uncertainty with Large Language Models” In: *arXiv Preprint*. [[pdf](#)] [[website](#)]

Ollie Liu, Sami Jaghouar, Johannes Hagemann, Jeff Kaufman, Willie Neiswanger “MGFM: Metagenomic Foundation Model for Pandemic Monitoring” In: *Foundation Models for Science Workshop at NeurIPS 2024*. [[pdf](#)]

Jiarui Zhang, **Ollie Liu**, Tianyu Yu, Jinyi Hu, Willie Neiswanger “**Euclid**: Supercharging Multimodal LLMs with Synthetic High-Fidelity Visual Descriptions” In: *Submission*.

Wenyue Hua, **Ollie Liu**, Lingyao Li, Alfonso Amayuelas, Julie Chen, Lucas Jiang, Mingyu Jin, Lizhou Fan, Fei Sun, William Wang, Xintong Wang, Yongfeng Zhang “Game-Theoretic LLM: Agent Workflow for Negotiation Games” In: *arXiv Preprint*. [[pdf](#)]

Chiyu Ma*, Lin Shi* **Ollie Liu**, Wenhua Liang, Jiaqi Gan, Ming Cheng, Willie Neiswanger, Soroush Vosoughi “Mechanistic Insights: Circuit Transformations Across Input and Fine-Tuning Landscapes” In: *Submission*.

Ghazal Khalighinejad, Sharon Scott, **Ollie Liu**, Kelly L. Anderson, Rickard Stureborg, Aman Tyagi, Bhuwan Dhingra “MATVIX: Multimodal Information Extraction from Visually Rich Articles” In: *arXiv Preprint*. [[pdf](#)] [[website](#)]

Publications

Deqing Fu $^{\alpha-\beta}$, Ruohao Guo $^{\alpha-\beta}$, Ghazal Khalighinejad $^{\alpha-\beta}$, **Ollie Liu** $^{\alpha-\beta}$, Bhuwan Dhingra, Dani Yogatama, Robin Jia, Willie Neiswanger “IsoBench: Benchmarking Multimodal Foundation Models on Isomorphic Representations” In: *Proceedings of COLM 2024*. [[pdf](#)] [[website](#)]

Ting-Rui Chiang, Xinyan Velocity Yu, Joshua Robinson, **Ollie Liu**, Isabelle Lee, Dani Yogatama “On Retrieval Augmentation and the Limitations of Language Model Training” In: *Proceedings of NAACL 2024 (short)*. [[pdf](#)] [[code](#)]

Xianghao Kong*, **Ollie Liu***, Han Li, Dani Yogatama, Greg Ver Steeg “Interpretable Diffusion via Information Decomposition” In: *Proceedings of ICLR 2024*. [[pdf](#)] [[code](#)]

Ghazal Khalighinejad , **Ollie Liu**, Sam Wiseman “Approximating CKY with Transformers” In: *Proceedings of Findings of EMNLP 2023*. [[pdf](#)] [[code](#)]

Michael Hanna, **Ollie Liu**, Alexandre Variengien “How Does GPT-2 Compute Greater-Than?: Interpreting Mathematical Abilities in a Pre-Trained Language Model” In: *Proceedings of NeurIPS 2023*. [[pdf](#)]

In Progress **Multimodal Foundation Model for Physical Sciences**, Core Contributor, with Polymathic AI
Self-Improving LM with Textual Feedback, Lead, with Microsoft Research

Positions	New York University & Polymathic AI , Research Scientist	Fall 2024
	Microsoft Research, AI Frontiers , Research intern	Summer 2024
	Reka AI , Research intern	Summer 2023
	Redwood Research , Research Resident	Winter 2023
	Meta Reality Labs, Assistant Technologies , Applied Research Intern	Summer 2022
	You.com , Software Engineer Intern	Spring 2022
	Amazon Web Services, GenAI Innovation Center , Applied Scientist Intern	2021

Honors and Awards **University Organizer Fellowship**, Open Philanthropy, 2024
Provost’s Fellowship, University of Southern California, 2022
Data Science Fellowship, Northwestern University, 2019
Royal E. Cabell Fellowship, Northwestern University, 2019
Senior Leadership Recognition, Carnegie Mellon University, 2018

Invited Talks **USC Information Science Institute NLG Seminar**, DeLLMa: A Framework for Decision Making Under Uncertainty with Large Language Models, [[vi](#) [deo](#)]

Teaching Experiences **TA**, Machine Learning (Master), University of Southern California, Fall 2023
Co-Instructor, Machine Learning (Ph.D Elective), Northwestern University, Fall 2021
Co-Instructor, Mathematical Statistics (Ph.D Core), Northwestern University, Fall 2020
TA, Introduction to Machine Learning (Master), Carnegie Mellon University, 2 Semesters.
TA, Principles of Computing (Undergraduate), Carnegie Mellon University, 4 Semesters.

Doctoral Courseworks Machine Learning, Natural Language Processing, Computer Vision, Learning Theory, Scalable Learning Systems, Theoretical Optimization

Services and Activities **Reviewer**, ICML (2023, 2024); NeurIPS (2024); ICLR (2025); ACL Rolling Review (2024)
President, [AI Safety Group](#), University of Southern California
Student organizer, [Center for Optimization and Statistical Learning](#), Northwestern University

Skills **Software**: Python (JAX, PyTorch, Hugging Face), Linux, R, \LaTeX
Language: Chinese (*native*), English (*proficient*, GRE V169+Q168)