

Marvin Li

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EDUCATION

Harvard College, *BA in Computer Science and Math, summa cum laude, GPA: 4.0* 09/21 – 05/25

Selected courses: Math 55a (Algebra & Group Theory) and b (Topology & Complex Analysis); *Math & Engineering Principles for Training Foundation Models; Foundations of Deep Learning; Deep Learning (MIT); High-Dimensional Probability; Statistical Inference I; Algorithms for Data Science; Computational Learning Theory; Algorithmic Statistics (MIT); Systems Programming; Machine Learning; Optimized Democracy; Economic Analysis as a Frontier of Theoretical CS; Fairness and Validity; Functional Analysis. Graduate-level courses in italics.*

Teaching Fellow: Data Structures & Algorithms; *Algorithms for Data Science.*

TECHNICAL SKILLS

language models, diffusion; python, bash, C++, SQL; pytorch, transformers, trl, diffusers, pandas, numpy

RESEARCH EXPERIENCE

Harvard SEAS, *Research Assistant for Prof. Sitan Chen* 10/23 – NOW

- Pioneered theory to explain *critical windows*, the sudden formation of features like answer correctness, reward hacking, or toxicity in generative models, with probability theory (**ICML 2024** [1], **ICML 2025 oral** [2]).
- Created new methods to identify LLM jailbreaks and reasoning failures based on the presence of critical windows.
- Invented a new zero-shot method to detect individual samples from training data for CIFAR-10 diffusion models by using critical windows around training points in **diffusers** library.

ML Alignment & Theory Scholars

01/25 – 05/25

- Developed methods to mitigate chain of thought unfaithfulness induced by RL (**ICML 2025 workshop** [3]).

Harvard Secure and Fair Machine Learning Lab, *Research Assistant for Prof. Seth Neel* 02/23 – 05/25

- Developed MOPE, a novel zero-shot privacy attack against LLMs that identifies members of pre-training data by exploiting gradient information (**EMNLP 2023** [4]).
- Developed FLoRa, a loss ratio attack which extracts > 90% of LLAMA-7B's finetuning dataset.
- Contributed to a comprehensive codebase and library to evaluate different privacy attacks against LLMs. [5, 6]

Harvard SEAS, *Research Assistant for Prof. Cynthia Dwork*

02/24 – NOW

- Analyzed how geometric bias in prompt embeddings leads to representational bias of race in text-to-image diffusion models using Lipschitz-based conditions on generative models (**ICML 2024 workshop** [7]).

WORK EXPERIENCE

Hudson River Trading, *Quantitative Researcher Intern*

05/24 – 08/24

- Designed a research pipeline to quickly test and iterate on research ideas for alpha discovery and modeling.
- Discovered new medium-frequency signals for equities by crafting features from alternative data sources.
- Reduced risk in US options portfolios by improving an existing delta-hedging model with machine learning.

Citadel Securities, *Quantitative Researcher Intern*

05/23 – 08/23

- Applied machine learning models to predict bid-ask spreads, improving algorithmic trading strategies.
- Simulated profit of a liquidity-providing strategy based on new model with high-frequency market data.

Two Sigma, *Software Engineering Intern*

05/22 – 08/22

- Created an internal workflow API in Java/SQL to liquidate out-of-universe securities.
- Programmed the API endpoints of an internal web tool for users to search, create, and edit manual orders.

HONORS AND AWARDS

Academic: **Captain Jonathan Fay Prize** (given to the three best theses of Harvard College's graduating class); Hoopes Prize; Detur Book Prize (top 6%, '23); John A. Harvard Scholar (top 5%, '22-'24).

Research: Regeneron Science Talent Search Finalist ('21), Research Science Institute ('20).

INVITED TALKS

Harvard ML Foundations. Apr 2025

Harvard-MIT Mathematics Tournament. Feb 2025

Donder's Institute for Brain, Cognition, and Behaviour. May 2024.

PUBLICATIONS

 (* denotes equal contribution.)

- [1] Marvin Li and Sitan Chen. "Critical windows: non-asymptotic theory for feature emergence in diffusion models". In: *International Conference on Machine Learning*. 2024.
- [2] Marvin Li, Aayush Karan, and Sitan Chen. "Blink of an eye: a simple theory for feature localization in generative models". In: *International Conference on Machine Learning. Oral, top 1%*. 2025.

- [3] Miles Turpin, Andy Ardit, Marvin Li, Joe Benton, and Julian Michael. “Verbalization fine-tuning helps language models verbalize biases learned in RL”. In: *Proceedings of the ICML 2025 Workshop on Responsible and Reliable Foundation Models (R2-FM)*. Poster. July 2025.
- [4] Marvin Li*, Jason Wang*, Jeffrey Wang*, and Seth Neel. “MOPE: Model Perturbation based Privacy Attacks on Language Models”. In: *Large Language Models and the Future of NLP: Main Conference of EMNLP 2023*. Association for Computational Linguistics, Dec. 2023.
- [5] Jeffrey Wang*, Jason Wang*, Marvin Li*, and Seth Neel. “Firm Foundations for Membership Inference Attacks Against Large Language Models”. In: *International Conference on Machine Learning*. Workshop on Data in Generative Models. 2025.
- [6] Jeffrey Wang*, Jason Wang*, Marvin Li*, and Seth Neel. *pandora_llm: A red-teaming library for assessing membership-inference and data extraction vulnerabilities in large language models*. https://github.com/safr-ai-lab/pandora_llm. Python package (version 0.0.0), released July 1, 2025. July 2025.
- [7] Sahil Kuchlous*, Marvin Li*, and Jeffrey G. Wang*. “Bias Begets Bias: the Impact of Biased Embeddings on Diffusion Models”. In: *ICML Trustworthy Multi-modal Foundation Models and AI Agents workshop*. 2024.
- [8] Marvin Li, Patricia Glibert, and Vyacheslav Lyubchich. “Machine Learning Classification Algorithms for Predicting *Karenia brevis* Blooms on the West Florida Shelf”. In: *J.Mar.Sci.Eng.* 9.9 (2021). ISSN: 2077-1312.