

# Vinod Raman

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<https://vinodkraman.github.io>

## Education

### University of Michigan

PhD Statistics

Thesis Advisor: Ambuj Tewari

Research Areas: LLM Inference-time Methods, Privacy, Synthetic Data Generation, Alignment

Ann Arbor, MI

Sep. 2021 - Dec. 2025

### University of Michigan

BSE Computer Science, BSE Chemical Engineering

Thesis Advisors: Mahdi Cheraghchi, Sindhu Kutty, Andrej Lenert

Research Areas: Submodular Optimization, Bandits, Thermophotovoltaics

Ann Arbor, MI

Sep. 2015 - May 2020

## Industry Experience

### Google Research

Research Intern

Hosts: Matthew Joseph, Travis Dick, Umar Syed

New York City, NY

June - Sep. 2025

- Designed and implemented new private algorithms for domain discovery, top- $k$  selection, and submodular maximization over unbounded domains. Algorithms achieve state-of-the-art privacy-utility guarantees. Paper in submission at ICLR 2026.
- Implemented and ran an evaluation pipeline to benchmark the arithmetic capabilities of flagship LLMs (ChatGPT, Gemini, etc.). Paper in progress.
- Implemented a novel synthetic data generation pipeline that involved filtering the outputs of a fine-tuned LLM; used JAX to scale filtering method to process tens of thousands of synthetic examples.

### Apple

Research Intern

Host: Satyen Kale

New York City, NY

Feb. - June 2025

- Designed and implemented adaptive allocation strategy for Best-of- $N$  alignment for batch LLM inference. Paper in submission at ICLR 2026.
- Proposed efficient methods for sample-dependent mass estimation. Paper in progress.

### Apple

Research Intern

Host: Kunal Talwar

Cupertino, CA

May - Aug. 2024

- Developed new differentially private algorithms achieving state-of-the-art privacy-utility tradeoffs for adversarial bandits and dynamic regret minimization.
- Research published in two papers at ICML 2025.

## Awards & Fellowships

- ALT Outstanding Paper Award, 2025
- Apple Scholars in AI/ML PhD Fellowship, 2025
- Outstanding First-Year Ph.D. Student, 2022
- NSF Graduate Research Fellowship, 2022

**Technical Skills:** Python, C++, Java; PyTorch, JAX, TensorFlow, HuggingFace

## Publications

\*denotes equal contribution

1. J. Li\*, **V.Raman\***, A. Tewari. Generation through the lens of learning theory.  
*Conference on Learning Theory (COLT)*, 2025.  
<https://arxiv.org/abs/2410.13714>
2. A. Raman\*, **V.Raman\***. Generation from Noisy Examples.  
*International Conference on Machine Learning (ICML)*, 2025.  
<https://arxiv.org/abs/2501.04179>
3. C. Peale\*, **V.Raman\***, O. Reingold\*. Representative Language Generation.  
*International Conference on Machine Learning (ICML)*, 2025.  
<https://arxiv.org/abs/2505.21819>
4. H. Asi\*, **V.Raman\***, A. Saha\*. Tracking the Best Expert Privately.  
*International Conference on Machine Learning (ICML)*, 2025.  
<https://arxiv.org/abs/2503.09889>
5. **V.Raman**, H. Asi, K. Talwar. Faster Rates for Private Adversarial Bandits.  
*International Conference on Machine Learning (ICML)*, 2025.  
<https://arxiv.org/abs/2505.21790>
6. **V.Raman\***, U.Subedi\*, A.Tewari. The Complexity of Sequential Prediction in Dynamical Systems.  
*Conference on Learning for Dynamics and Control (L4DC)*, 2025. **Oral Presentation**.  
<https://arxiv.org/abs/2402.06614>
7. **V.Raman\***, U.Subedi\*, A.Tewari. A Unified Theory of Supervised Online Learnability.  
*Conference on Algorithmic Learning Theory (ALT)*, 2025. **Outstanding Paper Award**.  
<https://arxiv.org/abs/2307.03816>
8. **V.Raman\***, U.Subedi\*, A.Tewari. A Characterization of Multioutput Learnability.  
*Journal of Machine Learning Research (JMLR)*, 2024.  
<https://arxiv.org/abs/2301.02729>
9. **V.Raman**, A.Tewari. Online Classification with Predictions.  
*Conference on Neural Information Processing Systems (NeurIPS)*, 2024.  
<https://arxiv.org/abs/2405.14066>
10. S.Hanneke\*, **V.Raman\***, A. Shaeiri\*, U.Subedi\*. Multiclass Transductive Online Learning.  
*Conference on Neural Information Processing Systems (NeurIPS)*, 2024. **Spotlight**.
11. **V.Raman\***, U.Subedi\*, A.Tewari. Smoothed Online Classification can be Harder than Batch Classification.  
*Conference on Neural Information Processing Systems (NeurIPS)*, 2024.  
<https://arxiv.org/pdf/2405.15424>
12. **V.Raman\***, U.Subedi\*, A. Raman, A.Tewari. Apple Tasting: Combinatorial Dimensions and Minimax Rates.  
*Conference on Learning Theory (COLT)*, 2024.  
<https://arxiv.org/abs/2310.19064>
13. **V.Raman\***, U.Subedi\*, A.Tewari. Online Learning with Set-Valued Feedback.  
*Conference on Learning Theory (COLT)*, 2024.  
<https://arxiv.org/abs/2306.06247>
14. **V.Raman\***, U.Subedi\*, A.Tewari. Online Infinite-Dimensional Regression: Learning Linear Operators.  
*Conference on Algorithmic Learning Theory (ALT)* 2024.  
<https://arxiv.org/abs/2309.06548>

15. A.Raman, **V.Raman\***, U.Subedi\*, I.Mehalel\*, A.Tewari. Multiclass Online Learnability under Bandit Feedback.  
*Conference on Algorithmic Learning Theory (ALT)* 2024.  
<https://arxiv.org/abs/2308.04620>
16. **V.Raman\***, U.Subedi\*, A.Tewari. On Proper Learnability between Average- and Worst-case Robustness.  
*Conference on Neural Information Processing Systems (NeurIPS)* 2023.  
<https://arxiv.org/abs/2211.05656>
17. **V.Raman\***, U.Subedi\*, A.Tewari. On the Learnability of Multilabel Ranking.  
*Conference on Neural Information Processing Systems (NeurIPS)* 2023. **Spotlight**.  
<https://arxiv.org/abs/2304.03337>
18. S.Hanneke\*, S.Moran\*, **V.Raman\***, U.Subedi\*, A.Tewari. Multiclass Online Learning and Uniform Convergence.  
*Conference on Learning Theory (COLT)* 2023.  
<https://arxiv.org/abs/2303.17716>
19. **V.Raman**, A.Tewari. Online Agnostic Multiclass Boosting.  
*Conference on Neural Information Processing Systems (NeurIPS)* 2022.  
<https://arxiv.org/abs/2205.15113>
20. **V.Raman**, T.Burger, A.Lenert. Design of thermophotovoltaics for tolerance of parasitic absorption.  
*Optics Express*, 27(22):31757–31772, 2019.  
<https://doi.org/10.1364/OE.27.031757>

## In Submission

1. Y. Kalayci\*, **V. Raman\***, S. Dughmi. Pandora’s Box vs. Best-of- $N$  for Inference-time Optimization.  
*In Submission*, 2025.  
<https://arxiv.org/abs/2510.01394>
2. S. Xie, **V. Raman**, S. Zhou. Transductive and Learning-Augmented Online Regression.  
*In Submission*, 2025.
3. **V. Raman**, T. Dick, M. Joseph. Missing Mass for Differentially Private Domain Discovery.  
*In Submission*, 2025.
4. **V. Raman**, H. Asi, S. Kale. AdaBoN: Adaptive Best-of- $N$  Alignment.  
*In Submission*, 2025.  
<https://arxiv.org/abs/2505.12050>
5. S. Somerstep, **V. Raman\***, U. Subedi\*, Y. Sun. Learning to Choose or Choosing to Learn: Best-of- $N$  vs. Supervised Fine-Tuning for Bit String Generation.  
*In Submission*, 2025.  
<https://www.arxiv.org/abs/2505.17288>

## Invited Talks

1. A Unified Theory of Supervised Online Learning. *ALT*, 2025.
2. Generation through the lens of learning theory. *Apple MLR Reading Group*, 2025.
3. Generation through the lens of learning theory, *NEU CS Theory Seminar*, 2024.
4. Trichotomies in Online Learnability. *Apple MLR Reading Group*, 2024
5. Multiclass Online Learning and Uniform Convergence. *UMich EECS Theory Seminar*, 2024.
6. On Classification-Calibration of Gamma-Phi Losses. *COLT*, 2023.