

# Vinod Raman

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<https://vinodkraman.github.io>

## Education

### University of Michigan

PhD Statistics

Thesis Advisor: Ambuj Tewari

Research Areas: Machine Learning Theory, Large Language Models, Differential Privacy, Synthetic Data

Ann Arbor, MI

2021 - 2026

### University of Michigan

BSE Computer Science, BSE Chemical Engineering

Thesis Advisors: Mahdi Cheraghchi, Sindhu Kuty, Andrej Lenert

Research Areas: Submodular Optimization, Bandits, Thermophotovoltaics

Ann Arbor, MI

2015 - 2020

## Industry Experience

### Google Research

Research Intern

Hosts: Matthew Joseph, Travis Dick

New York City, NY

June - Sept. 2025

- Analyzed existing and developed new private algorithms for domain discovery, top- $k$  selection, and submodular maximization over infinite domains.
- Studied the ability of large language models (ChatGPT, Gemini, etc.) to perform basic arithmetic capabilities, systematically characterizing the taxonomy of errors.
- Designed and implemented a new synthetic data generation pipeline that involves privately fine-tuning LLMs, performing unconditional generation, and then privately filtering its outputs to better align with target distributions derived from private data.
- Work led to a paper under submission at ICLR 2026.

### Apple

Research Intern

Host: Satyen Kale

New York City, NY

Feb. - June 2025

- Designed and evaluated an adaptive allocation strategy for Best-of- $N$  alignment for batch LLM inference.
- Proposed efficient methods for mass estimation of sample-dependent subsets of a distribution's support.
- Research resulted in submissions to ICLR 2026 and ALT 2026.

### Apple

Research Intern

Host: Kunal Talwar

Cupertino, CA

May - Aug. 2024

- Developed new 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, Javascript, Matlab; PyTorch, TensorFlow, HuggingFace, React Native

## 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. H. Asi\*, **V.Raman\***, 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.  
**Oral** at *Conference on Learning for Dynamics and Control (L4DC)*, 2025.  
<https://arxiv.org/abs/2402.06614>
7. **V.Raman\***, U.Subedi\*, A.Tewari. A Unified Theory of Supervised Online Learnability.  
**Outstanding Paper Award** at *Conference on Algorithmic Learning Theory (ALT)*, 2025.  
<https://arxiv.org/abs/2307.03816>
8. **V.Raman**, 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.  
**Spotlight** at *Conference on Neural Information Processing Systems (NeurIPS)*, 2024.
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. **Spotlight** at *Conference on Neural Information Processing Systems (NeurIPS)* 2023.  
<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>

## Works In Submission

1. **V. Raman**, H. Asi, S. Kale. ABoN: Adaptive Best-of-N Alignment. *In Submission*, 2025  
<https://arxiv.org/abs/2505.12050>
2. 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>

## Selected 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. Apple Tasting: Combinatorial Dimensions and Minimax Rates. *COLT*, 2024.
4. Trichotomies in Online Learnability. *Apple MLR Reading Group*, 2024
5. Multiclass Online Learnability under Bandit Feedback. *ALT*, 2024.
6. Multiclass Online Learning and Uniform Convergence. *University of Michigan EECS Theory Seminar*, 2024.
7. On Classification-Calibration of Gamma-Phi Losses. *COLT*, 2023.