Vinod Raman

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https://vinodkraman.github.io

Education

University of Michigan — Ann Arbor, MI
PhD Statistics — 2021 - 2026
Thesis Advisor: Ambuj Tewari
Research Areas: Inference-time Algorithms, Alignment, Privacy, Synthetic Data, Foundations of ML

University of Michigan — Ann Arbor, MI
BSE Computer Science, BSE Chemical Engineering — 2015 - 2020
Thesis Advisors: Mahdi Cheraghchi, Sindhu Kutty, Andrej Lenert
Research Areas: Submodular Optimization, Bandits, Thermophotovoltaics

Industry Experience

Google Research — New York City, NY
Research Intern — June - Sep. 2025
Hosts: Matthew Joseph, Travis Dick, Umar Syed

- 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.
- Built and executed an evaluation pipeline to benchmark the arithmetic capabilities of flagship LLMs (ChatGPT, Gemini, etc.).
- Created an LLM-driven synthetic text generation pipeline that boosted MAUVE scores by 30%; scaled the method with JAX to produce thousands of new examples.
- Research resulted in a paper submitted to ICLR 2026.

Apple — New York City, NY
Research Intern — Feb. - June 2025
Host: Satyen Kale

- Designed and implemented adaptive allocation strategy for Best-of-N alignment for batch LLM inference.
- Proposed efficient methods for sample-dependent mass estimation.
- Research resulted in a paper submitted to ICLR 2026.

Apple — Cupertino, CA
Research Intern — May - Aug. 2024
Host: Kunal Talwar

- 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. 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 Multiouput 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. Y. Kalayci*, **V. Raman***, S. Dughmi. Pandora's Box vs. Best-of-N for Inference-time Optimization.
In Submission, 2025

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

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.