Parikshit Ram

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Education & Training

Georgia Institute of Technology	Atlanta, USA	Ph.D. (CS, minor in Optimization) 2013
Indian Institute of Technology	Kharagpur, India	M.Sc. & B.Sc. (Math & Computing) 2007

Research & Professional Experience

2018 – present	Principal Research Staff Member, IBM Research
2017 – 2018	Principal Product Architect, Infosys Ltd
2015 – 2017	Senior Staff Research Scientist, Skytree Inc
2013 – 2015	Member of Technical Staff, Skytree Inc

Research Interests

I have a wide range of research interests, and I am always excited to learn about new areas and make connections between different areas. In this process, I have spent some time focusing on the following areas: Optimization (single and bilevel), Automated Machine Learning & Data Science, Large Scale Learning, Computational Geometry, Efficient All-Pairs Algorithms & Analysis, Density Estimation, Kernel Methods, Associative Memories & Energy-based Models, Machine Unlearning, Sparse Learning, Neuro-inspired Learning, Compositional Generalization.

Selected Publications

I have been fortunate to publish in various research areas at top AI, Machine Learning and Data Mining conferences with a h-index of 23. I have also filed 20+ patents. The following are some of my selected publications (see full list of papers and patents here)

- B. Hoover, D. H. Chau, H. Strobelt, P. Ram, and D. Krotov. Dense associative memory through the lens of random features. *Advances in Neural Information Processing Systems*, 37, 2024
- J. Jia, J. Liu, Y. Zhang, P. Ram, N. Baracaldo, and S. Liu. Wagle: Strategic weight attribution for effective and modular unlearning in large language models. *Advances in Neural Information Processing Systems*, 37, 2024
- P. Ram, T. Klinger, and A. G. Gray. What makes models compositional? a theoretical view. In *Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence (IJCAI-24)*, 2024
- J. Liu, P. Ram, Y. Yao, G. Liu, Y. Liu, P. Sharma, S. Liu, et al. Model sparsity can simplify machine unlearning. *Advances in Neural Information Processing Systems*, 36, 2023 `spotlight, 90+ citations`
- B. Saha, D. Krotov, M. J. Zaki, and P. Ram. End-to-end differentiable clustering with associative memories. In *International Conference on Machine Learning*, pages 29649–29670. PMLR, 2023
- Y. Zhou, P. Ram, T. Salonidis, N. Baracaldo, H. Samulowitz, and H. Ludwig. Single-shot general hyper-parameter optimization for federated learning. In *The 11th International Conference on Learning Representations*, 2023 `notable top-25%`
- A. Gu, S. Lu, P. Ram, and T.-W. Weng. Min-max multi-objective bilevel optimization with applications in robust machine learning. In *The 11th International Conference on Learning Representations*, 2023
- Y. Zhang, Y. Yao, P. Ram, P. Zhao, T. Chen, M. Hong, Y. Wang, and S. Liu. Advancing model pruning via bi-level optimization. *Advances in Neural Information Processing Systems*, 35:18309–18326, 2022
- P. Ram and K. Sinha. Federated nearest neighbor classification with a colony of fruit-flies. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 36, pages 8036–8044, 2022
- K. Sinha and P. Ram. Fruit-fly inspired neighborhood encoding for classification. In *Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery & Data Mining*, pages 1470–1480, 2021
- S. Liu, P. Ram, D. Vijaykeerthy, D. Bouneffouf, G. Bramble, H. Samulowitz, D. Wang, A. Conn, and A. Gray. An admm based framework for automl pipeline configuration. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 34, pages 4892–4899, 2020 `90 citations`
- P. Ram and K. Sinha. Revisiting kd-tree for nearest neighbor search. In *Proceedings of the 25th acm sigkdd international conference on knowledge discovery & data mining*, pages 1378–1388, 2019 `140 citations`
- R. R. Curtin, P. Ram, and A. G. Gray. Fast exact max-kernel search. In *Proceedings of the 2013 SIAM International Conference on Data Mining*, pages 1–9. Society for Industrial and Applied Mathematics, 2013 `best paper finalist`
- P. Ram and A. G. Gray. Maximum inner-product search using cone trees. In *Proceedings of the 18th ACM SIGKDD international conference on Knowledge discovery and data mining*, pages 931–939, 2012 `200+ citations`

- P. Ram and A. G. Gray. Density estimation trees. In *Proceedings of the 17th ACM SIGKDD international conference on Knowledge discovery and data mining*, pages 627–635, 2011 `140 citations`
- P. Ram, D. Lee, W. March, and A. Gray. Linear-time algorithms for pairwise statistical problems. *Advances in Neural Information Processing Systems*, 22, 2009 `spotlight, 90 citations`

Recognition

- IBM Research Accomplishments: *Towards Automating AI Lifecycle with AutoAI* (2019), *AutoAI: The Next Level* (2020), *Federated Learning Security & Privacy* (2022), *Neurobiologically Inspired Foundation Models* (2023).
- TMLR Expert Reviewer (2023), NeurIPS Top Reviewer (2022, 2023), ICML Top Reviewer (2022).
- IBM Invention Plateau 1 (May 2020) - 5 (January 2024).
- IBM Research 2020 Pat Goldberg Best Paper Finalist for *An ADMM based Framework for AutoML Pipeline Configuration*.
- SIAM Data Mining 2013 Best Paper Finalist for *Fast Exact Max-Kernel Search*.

Service

- Organizer, NeurIPS 2023 Workshop on *Associative Memory and Hopfield Networks*.
- Senior PC member AAAI 2024, 2025. NeurIPS Area Chair 2024. ICML Area Chair 2025.
- Office-hours, ICLR 2023.
- Organizer, KDD 2022 Tutorial on Gradual AutoML using Lale.
- Regular PC member for top AI/ML conferences NeurIPS, ICML, AISTATS, ICLR, UAI, KDD, AAAI.

Invited Talks

- *(Upcoming)* Dense Associative Memories through the Lens of Random Features, **VSAONLINE, June 2025**.
- *(Upcoming)* Associative Memories and its Role in Machine Learning, **ICLR 2025** workshop on *New Frontiers in Associative Memories*.
- The Critical Role of Fundamental Mathematical Tools on the Path to AGI, **IIITDM Kancheepuram** 2024 workshop on *Future Perspectives of AI and Data Sciences : Algorithms and Applications*. [video]
- What makes Models Compositional? A Neuro-Symbolic Theoretical View, **IJCAI 2024** workshop on *Logical Foundations of Neuro-Symbolic AI*.
- Robust Multi-objective Bilevel Optimization With Applications In Machine Learning, **INFORMS 2022** session on *Bilevel Stochastic Methods for Optimization and Learning*.
- Density Estimation Trees, **SIAM Uncertainty Quantification 2014 (UQ14)** mini-symposium on *Non-parametric Density Estimation*.
- Max-kernel Search: How to search for just about anything?, **MLConf Atlanta 2014**. [video]

Teaching

- Bilevel Optimization at the *Polyhedra and Combinatorial Optimization Days 2023 (JPOC13) summer school on Combinatorial Optimization & Machine Learning*.
- Compositional Generalization at the *Neuro-Symbolic Summer School 2023*.
- Hands-on tutorial at the *KDD 2022 Tutorial on Gradual AutoML using Lale*.
- Teaching Assistant, *Data and Visual Analytics (Spring 2011, 2013)*, Georgia Tech.

Research Grants

- Co-PI, *Fast Inference and Alignment for Large Multi-modal Models*, RPI-IBM Future of Computing Research Collaboration Program, 2025
- Co-PI, *Meta-Transfer-Learning for Tabular Data Distillation, Generation, and Predictive Modeling*,

RPI-IBM Future of Computing Research Collaboration Program, 2025
- Co-PI, *FIT: Fast Inference using Transformer Models*, RPI-IBM Future of Computing Research Collaboration Program, 2024
- Co-PI, *Data Distillation in Tabular Data: A Foundation Model Approach*, RPI-IBM Future of Computing Research Collaboration Program, 2024
- Co-PI, *A Framework for Automating Decentralized Training of Foundation Models*, RPI-IBM AI Research Collaboration Program, 2023
- Co-PI, *AutoDML: A Framework for Automating Decentralized Machine Learning*, RPI-IBM AI Research Collaboration Program, 2022

Mentorship

I have mentored students both during summer internships at IBM research, and through continued collaborations with their advisors at various academic institutions.

Continuing projects
- Ben Hoover (GT), 2024-current.
- Inwon Kang (RPI), 2023-current.
- Jinghan Jia (MSU), 2023-present.
- Bishwajit Saha (RPI), 2022-2024.
- Momin Abbas (RPI), 2022-2023.
- Jiancheng Liu (MSU), 2022-current.
- Yuguang Yao (MSU), 2020-present.
- Yihua Zhang (MSU), 2020-present.
- Yunfei Teng (NYU), 2020-2022.

Summer interns at IBM
- Inwon Kang (RPI) 2023, 2024
- Charlotte Park (MIT) 2024
- Momin Abbas (RPI) 2023
- Bishwajit Saha (RPI) 2022, 2023
- Xinying Qi (RPI) 2022, 2023
- Lucky Yerimah (RPI) 2021

Undergraduate researchers at MIT-IBM
- Alex Gu (MIT) 2021