Parikshit Ram

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Education

Georgia Institute of Technology	Atlanta, USA	PhD (CS, minor in Optimization) 2013
Indian Institute of Technology	Kharagpur, India	MSc & BSc (Math & Computing) 2007

Research & Professional Experience

2020 – present	Principal Research Staff Member, IBM Research
2018 – 2020	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 enjoy learning about new topics and making connections. Areas I have previously focused on: Optimization, 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, ML and DM conferences and journals (h-index: 24, 50+ publications). I have also filed 20+ patents. Here is a selected subset:

- T. Ito, M. Campbell, L. Horesh, T. Klinger, and P. Ram. Quantifying artificial intelligence through algorithmic generalization. *Nature Machine Intelligence*, 2025
- 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, 180+ 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
- 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
- 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 `100+ 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 `175+ 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 Outstanding Technical Achievement Awards: *Towards Automating AI Lifecycle with AutoAI* (2019), *AutoAI: The Next Level* (2020), *Federated Learning Security & Privacy* (2022), *Neurobiologically Inspired Foundation Models* (2023).
- IBM Council for Innovation Leadership Eminence & Excellence Award (2024).
- IBM Outstanding Innovation Award for *Neurobiologically Inspired Foundation Models* (2024).
- IBM Invention Plateau 5 (2024).
- IBM Research Pat Goldberg Best Paper Finalist for *An ADMM based Framework for AutoML Pipeline Configuration* (2020).
- SIAM Data Mining Best Paper Finalist for *Fast Exact Max-Kernel Search* (2013).
- NeurIPS Top Reviewer (2022, 2023), ICML Top Reviewer (2022), TMLR Expert Reviewer (2023).

Service

- Organizer, ICML 2025 Tutorial on *Modern Methods in Associative Memory*.
- Organizer, NeurIPS 2023 Workshop on *Associative Memory and Hopfield Networks*.
- Senior PC member: AAAI (2024-25), CIKM (2025); Area Chair: NeurIPS (2024-25), ICML (2025), ICLR (2026).
- Office-hours, ICLR 2023.
- Organizer, KDD 2022 Tutorial on Gradual AutoML using Lale.
- Regular PC member for NeurIPS, ICML, AISTATS, ICLR, UAI, KDD, AAAI conferences.

Invited Talks

- **Neuro-Symbolic Summer School 08/2025**. How to Quantify Compositionality? And how it can help us?
- **VSAONLINE 05/2025**. Dense Associative Memories through the Lens of Random Features.
- **ICLR 04/2025** workshop on *New Frontiers in Associative Memories*. Associative Memories and its Role in Machine Learning.
- **Centaur AI Institute 04/2025**. What makes Models Compositional? A Neuro-Symbolic Theoretical View.
- **IIITDM Kancheepuram 12/2024** workshop on *Future Perspectives of AI & Data Sciences: Algorithms and Applications*. The Critical Role of Fundamental Mathematical Tools on the Path to AGI.
- **IJCAI 08/2024** workshop on *Logical Foundations of Neuro-Symbolic AI*. What makes Models Compositional? A Neuro-Symbolic Theoretical View.
- **INFORMS 10/2022** session on *Bilevel Stochastic Methods for Optimization and Learning*. Robust Multi-objective Bilevel Optimization With Applications In Machine Learning.
- **SIAMUQ 04/2014** minisymposium on *Nonparametric Density Estimation*. Density Estimation Trees.
- **MLConf Atlanta 08/2014**. Max-kernel Search: How to search for just about anything?
- **U Rochester 03/2013**. Fast Similarity Search for the Big Data Era: Boosting Performance with Machine Learning.

Teaching

- Associative Memories at *ICML 2025 Tutorial on Modern Methods in Associative Memory*.
- 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*.
- Multi-objective AutoML at the *KDD 2022 Hands-on Tutorial on Gradual AutoML using Lale*.

- Teaching Assistant, *Data and Visual Analytics (Spring 2011, 2013)*, Georgia Tech.

Research Grants

- *Accelerator-friendly Randomized kd-tree for Efficient Similarity Search*, NSF AI Institute for Foundations of Machine Learning (IFML).
- *Fast Inference and Alignment for Large Multi-modal Models*, RPI-IBM Future of Computing Research Collaboration Program, 2025
- *Meta-Transfer-Learning for Tabular Data Distillation, Generation, and Predictive Modeling*, RPI-IBM Future of Computing Research Collaboration Program, 2025
- *FIT: Fast Inference using Transformer Models*, RPI-IBM Future of Computing Research Collaboration Program, 2024
- *Data Distillation in Tabular Data: A Foundation Model Approach*, RPI-IBM Future of Computing Research Collaboration Program, 2024
- *A Framework for Automating Decentralized Training of Foundation Models*, RPI-IBM AI Research Collaboration Program, 2023
- *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

- Benjamin Hoover (GT), 2024-present.
- Heshan Fernanda (RPI), 2024-present.
- Inwon Kang (RPI), 2023-present.
- Jinghan Jia (MSU), 2023-2025.
- Bishwajit Saha (RPI), 2022-2024.
- Md Ibrahim Alam (RPI), 2022-present.
- Momin Abbas (RPI), 2022-2023.
- Jiancheng Liu (MSU), 2022-present.
- 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

Publications

Here is the complete list of my publications in chronological order for each publication type.

Book Chapters

1. Y. Zhou, P. Ram, T. Salonidis, N. Baracaldo, H. Samulowitz, and H. Ludwig. Hyper-parameter optimization in federated learning. In *Federated Learning*, pages 237–255. Academic Press, 2024

Journals

1. R. R. Curtin, J. R. Cline, N. P. Slagle, W. B. March, P. Ram, N. A. Mehta, and A. G. Gray. Mlpack: A scalable c++ machine learning library. *The Journal of Machine Learning Research*, 14(1):801–805, 2013
2. R. R. Curtin and P. Ram. Dual-tree fast exact max-kernel search. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, 7(4):229–253, 2014
3. R. R. Curtin, D. Lee, W. B. March, and P. Ram. Plug-and-play dual-tree algorithm runtime analysis. *Journal of Machine Learning Research*, 16:3269–3297, 2015
4. O. Keivani, K. Sinha, and P. Ram. Improved maximum inner product search with better theoretical guarantee using randomized partition trees. *Machine Learning*, 107(6):1069–1094, 2018
5. I. Kang, P. Ram, Y. Zhou, H. Samulowitz, and O. Seneviratne. On learning representations for tabular data distillation. *Transactions on Machine Learning Research*, 2025. ISSN 2835-8856
6. M. I. I. Alam, P. Ram, S. Dan, H. Samulowitz, and K. Kar. On the utility of existing fine-tuned models on data-scarce domains. *Transactions on Machine Learning Research*, 2025. ISSN 2835-8856
7. T. Ito, M. Campbell, L. Horesh, T. Klinger, and P. Ram. Quantifying artificial intelligence through algorithmic generalization. *Nature Machine Intelligence*, 2025

Conferences

1. P. Ram, D. Lee, W. March, and A. Gray. Linear-time Algorithms for Pairwise Statistical Problems. *Advances in Neural Information Processing Systems*, 22, 2009
2. P. Ram, D. Lee, H. Ouyang, and A. Gray. Rank-approximate nearest neighbor search: Retaining meaning and speed in high dimensions. *Advances in Neural Information Processing Systems*, 22, 2009
3. W. B. March, P. Ram, and A. G. Gray. Fast euclidean minimum spanning tree: algorithm, analysis, and applications. In *Proceedings of the 16th ACM SIGKDD international conference on Knowledge discovery and data mining*, pages 603–612, 2010
4. P. Ram, D. Lee, and A. G. Gray. Nearest-neighbor search on a time budget via max-margin trees. In *SIAM Data Mining*, 2012
5. 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
6. 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
7. N. Koenigstein, P. Ram, and Y. Shavitt. Efficient retrieval of recommendations in a matrix factorization framework. In *Proceedings of the 21st ACM international conference on Information and knowledge management*, pages 535–544, 2012
8. 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
9. R. Curtin, W. March, P. Ram, D. Anderson, A. Gray, and C. Isbell. Tree-independent dual-tree algorithms. In *International Conference on Machine Learning*, pages 1435–1443. PMLR, 2013
10. P. Ram and A. Gray. Which space partitioning tree to use for search? *Advances in Neural Information Processing Systems*, 26, 2013
11. O. Keivani, K. Sinha, and P. Ram. Improved maximum inner product search with better theoretical guarantees. In *2017 International Joint Conference on Neural Networks (IJCNN)*, pages 2927–2934. IEEE, 2017
12. 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
13. D. Wang, J. D. Weisz, M. Muller, P. Ram, W. Geyer, C. Dugan, Y. Tausczik, H. Samulowitz, and A. Gray. Human-ai collaboration in data science: Exploring data scientists' perceptions of automated ai. *Proceedings of the ACM on human-computer interaction*, 3(CSCW):1–24, 2019
14. 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
15. D. Wang, P. Ram, D. K. I. Weidele, S. Liu, M. Muller, J. D. Weisz, A. Valente, A. Chaudhary, D. Torres, H. Samulowitz, et al. Autoai: Automating the end-to-end ai lifecycle with humans-in-the-loop. In *Companion Proceedings*

of the 25th International Conference on Intelligent User Interfaces, pages 77–78, 2020
16. M. Katz, P. Ram, S. Sohrabi, and O. Udrea. Exploring context-free languages via planning: The case for automating machine learning. In *Proceedings of the International Conference on Automated Planning and Scheduling*, volume 30, pages 403–411, 2020
17. D. Bouneffouf, C. Aggarwal, T. Hoang, U. Khurana, H. Samulowitz, B. Buesser, S. Liu, T. Pedapati, P. Ram, A. Rawat, et al. Survey on automated end-to-end data science? In *2020 International Joint Conference on Neural Networks (IJCNN)*, pages 1–9. IEEE, 2020
18. R. Marinescu, A. Kishimoto, P. Ram, A. Rawat, M. Wistuba, P. P. Palmes, and A. Botea. Searching for machine learning pipelines using a context-free grammar. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 35, pages 8902–8911, 2021
19. 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
20. A. Kishimoto, D. Bouneffouf, R. Marinescu, P. Ram, A. Rawat, M. Wistuba, P. Palmes, and A. Botea. Bandit limited discrepancy search and application to machine learning pipeline optimization. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 36, pages 10228–10237, 2022
21. G. Baudart, M. Hirzel, K. Kate, P. Ram, A. Shinnar, and J. Tsay. Pipeline combinators for gradual automl. *Advances in Neural Information Processing Systems*, 34:19705–19718, 2021
22. A. Kannan, A. R. Choudhury, V. Saxena, S. Raje, P. Ram, A. Verma, and Y. Sabharwal. Hyperaspo: Fusion of model and hyper parameter optimization for multi-objective machine learning. In *2021 IEEE International Conference on Big Data (Big Data)*, pages 790–800. IEEE, 2021
23. 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
24. P. Ram. On the optimality gap of warm-started hyperparameter optimization. In *International Conference on Automated Machine Learning*, pages 12–1. PMLR, 2022
25. D. Subramanian, S. Wasserkrug, P. Murali, D. Phan, P. Ram, O. Davidovich, X. Ceugniet, and F. Katai. Data and knowledge driven optimization model generation for flow based optimization problems. In *INFORMS Annual Meeting*, 2021
26. P. Zhao, P. Ram, S. Lu, Y. Yao, D. Bouneffouf, X. Lin, and S. Liu. Learning to generate image source-agnostic universal adversarial perturbations. In *Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence (IJCAI-22)*, 2022
27. M. Hirzel, K. Kate, P. Ram, A. Shinnar, and J. Tsay. Gradual automl using lale. In *Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining*, pages 4794–4795, 2022
28. Y. Teng, A. Choromanska, M. Campbell, S. Lu, P. Ram, and L. Horesh. Overcoming catastrophic forgetting via direction-constrained optimization. In *Joint European Conference on Machine Learning and Knowledge Discovery in Databases*, pages 675–692. Springer International Publishing Cham, 2022
29. A. Gu, S. Lu, P. Ram, and L. Weng. Robust multi-objective bilevel optimization with applications in machine learning. In *INFORMS Annual Meeting*, 2022
30. 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
31. P. Palmes, A. Kishimoto, R. Marinescu, P. Ram, and E. Daly. Distributed automl pipeline search in pc/raspi k8s cluster. In *Julia Con*, 2022
32. P. Ram, A. G. Gray, H. C. Samulowitz, and G. Bramble. Toward theoretical guidance for two common questions in practical cross-validation based hyperparameter selection. In *Proceedings of the 2023 SIAM International Conference on Data Mining (SDM)*, pages 802–810. Society for Industrial and Applied Mathematics, 2023
33. Y. Zhang, P. Sharma, P. Ram, M. Hong, K. Varshney, and S. Liu. What is missing in irm training and evaluation? challenges and solutions. In *The 11th International Conference on Learning Representations*, 2023
34. 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
35. Y. Zhou, P. Ram, T. Salonidis, N. Baracaldo, H. Samulowitz, and H. Ludwig. Single-shot General Hyperparameter Optimization for Federated Learning. In *The 11th International Conference on Learning Representations*, 2023
36. P. Dube, T. Salonidis, P. Ram, and A. Verma. Runtime prediction of machine learning algorithms in automl systems. In *ICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 1–5. IEEE, 2023
37. 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
38. M. Feffer, M. Hirzel, S. C. Hoffman, K. Kate, P. Ram, and A. Shinnar. Searching for fairer machine learning ensembles. In *International Conference on Automated Machine Learning*, pages 17–1. PMLR, 2023

39. M. Lazuka, A. Anghel, P. Ram, H. Pozidis, and T. Parnell. xcloudserving: Automated ml serving across clouds. In *2023 IEEE 16th International Conference on Cloud Computing (CLOUD)*, pages 1–12. IEEE, 2023
40. 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
41. I. Kang, P. Ram, Y. Zhou, H. Samulowitz, and O. Seneviratne. Effective data distillation for tabular datasets (student abstract). In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 38, pages 23533–23534, 2024
42. M. Abbas, Y. Zhou, P. Ram, N. Baracaldo, H. Samulowitz, T. Salonidis, and T. Chen. Enhancing in-context learning via linear probe calibration. In *International Conference on Artificial Intelligence and Statistics*, pages 307–315. PMLR, 2024
43. M. Abbas, Y. Zhou, N. Baracaldo, H. Samulowitz, P. Ram, and T. Salonidis. Byzantine-resilient bilevel federated learning. In *2024 IEEE 13rd Sensor Array and Multichannel Signal Processing Workshop (SAM)*, pages 1–5. IEEE, 2024
44. 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
45. 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
46. 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
47. S. Carrow, K. H. Erwin, O. Vilenskaia, P. Ram, T. Klinger, N. A. Khan, N. Makondo, and A. Gray. Neural reasoning networks: Efficient interpretable neural networks with automatic textual explanations. In *Proceedings of the AAAI Conference on Artificial Intelligence*, 2025
48. C. Wang, Y. Zhang, J. Jia, P. Ram, D. Wei, Y. Yao, S. Pal, N. Baracaldo, and S. Liu. Invariance makes LLM unlearning resilient even to unanticipated downstream fine-tuning. In *Forty-second International Conference on Machine Learning*, 2025
49. C. Wang, C. Fan, Y. Zhang, J. Jia, D. Wei, P. Ram, N. Baracaldo, and S. Liu. Reasoning model unlearning: Forgetting traces, not just answers, while preserving reasoning skills. In *The 2025 Conference on Empirical Methods in Natural Language Processing*, 2025

Workshops

1. P. Ram and A. G. Gray. Fraud detection with density estimation trees. In *KDD 2017 Workshop on Anomaly Detection in Finance*, pages 85–94. PMLR, 2018
2. P. Ram, S. Liu, D. Vijaykeerthi, D. Wang, D. Bouneffouf, G. Bramble, H. Samulowitz, and A. G. Gray. Solving constrained cash problems with admm. In *7th ICML 2020 Workshop on Automated Machine Learning (AutoML)*, 2020
3. G. Baudart, M. Hirzel, K. Kate, P. Ram, and A. Shinnar. Lale: Consistent automated machine learning. In *AutoML Workshop @ KDD'20*, 2020
4. M. Hirzel, K. Kate, and P. Ram. Engineering fair machine learning pipelines. In *ICLR 2021 Workshop on Responsible AI*, 2021
5. P. Ram, A. G. Gray, and H. Samulowitz. Leveraging theoretical tradeoffs in hyperparameter selection for improved empirical performance. In *8th ICML 2021 Workshop on Automated Machine Learning (AutoML)*, 2021
6. C. Fan, P. Ram, and S. Liu. Sign-MAML: Efficient model-agnostic meta-learning by SignSGD. In *5th NeurIPS 2021 Workshop on Meta-Learning*, 2021
7. S. Wasserkrug, O. Davidovich, E. Shindin, D. Subramanian, P. Ram, P. Murali, D. Phan, N. Zhou, and L. M. Nguyen. Ensuring the quality of optimization solutions in data generated optimization models. In *IJCAI 2021 DSO (Data Science Meets Optimisation) Workshop*, 2021
8. P. Ram and K. Sinha. Flynn: Fruit-fly inspired federated nearest neighbor classification. In *International Workshop on Federated Learning for User Privacy and Data Confidentiality in Conjunction with ICML 2021 (FL-ICML'21)*, 2021
9. Y. Zhou, P. Ram, T. Salonidis, N. Baracaldo, H. Samulowitz, and H. Ludwig. Flora: Single-shot hyper-parameter optimization for federated learning. In *NeurIPS 2021 Workshop on New Frontiers in Federated Learning: Privacy, Fairness, Robustness, Personalization and Data Ownership*, 2021
10. A. Gu, S. Lu, P. Ram, and L. Weng. Nonconvex min-max bilevel optimization for task robust meta learning. In *ICML 2021 Workshop on Beyond first-order methods in ML systems*, 2021
11. M. Feffer, M. Hirzel, S. C. Hoffman, K. Kate, P. Ram, and A. Shinnar. An empirical study of modular bias mitigators and ensembles. In *ICML 2022 Workshop on Benchmarking Data for Data-Centric AI (DataPerf@ICML)*, 2022
12. R. Marinescu, T. Pedapati, L. Vu, P. Palmes, T. Mummert, P. Kirchner, D. Subramanian, P. Ram, and D. Bouneffouf. Automated decision optimization with reinforcement learning. In *AAAI-22 Workshop on AI for Decision Optimization*, 2022

13. O. Davidovich, P. Ram, S. Wasserkrug, S. Subramaniam, N. Zhou, D. Phan, P. Murali, and L. Nguyen. Addressing solution quality in data generated optimization models. In *AAAI-22 Workshop on AI for Decision Optimization*, 2022
14. T. Klinger, L. Liu, S. Dan, M. Crouse, P. Ram, and A. Gray. Compositional program generation for systematic generalization. In *IJCAI 2023 Workshop on Knowledge-Based Compositional Generalization*, 2023
15. P. Ram, T. Klinger, and A. G. Gray. How compositional is a model? In *IJCAI 2023 Workshop on Knowledge-Based Compositional Generalization*, 2023
16. M. Hirzel and P. Ram. Oversampling to repair bias and imbalance simultaneously. In *Workshop track at AutoML Conference 2023*, 2023
17. P. Ram, T. Klinger, and A. Gray. What makes models compositional? a neuro-symbolic theoretical view. In *First IJCAI 2024 International Workshop on Logical Foundations of Neuro-Symbolic AI*, 2024
18. B. Saha, D. Krotov, M. J. Zaki, and P. Ram. Deep clustering with associative memories. In *NeurIPS 2024 Workshop on Machine Learning and Compression*, 2024
19. B. Saha, D. Krotov, M. J. Zaki, and P. Ram. Deep clustering with associative memories. In *ICLR 2025 Workshop on New Frontiers in Associative Memories*, 2025
20. B. Hoover, K. Balasubramanian, D. Krotov, and P. Ram. Dense associative memory with epanechnikov energy. In *ICLR 2025 Workshop on New Frontiers in Associative Memories*, 2025
21. T. Ito, L. Cocchi, T. Klinger, P. Ram, M. Campbell, and L. Hearne. Learning interpretable positional encodings in transformers depends on initialization. In *ICML 2025 Workshop on Actionable Interpretability*, 2025

Patents

1. M. Gibiansky, R. Riegel, Y. Yang, P. Ram, and A. Gray. Configurable machine learning method selection and parameter optimization system and method, Apr. 21 2016. US Patent App. 14/883,522
2. D. K. I. Weidele and P. Ram. Conditional parallel coordinates, July 27 2021. US Patent 11,074,728
3. P. Ram, D. Wang, D. Vijaykeerthy, V. Saxena, S. Liu, A. Chaudhary, G. Bramble, H. C. Samulowitz, and A. Gray. Machine learning with multiple constraints, Mar. 10 2022. US Patent App. 17/015,243
4. M. Katz, P. Ram, S. S. Araghi, and O. Udrea. Machine learning pipeline generation, June 16 2022. US Patent App. 17/119,134
5. A. Kannan, V. Saxena, A. R. Choudhury, Y. Sabharwal, P. Ram, A. Verma, and S. M. Raje. Multi-objective machine learning with model and hyperparameter optimization fusion, Mar. 9 2023. US Patent App. 17/470,763
6. B. Zhang, G. Bramble, P. Ram, and H. C. Samulowitz. Methods for automatically configuring performance evaluation schemes for machine learning algorithms, June 20 2023. US Patent 11,681,931
7. D. K. I. Weidele, P. Ram, D. Wang, A. N. Valente, and A. Chaudhary. Conditional parallel coordinates in automated artificial intelligence with constraints, Jan. 17 2023. US Patent 11,556,816
8. A. Kishimoto, D. Bouneffouf, B. Chen, R. Marinescu, P. Ram, A. Rwat, and M. Wistuba. Automated generation of a machine learning pipeline, Apr. 11 2023. US Patent 11,625,632
9. L. Horesh, G. Nannicini, O. Gunluk, S. Dash, P. Ram, and A. Gray. Free-form integration of machine learning model primitives, Mar. 7 2023. US Patent 11,599,829
10. R. Marinescu and P. Ram. Automl with multiple objectives and tradeoffs thereof, Mar. 30 2023. US Patent App. 17/489,781
11. R. Marinescu and P. Ram. Enhanced machine learning pipelines with multiple objectives and tradeoffs, Apr. 13 2023. US Patent App. 17/450,670
12. Y. Zhou, P. Ram, N. B. Angel, T. Salonidis, H. C. Samulowitz, M. Wistuba, and H. H. Ludwig. Performing automated tuning of hyperparameters in a federated learning environment, June 15 2023. US Patent App. 17/547,122
13. E. S. Wasserkrug, O. Davidovich, E. Shindin, D. Subramanian, and P. Ram. Augmenting mathematical optimization models generated from historical data, Aug. 3 2023. US Patent App. 17/589,092
14. R. Marinescu, P. Ram, D. Bouneffouf, T. Pedapati, and P. Palmes. Computing robust policies in offline reinforcement learning, Dec. 21 2023. US Patent App. 17/807,397
15. V. Saxena, A. Kannan, S. M. Raje, P. Ram, Y. Sabharwal, and A. Verma. Multi-objective automated machine learning, Oct. 8 2024. US Patent 12,112,249
16. R. Marinescu, P. Ram, D. Bouneffouf, T. Pedapati, and P. Palmes. Reinforcement learning with multiple objectives and tradeoffs, Apr. 25 2024. US Patent App. 17/972,291
17. Y. J. Ong, Y. Zhou, P. Ram, T. Salonidis, and N. B. Angel. Personalized federated learning of gradient boosted trees, May 2 2024. US Patent App. 18/175,006
18. Y. Zhou, P. Ram, T. Salonidis, N. B. Angel, H. C. Samulowitz, and H. H. Ludwig. Automated tuning of hyperparameters based on rankings in a federated learning environment, May 2 2024. US Patent App. 18/115,596
19. T. Gokmen, V. Kalantzis, P. Ram, C. W. Wu, K. L. Clarkson, L. Horesh, and S. Ubaru. Vsa efficient lookup, 2024
20. X. Qu, P. Ram, H. C. Samulowitz, and U. Khurana. Foundational models for tabular data, 2024

21. T. Salonidis, Y. Zhou, M. Abbas, P. Ram, N. B. Angel, H. C. Samulowitz, and T. Chen. Combating byzantine attacks in bilevel federated learning systems, 2024
22. T. Parnell, M. Lazuka, A. Anghel, and P. Ram. Configuration of services across multiple cloud providers, 2024
23. M. Abbas, Y. Zhou, P. Ram, N. B. Angel, H. C. Samulowitz, T. Salonidis, and T. Chen. Enhancing in-context learning with foundation models via few-shot linear probe calibration, 2024
24. C. Park, P. Ram, K. L. Clarkson, and L. Horesh. Gpu-accelerated k-means clustering with transformers, 2025

Preprints

1. M. Hirzel, K. Kate, A. Shinnar, S. Roy, and P. Ram. Type-driven automated learning with lale. *arXiv preprint arXiv:1906.03957*, 2019
2. M. Feffer, M. Hirzel, S. C. Hoffman, K. Kate, P. Ram, and A. Shinnar. Navigating ensemble configurations for algorithmic fairness. *arXiv preprint arXiv:2210.05594*, 2022
3. T. Klinger, L. Liu, S. Dan, M. Crouse, P. Ram, and A. Gray. Compositional program generation for systematic generalization. *arXiv preprint arXiv:2309.16467*, 2023
4. H. Fernando, H. Shen, P. Ram, Y. Zhou, H. Samulowitz, N. Baracaldo, and T. Chen. Mitigating forgetting in LLM supervised fine-tuning and preference learning. *arXiv preprint arXiv:2410.15483*, 2024
5. P. Ram, K. L. Clarkson, T. Klinger, S. Ubaru, and A. G. Gray. Transformers learn faster with semantic focus. *arXiv preprint arXiv:2506.14095*, 2025
6. B. Hoover, Z. Shi, K. Balasubramanian, D. Krotov, and P. Ram. Dense associative memory with epanechnikov energy. *arXiv preprint arXiv:2506.10801*, 2025
7. D. Krotov, B. Hoover, P. Ram, and B. Pham. Modern methods in associative memory. *arXiv preprint arXiv:2507.06211*, 2025
8. K. L. Clarkson, L. Horesh, T. Ito, C. Park, and P. Ram. Finding clustering algorithms in the transformer architecture. *arXiv preprint arXiv:2506.19125*, 2025

Thesis

1. P. Ram. New paradigms for approximate nearest-neighbor search. 2013