Harikrishna Narasimhan

Senior Research Scientist
Google LLC
1600 Amphitheatre Pkwy, Mountain View, CA 94043 Email: hnarasimhan@google.com

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Research Interests

Supervised Machine Learning, Optimization, Algorithmic Fairness, Statistical Learning Theory, Machine Learning for Economic Design

Employment

Senior Research Scientist 11/2020 - Present
Research Scientist 11/2018 - 10/2020
Google, Mountain View, USA

Post-doctoral Fellow 09/2015 - 08/2018
Institute for Applied Computational Science, SEAS
Harvard University, Cambridge, USA
Advisor: Prof. David C. Parkes

Research Intern 06/2014 - 08/2014
Microsoft Research, Bangalore, India
Mentor: Dr. Prateek Jain

Education

Indian Institute of Science, Bangalore, India 08/2012 - 08/2015
Ph.D. in Computer Science (*Supported by a Google India PhD Fellowship*)
Advisor: Prof. Shivani Agarwal
CGPA: 7.5/8

Indian Institute of Science, Bangalore, India 08/2010 - 06/2012
M.E. Computer Science and Engineering
CGPA: 7.9/8 (*Awarded Best Student in M.E. CSE*)

College of Engineering, Guindy, Chennai, India 07/2006 - 05/2010
B.E. Computer Science and Engineering
CGPA: 9.94/10 (*Awarded Best Outgoing Student with Gold Medal*)

Journal Publications

Dutting, P., Feng, Z., Narasimhan, H., Parkes, D.C. and Ravindranath, S.S. **Optimal Auctions through Deep Learning**. Invited Research Highlight, *Communications of the ACM (CACM)*, accepted April 2020, forthcoming.

Narasimhan, H. and Agarwal, S. **Support Vector Algorithms for Optimizing the Partial Area Under the ROC curve**. *Neural Computation*, 29(7):1919-1963, 2017.

Majumder, B., Baraneedharan, U., Thiyagarajan, S., Radhakrishnan, P., Narasimhan, H., Dhandapani, M., Brijwani, N., Pinto, D.D., Prasath, A., Shanthappa, B.U., Thayakumar, A., Surendran, R., Babu, G., Shenoy, A.M., Kuriakose, M.A., Bergthold, G., Horowitz, P., Loda, M., Beroukhim, R., Agarwal, S., Sengupta, S., Sundaram, M. and Majumder, P.K., **Predicting clinical response to anticancer drugs using an ex vivo platform that captures tumour heterogeneity**. *Nature Communications* 6:6169, 2015.

Conference Publications

Wang, S., Guo, W., Narasimhan, H., Cotter, A., Gupta, M., Jordan, M.I. **Robust Optimization for Fairness with Noisy Protected Groups**. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.

Narasimhan, H., Cotter, A., Zhou, Y., Wang, S., Guo, W. **Approximate Heavily-constrained Learning with Lagrange Multiplier Models**. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.

Hiranandani, G., Narasimhan, H., and Koyejo, O. **Fair Performance Metric Elicitation**. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.

Tavker, S.K., Ramaswamy, H.G., and Narasimhan, H. **Consistent Plug-in Classifiers for Complex Objectives and Constraints**. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.

Jiang, Q., Adigun, O., Narasimhan, H., Fard, M.M., and Gupta M. **Optimizing Black-box Metrics with Adaptive Surrogates**. In *Proceedings of the 37th International Conference on Machine Learning (ICML)*, 2020.

Narasimhan, H., Cotter, A., Gupta, M., and Wang, S. **Pairwise Fairness for Ranking and Regression**. In *Proceedings of the 34th AAAI Conference on Artificial Intelligence (AAAI)*, 2020.

Narasimhan, H., Cotter, A., and Gupta, M. **Optimizing Generalized Rate Metrics with Three Players**. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2019 [Oral Presentation]

Cotter, A., Narasimhan, H., and Gupta, M. **On Making Stochastic Classifiers Deterministic**. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2019. [Oral Presentation]

Zhao, S., Fard, M.M., Narasimhan, H. and Gupta, M. **Metric-optimized Example Weights**. In *Proceedings of the 36th International Conference on Machine Learning (ICML)*, 2019.

Dutting, P., Feng, Z., Narasimhan, H., Parkes, D.C. and Ravindranath, S.S. **Optimal Auctions through Deep Learning**. In *Proceedings of the 36th International Conference on Machine Learning (ICML)*, 2019. [Oral Presentation]

Narasimhan, H. **Learning with Complex Loss Functions and Constraints**. In *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2018.

Golowich, N., Narasimhan, H. and Parkes, D.C. **Deep Learning for Multi-Facility Location Mechanism Design**. In *Proceedings of the 27th International Joint Conference on Artificial Intelligence (IJCAI)*, 2018.

Feng, Z., Narasimhan, H. and Parkes, D.C. **Deep Learning for Revenue-Optimal Auctions with Budgets**. In *Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2018.

Pan, W., Narasimhan, H., Kar, P., Protopapas, P. and Ramaswamy, H. **Optimizing the multiclass F-measure via biconcave programming**. In *Proceedings of the IEEE International Conference on Data Mining (ICDM)*, 2016.

Li, S., Kar, P.K., Narasimhan, H., Chawla, S. and Sebastiani, F. **Stochastic optimization techniques for quantification performance measures**. In *Proceedings of the 22nd ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2016.

Narasimhan, H., and Parkes, D.C. **A general statistical framework for designing strategy-proof assignment mechanisms**. In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2016.

Narasimhan, H., Agarwal, S. and Parkes, D.C. **Automated mechanism design without money via machine learning**. In *Proceedings of the 25th International Joint Conference on Artificial Intelligence (IJCAI)*, 2016.

Narasimhan, H., Parkes, D.C. and Singer, Y. **Learnability of influence in networks**. In *Advances in Neural Information Processing Systems (NIPS)*, 2015.

Ahmed, S., Narasimhan, H. and Agarwal, S. **Bayes optimal feature selection for supervised learning with general performance measures**. In *Proceedings of the 31st Conference on Uncertainty in Artificial Intelligence (UAI)*, 2015.

Narasimhan, H.*, Ramaswamy, H.G.*, Saha, A. and Agarwal, S. **Consistent multiclass algorithms for complex performance measures**. In *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, 2015.
(*both authors contributed equally to the paper)

Narasimhan, H., Kar, P. and Jain, P. **Optimizing non-decomposable performance measures: A tale of two classes**. In *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, 2015.

Kar, P., Narasimhan, H. and Jain, P. **Surrogate functions for maximizing precision at the top**. In *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, 2015.

Narasimhan, H.*, Vaish, R.* and Agarwal, S., **On the statistical consistency of plug-in classifiers for non-decomposable performance measures**. In *Advances in Neural Information Processing Systems (NIPS)*, 2014.
(*both authors contributed equally to the paper)

Kar, P., Narasimhan, H., and Jain, P. **Online and stochastic gradient methods for non-decomposable loss functions**. In *Advances in Neural Information Processing Systems (NIPS)*, 2014.

Agarwal, A., Narasimhan, H., Kalyanakrishnan, S., Agarwal, S. **GEV-canonical regression for accurate binary class probability estimation when one class is rare**. In *Proceedings of the 31st International Conference on Machine Learning (ICML)*, 2014.

Saha, A., Dewangan, C., Narasimhan, H., Sriram, S., and Agarwal, S. **Learning score systems for patient mortality prediction in intensive-care units via orthogonal matching pursuit**. In *Proceedings of the 13th International Conference on Machine Learning and Applications (ICMLA)*, 2014.

Narasimhan, H. and Agarwal, S. **On the relationship between binary classification, bipartite ranking, and binary class probability estimation**. In *Advances in Neural Information Processing Systems (NIPS)*, 2013. [Spotlight Presentation]

Narasimhan, H. and Agarwal, S. **$\text{SVM}^{\text{tight}}_{\text{pAUC}}$: A new support vector method for optimizing partial AUC based on a tight convex upper bound**. In *Proceedings of the 19th ACM SIGKDD Conference on Knowledge, Discovery and Data Mining (KDD)*, 2013.

Menon, A. K., Narasimhan, H., Agarwal, S. and Chawla, S. **On the statistical consistency of algorithms for binary classification under class imbalance**. In *Proceedings of the 30th International Conference on Machine Learning (ICML)*, 2013.

Narasimhan, H. and Agarwal, S. **A structural SVM based approach for optimizing partial AUC**. In *Proceedings of the 30th International Conference on Machine Learning (ICML)*, 2013.

Book Chapter

Dutting, P., Feng, Z., Narasimhan, H., Parkes, D.C. and Ravindranath, S.S. **Machine Learning for Optimal Economic Design**. In *The Future of Economic Design*, Springer, 2019.

Preprints

Hiranandani, G., Mathur, J., Narasimhan, H., and Koyejo, O. **Quadratic Metric Elicitation with Application to Fairness**. ArXiv:2011.01516 [stat.ML], 2020.

Dutting, P., Feng, Z., Narasimhan, H., Parkes, D.C. and Ravindranath, S.S. **Optimal Auctions through Deep Learning**. ArXiv:1706.03459 [cs.GT], 2020. Longer version of the conference paper under the same title.

Reviewer Service

- **Program Committee:** FAccT 2021, IJCAI 2016, IKDD CoDS 2016
- **Conference Reviewing:** ICLR 2021, NeurIPS 2020, ICML 2020, NeurIPS 2019, COLT 2019, NeurIPS 2018, STAC 2018, ICML 2015 (sub-reviewer), ICML 2013 (sub-reviewer), AISTATS 2013 (sub-reviewer)
- **Journal Reviewing:** Journal of Machine Learning Research, ACM Transactions on Economics and Computation, Artificial Intelligence, IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Cybernetics, Pattern Recognition Letters

Selected Awards and Achievements

- Reviewer awards:
  - Among top 10% of reviewers in NeurIPS 2020
  - Among top 33% of reviewers in ICML 2020
  - Among top 400 reviewers in NeurIPS 2019
  - Among top 200 reviewers in NeurIPS 2018.
- Google India PhD Fellowship in Machine Learning, 2013.
- Shell India Computational Talent Prize 2013 (SICTP) Gold Award.
- Computer Society of India (Bangalore Chapter) Medal for best M.E. student in computer science, Indian Institute of Science, 2012.
- Secured an all India rank of 4 (out of around 100,000 candidates) in Graduate Aptitude Test in Engineering (GATE) 2010.
- Several awards during the bachelors programme for academic excellence including one for Best Outgoing Student with Gold medal.

Teaching Experience

Developmental Teaching Fellow, Harvard CS109b Data Science 2, Spring 2017; 2018

Developmental Teaching Fellow, Harvard CS109a Data Science 1, Fall 2016; 2017

Teaching Fellow, Harvard AC297r CSE Capstone Project, Spring 2016

Head Teaching Assistant, IISc E0 270 Machine Learning, Spring 2015

Teaching Assistant, IISc E0 270 Machine Learning, Spring 2013

References

Available upon request.