

AARTI SINGH

Machine Learning Department, Carnegie Mellon University
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<http://www.cs.cmu.edu/~aarti/>

Research Interests:

Machine Learning, Statistical Signal Processing, Information Theory, Networked Systems

Education:

Ph.D., Electrical Engineering Aug 2008
University of Wisconsin, Madison
Thesis: Nonparametric set estimation problems in statistical inference and learning
Advisor: Robert Nowak

M.S., Electrical Engineering Dec 2003
University of Wisconsin, Madison
Thesis: Experimental investigation of TWT nonlinearities and distortion suppression by signal injection
Advisor: John E. Schärer

B.E., Electronics & Communication Engineering June 2001
University of Delhi, India

Professional Positions:

Jul 2017 - present	Associate Professor (Tenured) Machine Learning Department, Carnegie Mellon University
Jul 2015 - Jul 2017	Associate Professor Machine Learning Department, Carnegie Mellon University
Aug 2009 - Jun 2015	Assistant Professor Machine Learning Department, Carnegie Mellon University
Oct 2008 - Aug 2009	Postdoctoral Research Associate Program in Applied and Computational Mathematics, Princeton University
Jun 2001 - Aug 2008	Graduate Research and Teaching Assistant Electrical Engineering, University of Wisconsin - Madison
Jun - Aug 2000, Jan 2001	Research Trainee Central Electronics Engineering Research Institute, India

Honors and Awards:

Research

2014 **United States Air Force Office of Scientific Research Young Investigator Award**
2013 **Best student paper award**, Asilomar Conference on Signals, Systems, and Computers
2013 **National Science Foundation CAREER award**
2009 **Harold A. Peterson Best Dissertation Award**, Electrical and Computer Engineering Department, University of Wisconsin - Madison

Academic

- 2013-16 **A. Nico Habermann Junior Faculty Chair** Award
2005 Grand Integrator of Madison, University of Wisconsin Integration Bee
1997-98 Merit Scholarships - 1st rank, Electronics and Communications Engineering Department, Netaji Subhas Institute of Technology, Delhi University

Service

- 2017- **NAS Committee Member**, Committee on Applied and Theoretical Statistics, National Academy of Sciences
2017 **AISTATS Program Co-Chair**, International Conference on Artificial Intelligence and Statistics
2013 **IMS NRC Program Chair**, Institute of Mathematical Statistics New Researchers Conference

Teaching:

Carnegie Mellon University, Assistant & Associate Professor

Undergraduate Introduction to Machine Learning 10-401: Spring'16

PhD Introduction to Machine Learning 10-701/15-781: Spring'17, Fall'14, Spring'14, Fall'12, Fall'10, Spring'10

MS Introduction to Machine Learning 10-601: Fall'15, Fall'11

Information Processing and Learning 10-704: Fall'16, Spring'15, Spring'12

Statistical Machine Learning 10-702/36-702: Spring'13, Spring'11

MLD Speaking Skills Journal Club: Spring'10, Fall'09

University of Wisconsin-Madison, Teaching Assistant

Theory and Applications of Pattern Recognition: Spring'05

Digital Image Processing: Fall'04

Circuits Lab: Fall'01 - Spring'03

Student Advising:

Current

- PhD Yining Wang (PhD, Machine Learning)
Simon Du (PhD, Machine Learning) - co-advised with Barnabas Poczos
Yifan Wu (PhD, Machine Learning)
Yichong Xu (PhD, Machine Learning) - co-advised with Artur Dubrawski
Jayanth Koushik (PhD, Program in Neural Computation) - co-advised with Mike Tarr
- Masters Vivek Nangia (MS, Machine Learning)
Chiqun Zhang (MS, Machine Learning)
Danish (MS, Language Technologies Institute)
- Bachelors Shelly Bensal (BS, Computer Science)

Former

- PhD Martin Azizyan (PhD, Machine Learning, 2016, deceased)
Thesis: *High-Dimensional Analysis of Unsupervised Learning Problems*
Aaditya Ramdas (PhD, Machine Learning, 2015) - co-advised with Larry Wasserman
Thesis: *Computational and Statistical Advances in Testing and Learning*
Best Thesis Award, Statistics Department
Now: Postdoc, EECS and Statistics Department, University of California - Berkeley

Akshay Krishnamurthy (PhD, Computer Science, 2015)

Thesis: *Interactive Algorithms for Unsupervised Machine Learning*

Now: Assistant Professor, College of Information and Computer Sciences, University of Massachusetts - Amherst; Postdoc, Microsoft Research NYC

James Sharpnack (PhD, Joint Statistics-Machine Learning, 2013)

Thesis: *Graph Structured Normal Means Inference*

Now: Assistant Professor, Statistics Department, University of California - Davis; Postdoc, Mathematics Department, University of California - San Diego

Invited Talks:

Conferences and Workshops

- **Simons Institute**, Workshop on Computational Challenges in Machine Learning, Berkeley, CA, 2017.
- **Simons Institute**, Workshop on Interactive Learning, Berkeley, CA, 2017.
- **Allerton conference**, Big Data in Signal Processing session, Urbana, IL, 2016.
- **Workshop on Algorithms for Modern Massive Data Sets (MMDS)**, Berkeley, CA, 2016.
- **McKinsey Analytics Program for Executive Education**, Pittsburgh, PA, 2016.
- **Neural Information Processing Systems (NIPS)**, Easy Data II Workshop, Montreal, Canada, 2015.
- **World Economic Forum**, IdeasLab, Annual Meeting of the New Champions, Dalian, China, 2015.
- **Joint Statistical Meetings**, Tradeoffs in Resource-constrained Statistical Learning, Seattle, WA, 2015.
- **Institute for Mathematics and its Applications (IMA)**, Workshop on Graphical Models, Statistical Inference, and Algorithms (GRAMSIA), Minnesota, MN, 2015.
- **Air Force Research Laboratory**, Complex Networks Technical Interchange, Rome, NY, 2014.
- **International Society for Business and Industrial Statistics (ISBIS) and the ASA Section on Statistical Learning and Data Mining (SLDM) joint meeting**, Active Learning session, Durham, NC, 2014.
- **SIAM Conference on Optimization**, Minisymposium on Optimization for Clustering and Classification, San Diego, CA, 2014.
- **Institut des Hautes Études Scientifiques (IHES)**, Fête Parisienne in Computation, Inference and Optimization: A Young Researchers' Forum, Paris, France, 2013.
- **Banff International Research Station**, Workshop on Asymptotics of Large-Scale Interacting Networks, Banff, Canada, 2013.
- **Information Theory and Applications (ITA) Workshop**, San Diego, CA, 2013.
- **Systems, Information, Learning, and Optimization (SILO) Workshop**, Madison, WI, 2013.
- **LaunchCMU Research and Technology Startup Showcase**, Pittsburgh, PA, 2013.
- **International Conference on Signal Processing and Communications (SPCOM)**, Bangalore, India, 2012.
- **National Security Agency (NSA) Graph Analytics Workshop**, Pittsburgh, PA, 2012.

- **SIAM Conference on Imaging Science**, Minisymposium on Low Rank Modeling and its Applications to Imaging, Philadelphia, PA, 2012.
- **Information Theory and Applications (ITA) Workshop**, San Diego, CA, 2012.
- **Institute for Mathematics and its Applications (IMA)**, Workshop on Large Graphs: Modeling, Algorithms and Applications, Minnesota, MN, 2011.
- **Workshop on Infusing Statistics and Engineering**, Cambridge, MA, 2011.
- **Information Theory and Applications (ITA) Workshop**, San Diego, CA, 2011.
- **Shanks Workshop on Machine learning and the Analysis of High Dimensional Data Sets**, Nashville, TN, 2010.
- **Statistical and Applied Mathematics Sciences Institute (SAMSI)**, Complex Networks Modeling Workshop, Research Triangle Park, NC, 2010.
- **International Conference on Statistics and Society**, Sparse inference session, Beijing, China, 2010.
- **SIAM Conference on Imaging Science**, Minisymposium on Emerging Themes in Geometric Data Modeling with Applications to Imaging, Chicago, IL, 2010.
- **Information Theory and Applications (ITA) Workshop**, San Diego, CA, 2010.
- **Workshop on Statistical Signal Processing**, Madison, WI, 2009.
- **Network Mapping and Measurement Conference (NMMC)**, Laboratory for Telecommunications Sciences, College Park, MD, 2009.

Departmental Seminars

- **Georgia Institute of Technology**, School of Industrial and Systems Engineering, Statistics Seminar, 2017.
- **University of California, Berkeley**, Neyman Statistics Seminar, 2017.
- **Carnegie Mellon University**, Electrical and Computer Engineering Department, 2017.
- **Princeton University**, Wilks Statistics Seminar, 2015.
- **University of Pennsylvania**, Wharton Statistics Department, 2015.
- **Duke University**, Electrical and Computer Engineering Department, 2014.
- **University of California, San Diego**, Computer Science Department, 2014.
- **University of Wisconsin, Madison**, Computer Science Department, 2012.
- **Georgia Institute of Technology**, School of Electrical and Computer Engineering, 2012.
- **University of Wisconsin, Madison**, Electrical and Computer Engineering Department, 2011.
- **Boston University**, Statistics & Probability seminar, Department of Mathematics and Statistics, 2010.
- **Carnegie Mellon University**, Statistics Department, 2009.
- **Purdue University**, Electrical and Computer Engineering Department, 2009.
- **West Virginia University**, Lane Department of Computer Science & Electrical Engineering, 2009.
- **Carnegie Mellon University**, Machine Learning Department, 2009.
- **Rice University**, Electrical and Computer Engineering Department, 2009.

Professional Activities:

- Program Chair** International Conference on Artificial Intelligence and Statistics AISTATS 2017
Institute of Mathematical Statistics (IMS) New Researchers Conference 2013
- Guest Editor** Electronic Journal of Statistics, special issue, 2017
- Senior Committee** Committee on Applied and Theoretical Statistics, National Academy of Sciences
International Conference on Artificial Intelligence and Statistics AISTATS 2016
Conference on Neural Information Processing Systems NIPS 2012, 2013, 2015
International Conference on Machine Learning ICML 2013, 2015
IEEE International Conference on Big Data 2013
ASE/IEEE International Conference on Big Data 2013
Institute of Mathematical Statistics (IMS) New Researchers Conference 2012
International Conference on Signal Processing and Communications, SPCOM 2012
IEEE Wireless Communications and Mobile Computing Conference, IWCMC 2010
- Organizer** ICML Workshop on Active Learning: Theory and Practice, 2015
Institute of Mathematical Statistics (IMS) Annual Meeting, Invited session, 2015
NIPS Workshop on Algebraic Topology and Machine Learning, 2012
Institute for Mathematics and its Applications (IMA), Workshop on High Dimensional Phenomena, 2011
IEEE Statistical Signal Processing Workshop SSP, Student organizer, 2007
- Grant Reviewer** United States-Israel Binational Science Foundation 2013
NSF IIS Panelist 2011, NSF RI Panelist 2010
- Paper Reviewer** Journal of Machine Learning Research
Annals of Statistics
Annals of Applied Statistics
Proceedings of the National Academy of Sciences
IEEE Transactions on Information Theory
IEEE Transactions on Signal Processing
ACM Transactions on Sensor Networks
Communications of the ACM
Probability Theory and Related Fields
Elsevier Journal of Multivariate Analysis
Statistics and Computing Journal
Machine Learning Journal
Journal of Mathematical Imaging and Vision
IEEE International Symposium on Information Theory ISIT 2014
IEEE International Symposium on Signal Processing Advances in Wireless Communications SPAWC 2014
Intl. Conf. Artificial Intelligence and Statistics AISTATS 2010, 2011, 2012, 2013
International Conference on Machine Learning ICML 2010, 2012
Uncertainty in Artificial Intelligence UAI 2012
Conference on Learning Theory COLT 2009, 2012
Conference on Neural Information Processing Systems NIPS 2008, 2009, 2010
IEEE Wireless Comm. and Mobile Computing Conference IWCMC 2009, 2010

University Activities:

Service Committees

CMU, K&L Gates Ethics and Computation Steering Committee, 2017-present
CMU, Brainhub Steering Committee, 2015-present
CMU, Berkman Grant Committee, 2010, 2011
School of Computer Science, Dean Search Committee, 2013-14
School of Computer Science, Fellowship Committee, 2011
School of Computer Science, Google Fellowship Committee 2010
Machine Learning Department, Hiring Committee, 2011, 2012, 2016
Machine Learning Department, Head Search Committee, 2015
Machine Learning Department, Retreat Organizing Committee, 2013

Thesis Committees

Kirthevasan Kanadasamy (PhD, Machine Learning)
Tuning Hyper-parameters without Grad Students: Scaling up Bandit Optimisation

Victor Okhoya (PhD, Architecture)
Applications of Data Science in Architecture

Pengcheng Zhou (PhD, Joint Neural Computation and Machine Learning)
Computational Tools for Identification and Analysis of Neuronal Population Activity

Miguel Araujo (PhD, CMU-Portugal Program)
Communities and Anomalies in Large Labeled Graphs

Siheng Chen (PhD, Electrical and Computer Engineering)
Data Science on Graphs: Tools and Applications

Yifei Ma (PhD, Machine Learning)
Active Search and Bandit Methods for Complex Actions and Rewards

Eric Heim (PhD, Computer Science, University of Pittsburgh)
Efficiently and effectively learning models of similarity from human feedback

Min Xu (PhD, Machine Learning)
Shape constrained estimation in high dimensions

Narges Sharif Razavian (PhD, Language Technologies)
Continuous Graphical Models for Static and Dynamic Distributions: Application to Structural Biology

Sivaraman Balakrishnan (PhD, Language Technologies)
Finding and Leveraging Structure in Learning Problems

Mladen Kolar (PhD, Machine Learning)
Uncovering Structure in High-Dimensions: Networks and Multi-task Learning Problems

Brian Kent (PhD, Statistics)
Using structured sparse regression to add anatomical constraints to functional brain connectivity models

Liang Xiong (PhD, Machine Learning)
On Learning from Collective Data

Leman Akoglu (PhD, Computer Science)
Mining and Modeling Real Graphs: Patterns, Generators, Anomalies, and Tools

Maheshkumar Sabhnani (PhD, Machine Learning)
Disjunctive Anomaly Detection: Identifying Complex Anomalous Patterns

Yang Xu (PhD, Machine Learning - special track in the center for the neural basis of cognition)
Dynamics of visual category learning with MEG

Daniel Percival (PhD, Statistics)
Structured Sparsity

Shannon Quinn (MS, Biological Sciences)
A Framework for Inferring Protein Location as a Function of Condition

Outreach Activities:

Invited Speaker Andrew's Leap - summer enrichment program for high school students, CMU, 2012

Team Leader Neurohackathon, QualComm and Brainhub, CMU, 2015
Opportunities for undergraduate women research in Computer Science (OurCS), CMU, 2011, 2015

Panelist STEM superstar for Girls Love STEM Mashup, Carnegie Science Center, Pittsburgh, PA, 2015
AAUW (The American Association of University Women) STEM Careers high school program, Fox Chapel, PA, 2011, 2013
PA STEM Girls Collaborative Annual Conference, Allison Park, PA, 2011
Faculty panel, Women@SCS lunch, CMU, 2011

Research Publications:

(Available at <http://www.cs.cmu.edu/~aarti/pubs.html>)

Journal papers:

1. S. Balakrishnan, M. Kolar, A. Rinaldo and A. Singh. Recovering Block-structured Activations Using Compressive Measurements. *Electronic Journal of Statistics*, pp. 2647-2678, vol. 11, no. 1, 2017.
2. S. Chen, Y. Yang, S. Zong, A. Singh, and J. Kovačević. Detecting localized categorical attributes on graphs. *IEEE Transactions on Signal Processing*, pp. 2725 - 2740, vol. 65, no. 10, 2017.
3. F.-C. Yeh, J. Vettel, A. Singh, B. Póczos, S. Grafton, K. Erickson, W.-Y. Tseng, and T. Verstynen. Quantifying Differences and Similarities in Whole-Brain White Matter Architecture Using Local Connectome Fingerprints. *PLOS Computational Biology*, e1005203, pp. 1-17, vol. 12, no. 11, 2016.
4. S. Chen, R. Varma, A. Singh, and J. Kovačević. Signal recovery on graphs: Fundamental limits of sampling strategies. *IEEE Transactions on Signal and Information Processing over Networks, special issue on Inference and Learning over Networks*, pp. 539 - 554, vol. 2, no. 4, 2016.
5. J. Sharpnack, A. Singh and A. Rinaldo. Detecting Anomalous Activity on Networks with the Graph Fourier Scan Statistic. *IEEE Transactions on Signal Processing*, pp. 364-379, vol. 64, no. 2, 2016.

6. B. Fasy, F. Lecci, A. Rinaldo, L. Wasserman, S. Balakrishnan and A. Singh. Confidence Sets For Persistence Diagrams. *Annals of Statistics*, Vol. 42, No. 6, 2301-2339, 2014.
7. F. Chazal, B. Fasy, F. Lecci, A. Rinaldo, A. Singh and L. Wasserman. On the Bootstrap for Persistence Diagrams and Landscapes. *Modeling and Analysis of Information Systems*, pp. 111-120, vol. 20, no. 6, 2013.
8. M. Azizyan, A. Singh and L. Wasserman. Density-sensitive Semisupervised Inference. *Annals of Statistics*, pp. 751-771, vol. 41, no. 2, 2013.
9. A. Rinaldo, A. Singh, R. Nugent and L. Wasserman. Stability of Density-based Clustering. *Journal of Machine Learning Research (JMLR)*, pp. 905-948, vol. 13, 2012.
10. A. Singh, C. Scott and R. Nowak. Adaptive Hausdorff Estimation of Density Level Sets. *Annals of Statistics*, pp. 2760-2782, vol. 37, no. 5B, 2009.
11. A. Singh, J. E. Scharer, J. H. Booske and J. G. Wöhlbier. Second and Third-order Signal Injection for Nonlinear Distortion Suppression in a Traveling Wave Tube. *IEEE Transactions on Electron Devices, Special Issue on Vacuum Electron Devices*, pp. 709-717, vol. 52, no. 5, May 2005.
12. A. Singh, J. G. Wöhlbier, J. H. Booske and J. E. Scharer. Experimental Verification of the Mechanisms for Nonlinear Harmonic Growth and Suppression by Harmonic Injection in a Traveling Wave Tube. *Physical Review Letters*, vol. 92, no. 20, Article 205005, 2004.
13. S. Bhattacharjee, C. Marchewka, J. Welter, R. Kowalczyk, C. B. Wilsen, Y. Y. Lau, J. H. Booske, A. Singh, J. E. Scharer, R. M. Gilgenbach, M. J. Neumann, and M. W. Keyser. Suppression of Third-order Intermodulation in a Klystron by Third-order Injection. *Physical Review Letters*, 90, Article 098303, 2003.
14. M. Wirth, A. Singh, J. Scharer and J. Booske. Third-Order Intermodulation Reduction by Harmonic Injection in a TWT Amplifier. *IEEE Transactions on Electron Devices*, pp. 1082-84, vol. 49, No. 6, June 2002.

Peer-Reviewed Conference papers:

1. Z. A.-Zhu, Y. Li, A. Singh, and Y. Wang. Near-Optimal Design of Experiments via Regret Minimization. *Accepted to International Conference on Machine Learning, ICML 2017*. (acceptance rate $433/1701 = 25.5\%$)
2. P. Xie, A. Singh, and E. Xing. Uncorrelation and Evenness: A New Diversity-Promoting Regularizer. *Accepted to International Conference on Machine Learning, ICML 2017*. (acceptance rate $433/1701 = 25.5\%$)
3. S. Balakrishnan, S. S. Du, J. Li, and A. Singh. Computationally Efficient Robust Sparse Estimation in High Dimensions. *Conference of Learning Theory, COLT 2017*. (acceptance rate $73/228 = 32.0\%$)
4. S. Chen, Y. Yang, A. Singh, and J. Kovačević. Signal detection on graphs: Bernoulli noise model. *IEEE Global Conference on Signal and Information Processing, GlobalSIP 2016*.
5. D. Isenberg, A. Ramdas, A. Singh and L. Wasserman. Minimax Lower Bounds for Linear Independence Testing. *IEEE International Symposium on Information Theory, ISIT 2016*.
6. S. Chen, R. Varma, A. Singh and J. Kovačević. A statistical perspective of sampling scores for linear regression. *IEEE International Symposium on Information Theory, ISIT 2016*.

7. G. Dasarathy, A. Singh, M.-F. Balcan and J.H. Park. Active Learning Algorithms for Graphical Model Selection. *International Conference on Artificial Intelligence and Statistics*, AISTATS 2016. (acceptance rate $165/537 = 30.7\%$; oral presentation $35/537 = 6.5\%$)
8. Y. Wang, Y.-X. Wang and A. Singh. Graph Connectivity in Noisy Sparse Subspace Clustering. *International Conference on Artificial Intelligence and Statistics*, AISTATS 2016. (acceptance rate $165/537 = 30.7\%$)
9. Y. Wang and A. Singh. Noise-adaptive Margin-based Active Learning for Multi-dimensional Data and Lower Bounds under Tsybakov Noise Condition. *AAAI Conference on Artificial Intelligence*, AAAI 2016. (acceptance rate $549/2132 = 26\%$)
10. S. Chen, R. Varma, A. Singh and J. Kovačević. Representations of piecewise smooth signals on graphs. *IEEE International Conference on Acoustic, Speech and Signal Processing*, ICASSP 2016.
11. Y. Wang, Y.-X. Wang and A. Singh. Differentially Private Subspace Clustering. *Annual Conference on Neural Information Processing Systems*, NIPS 2015. (acceptance rate $403/1838 = 21.9\%$)
12. Y. Wang, Y.-X. Wang and A. Singh. A Deterministic Analysis of Noisy Sparse Subspace Clustering for Dimensionality-reduced Data. *International Conference on Machine Learning*, ICML 2015. (acceptance rate $270/1037 = 26.0\%$)
13. Y. Wang and A. Singh. An Empirical Comparison of Sampling Techniques for Matrix Column Subset Selection. *Allerton Conference on Communication, Control and Computing*, 2015.
14. S. Chen, R. Varma, A. Singh and J. Kovačević. Signal recovery on graphs: Random versus experimentally designed sampling. *Sampling Theory and Applications*, SampTA 2015, *invited paper*.
15. Y. Wang and A. Singh. Column Subset Selection with Missing Data via Active Sampling. *International Conference on Artificial Intelligence and Statistics*, AISTATS 2015. (acceptance rate $127/442 = 28.7\%$)
16. S. Reddi, A. Ramdas, B. Poczos, A. Singh and L. Wasserman. On the High Dimensional Power of a Linear-Time Two Sample Test under Mean-shift Alternatives. *International Conference on Artificial Intelligence and Statistics*, AISTATS 2015. (acceptance rate $127/442 = 28.7\%$)
17. M. Azizyan, A. Singh and L. Wasserman. Efficient Sparse Clustering of High-Dimensional Non-spherical Gaussian Mixtures. *International Conference on Artificial Intelligence and Statistics*, AISTATS 2015. (acceptance rate $127/442 = 28.7\%$)
18. S. Reddi, A. Ramdas, B. Poczos, A. Singh and L. Wasserman. On the Decreasing Power of Kernel and Distance based Nonparametric Hypothesis Tests in High Dimensions. *AAAI Conference on Artificial Intelligence*, 2015. (acceptance rate $531/1991 = 26.7\%$)
19. M. Azizyan, A. Krishnamurthy and A. Singh. Subspace Learning from Extremely Compressed Measurements. *Asilomar Conference on Signals, Systems, and Computers*, 2014, *invited paper, finalist for best student paper award*.
20. A. Ramdas, B. Poczos, A. Singh and L. Wasserman. An Analysis of Active Learning with Uniform Feature Noise. *International Conference on Artificial Intelligence and Statistics*, AISTATS 2014. (acceptance rate $= 120/335 = 35.8\%$; oral presentation $= 22/335 = 6.6\%$).

21. J. Oliva, B. Poczos, T. Verstynen, A. Singh, J. Schneider, F.-C. Yeh and E.-Y. Tseng. FuSSO: Functional Shrinkage and Selection Operator. *International Conference on Artificial Intelligence and Statistics, AISTATS 2014*. A preliminary version appeared in *NIPS 2013 workshop on Modern Non-parametric Methods in Machine Learning*.
22. A. Krishnamurthy and A. Singh. Low-Rank Matrix and Tensor Completion via Adaptive Sampling. *Annual Conference on Neural Information Processing Systems, NIPS 2013*. (acceptance rate = $360/1420 = 25.3\%$).
23. M. Azizyan, A. Singh and L. Wasserman. Minimax Theory for High-dimensional Gaussian Mixtures with Sparse Mean Separation. *Annual Conference on Neural Information Processing Systems, NIPS 2013*. (acceptance rate = $360/1420 = 25.3\%$).
24. S. Balakrishnan, S. Narayanan, A. Rinaldo, A. Singh and L. Wasserman. Cluster Trees on Manifolds. *Annual Conference on Neural Information Processing Systems, NIPS 2013*. (acceptance rate = $360/1420 = 25.3\%$).
25. J. Sharpnack, A. Krishnamurthy and A. Singh. Near-optimal Anomaly Detection in Graphs using Lovasz Extended Scan Statistic. *Annual Conference on Neural Information Processing Systems, NIPS 2013*. (acceptance rate = $360/1420 = 25.3\%$).
26. A. Krishnamurthy, J. Sharpnack and A. Singh. Recovering Graph-Structured Activations using Adaptive Compressive Measurements. *Asilomar Conference on Signals, Systems, and Computers, 2013*, invited paper; **best student paper award**.
27. A. Ramdas and A. Singh. Algorithmic Connections between Active Learning and Stochastic Convex Optimization. *Algorithmic Learning Theory, ALT 2013*. Preliminary version appeared in *NIPS 2013 workshop on Optimization for Machine Learning and an abridged version in IEEE Global Conference on Signal and Information Processing GlobalSIP 2013*.
28. A. Ramdas and A. Singh. Optimal rates for stochastic convex optimization under Tsybakov noise condition. *International Conference on Machine Learning, ICML 2013*. (acceptance rate: $283/1204 = 24\%$; oral presentation = $143/1204 = 12\%$)
29. J. Sharpnack, A. Krishnamurthy and A. Singh. Detecting Activations over Graphs using Spanning Tree Wavelet Bases. *International Conference on Artificial Intelligence and Statistics, AISTATS 2013*. (acceptance rate $71/211 = 33.6\%$; oral presentation $24/211 = 11.3\%$)
30. J. Sharpnack, A. Rinaldo and A. Singh. Changepoint Detection over Graphs with the Spectral Scan Statistic. *International Conference on Artificial Intelligence and Statistics, AISTATS 2013*. (acceptance rate $71/211 = 33.6\%$) A summary appeared in *IEEE Global Conference on Signal and Information Processing, GlobalSIP 2013*.
31. B. Poczos, A. Rinaldo, A. Singh and L. Wasserman. Distribution-free Distribution Regression. *International Conference on Artificial Intelligence and Statistics, AISTATS 2013*. (acceptance rate $71/211 = 33.6\%$; oral presentation $24/211 = 11.3\%$)
32. M. Azizyan and A. Singh. Subspace detection of high-dimensional vectors using compressive sampling. *IEEE Statistical Signal Processing Workshop, SSP 2012*.
33. A. Singh, A. Krishnamurthy, S. Balakrishnan and M. Xu. Completion of high-rank ultrametric matrices using selective entries. *International Conference on Signal Processing and Communications, SPCOM 2012*, invited paper.

34. A. Krishnamurthy, S. Balakrishnan, M. Xu and A. Singh. Efficient Active Algorithms for Hierarchical Clustering. *International Conference on Machine Learning, ICML 2012*. (acceptance rate $243/890 = 27.3\%$)
35. J. Sharpnack, A. Rinaldo and A. Singh. Sparsistency of the Edge Lasso over Graphs. *International Conference on Artificial Intelligence and Statistics, AISTATS 2012*. (acceptance rate $< 134/400 = 33.5\%$)
36. S. Balakrishnan, A. Rinaldo, D. Sheehy, A. Singh and L. Wasserman. Minimax Rates for Homology Inference. *International Conference on Artificial Intelligence and Statistics, AISTATS 2012*. (acceptance rate $< 134/400 = 33.5\%$; oral presentation $< 24/400 = 6\%$)
37. A. Krishnamurthy and A. Singh. Robust Multi-Source Network Tomography using Selective Probes. *IEEE International Conference on Computer Communications, INFOCOM 2012*. (acceptance rate $278/1547 = 18\%$)
38. S. Balakrishnan, M. Xu, A. Krishnamurthy and A. Singh. Noise Thresholds for Spectral Clustering. *Annual Conference on Neural Information Processing Systems, NIPS 2011*. (acceptance rate $305/1400=22\%$, spotlight $46/1400 = 3.3\%$)
39. M. Kolar, S. Balakrishnan, A. Rinaldo and A. Singh. Minimax Localization of Structural Information in Large Noisy Matrices. *Annual Conference on Neural Information Processing Systems, NIPS 2011*. (acceptance rate $305/1400=22\%$, spotlight $46/1400 = 3.3\%$)
40. B. Eriksson, G. Dasarathy, A. Singh and R. Nowak. Active Clustering: Robust and Efficient Hierarchical Clustering using Adaptively Selected Similarities. *International Conference on Artificial Intelligence and Statistics, AISTATS 2011*. (acceptance rate $77/272 = 28.3\%$)
41. J. Sharpnack and A. Singh. Identifying Graph-structured Activation Patterns in Networks. *Annual Conference on Neural Information Processing Systems, NIPS 2010*. (acceptance rate $293/1219 = 24\%$; oral presentation: $20/1219 = 1.6\%$)
42. A. Singh, R. Nowak and R. Calderbank. Detecting Weak but Hierarchically-Structured Patterns in Networks. *International Conference on Artificial Intelligence and Statistics, AISTATS 2010*. (acceptance rate $125/308 = 40.6\%$; oral presentation: $24/308 = 7.8\%$)
43. A. Goldberg, X. Zhu, A. Singh, Z. Xu and R. Nowak. Multi-Manifold Semi-Supervised Learning. *International Conference on Artificial Intelligence and Statistics, AISTATS 2009*. (acceptance rate $84/210 = 40\%$).
44. A. Singh, R. Nowak and X. Zhu. Unlabeled data: Now it helps, now it doesn't. *Annual Conference on Neural Information Processing Systems, NIPS 2008*. (acceptance rate $250/1022 = 24.5\%$; oral presentation: $28/1022 = 2.7\%$)
45. A. Singh, C. Scott and R. Nowak. Adaptive Hausdorff Estimation of Density Level Sets. *Conference on Learning Theory, COLT 2008*. (acceptance rate $44/126 = 34.9\%$).
46. Z. Harmany, R. Willett, A. Singh and R. Nowak. Controlling the error in fMRI: Hypothesis testing or Set estimation? *IEEE International Symposium on Biomedical Imaging, ISBI 2008*.
47. P. Ramanathan and A. Singh. Delay-differentiated Gossiping in Delay Tolerant Networks. *IEEE International Conference on Communications, ICC 2008*.

48. A. Singh, R. Nowak and P. Ramanathan. Active Learning for Adaptive Mobile Sensing Networks. *ACM/IEEE International Conference on Information Processing in Sensor Networks*, IPSN 2006.
49. M. Rabbat, J. Haupt, A. Singh and R. Nowak. Decentralized Compression and Predistribution via Randomized Gossiping. *ACM/IEEE International Conference on Information Processing in Sensor Networks*, IPSN 2006.
50. A. Singh, P. Ramanathan and B. D. Van Veen. Spatial Reuse through Adaptive Interference Cancellation in Multi-Antenna Wireless Ad Hoc Networks. *IEEE Global Telecommunications Conference, GLOBECOM 2005*.

Submitted journal papers:

1. Y. Wang, A. W. Yu and A. Singh. On Computationally Tractable Selection of Experiments in Measurement-Constrained Regression Models. *Submitted to Journal of Machine Learning Research*. <http://arxiv.org/abs/1601.02068>.
2. S. Chen, R. Varma, A. Singh, and J. Kovačević. Signal representations on graphs: Tools and applications. *Submitted to IEEE Transactions on Signal Processing*. <http://arxiv.org/abs/1512.05406>.
3. A. Ramdas, S. J. Reddi, B. Poczos, A. Singh and L. Wasserman. Adaptivity and Computation-Statistics Tradeoffs for Kernel and Distance based High-dimensional Two Sample Testing. *Submitted to Annals of Statistics (under revision)*. <http://arxiv.org/abs/1508.00655>.
4. M. Azizyan, A. Krishnamurthy and A. Singh. Extreme Compressive Sampling for Covariance Estimation. *Submitted to IEEE Transactions on Information Theory*. <http://arxiv.org/abs/1506.00898>.
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1. S. S Du, Y. Xu, Y. Li, H. Zhang, A. Singh and P. Grover. Novel Quantization Strategies for Linear Prediction with Guarantees. *ICML workshop on On Device Intelligence*, 2016.
2. Y. Wang and A. Singh. Minimax Linear Regression under Measurement Constraints. *ICML workshop on Data-efficient Machine Learning*, 2016.
3. S. Mowlaei, A. Singh and A. Ghuman. Frequency bands are an organizational force of intrinsic brain networks. *Society for Neuroscience*, 2016.
4. M. Clute, A. Singh, B. Poczoz and T. Verstynen. The predictive value of functional connectivity. *Annual Meeting of the Organization for Human Brain Mapping*, OHBM 2014.
5. M. Azizyan, A. Singh, and W. Wu. Interpretability and Informativeness of Clustering Methods for Exploratory Analysis of Clinical Data. *2nd NIPS Workshop on Machine Learning for Clinical Data Analysis, Healthcare and Genomics*, 2014.
6. S. Balakrishnan, M. Kolar, A. Rinaldo, A. Singh, and L. Wasserman. Statistical and computational tradeoffs in biclustering. *NIPS 2011 Workshop on Computational Trade-offs in Statistical Learning*.
7. A. Singh, J. E. Scharer, J. G. Wöhlbier and J. H. Booske. Sensitivity of Harmonic Injection and its Spatial Evolution for Nonlinear Distortion Suppression in a TWT. *IEEE International Vacuum Electronics Conference*, IVEC 2004.
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9. J. G. Wöhlbier, M. C. Converse, J. Plouin, A. Rawal, A. Singh, J. H. Booske. LATTE/MUSE numerical suite: An Open Source Teaching and Research Code for Traveling Wave Tube Amplifiers. *IEEE International Conference on Plasma Science*, ICOPS 2003.
10. J. G. Wöhlbier, J. H. Booske, I. Dobson, A. Singh, J. E. Scharer. A New look at the Nonlinear Physics of Traveling Wave Tubes. *American Physical Society Annual Meeting, Division of Plasma Physics*, APS-DPP 2003.
11. A. Singh, J. E. Scharer, M. Wirth, S. Bhattacharjee and J. H. Booske. Intermodulation Suppression in a Broad Band TWT. *IEEE International Vacuum Electronics Conference*, IVEC 2002.
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Sponsored Projects:

- Title: Modeling Multi-Scale Complex Phenomena Using Graphical Models and Deep Nets
PI: A. Singh and R. Salakhutdinov
Sponsor: DARPA, D17AP00001
Amount: \$391,045
Duration: 2016-2017
- Title: CIF:Medium:Signal representation, sampling and recovery on graphs
PI: J. Kovačević
Sponsor: National Science Foundation (NSF), CCF-1563918
Amount: \$690,000
Duration: 2016-2019
- Title: Active identification of complex visual features for natural scene perception
PI: A. Singh
Sponsor: ProSEED/BrainHub Seed grant
Amount: \$76,193
Duration: 2016-2017
- Title: Expert-guided machine learning for nanomaterial discovery
PI: R. Jayan
Sponsor: CIT Incubation Seed grant
Amount: \$144,661
Duration: 2016-2018
- Title: QuBBD: Collaborative Research: Personalized Predictive Neuromarkers for Stress-Related Health Risks
PI: A. Singh
Sponsor: National Science Foundation (NSF), DMS-1557572
Amount: \$91,165
Duration: 2015-2016
- Title: ConnPort: A standardized interface accessing human connectome data
PI: T. Verstynen
Sponsor: ProSEED/BrainHub Seed grant
Amount: \$45,000
Duration: 2015-2016
- Title: Towards Useful Benchmarking and Understanding of Energy Use in Urban Facilities
PI: B. Akinci
Sponsor: Metro21 grant
Amount: \$35,000
Duration: 2015
- Title: Young Investigator Award: Compressive and adaptive measurement design for inference problems in multi-attribute large-scale graphs
PI: A. Singh
Sponsor: Air Force Office of Scientific Research (AFOSR)
Amount: \$367,822
Duration: 2014-2017

- Title: CAREER: Distilling information structure from big and dirty data: Efficient learning of clusters and graphs in modern datasets.
 PI: A. Singh
 Sponsor: National Science Foundation (NSF), IIS-1252412
 Amount: \$500,000
 Duration: 2013-2018
- Title: BIGDATA: Distribution-based machine learning for high dimensional datasets.
 PI: A. Singh
 Sponsor: National Science Foundation (NSF), IIS-1247658
 Amount: \$1,000,000
 Duration: 2013-2015
- Title: 15th IMS New Researchers Conference.
 PI: A. Singh
 Sponsor: National Institute of Health (NIH)/NIBIB,
 Amount: \$15,000
 Duration: 2013-2014
- Title: 15th IMS New Researchers Conference.
 PI: A. Singh
 Sponsor: National Science Foundation (NSF), DMS-1301845
 Amount: \$25,000
 Duration: 2013-2014
- Title: Spectral Methods for Active Clustering and Bi-Clustering.
 PI: A. Singh
 Sponsor: National Science Foundation (NSF), IIS-1116458
 Amount: \$372,765 (+ \$18,000 REU-Supplement)
 Duration: 2011-2014
- Title: Resource-constrained data collection and fusion for identifying weak distributed patterns in networks.
 PI: A. Singh
 Sponsor: Air Force Office of Scientific Research (AFOSR), FA9550-10-1-0382
 Amount: \$364,734
 Duration: 2010-2013
- Title: Using Non-Local Connectivity Information to Identify Nascent Disease Outbreaks.
 PI: A. Singh
 Sponsor: NIH MIDAS National Center of Excellence at Univ. Pittsburgh, 5U54GM088491-03
 Amount: \$20,000
 Duration: 2011-2012