

Adam R. Klivans

Contact

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Education

MIT Ph.D. in Mathematics	Cambridge, MA 2002
Carnegie Mellon University M.S. in Mathematics	Pittsburgh, PA 1997
Carnegie Mellon University B.S. in Math/Computer Science	Pittsburgh, PA 1997

Professional Experience

The University of Texas at Austin <i>Professor of Computer Science</i>	Austin, TX 2019-current
The University of Texas at Austin <i>Associate Professor of Computer Science</i>	Austin, TX 2010-2018
The University of Texas at Austin <i>Assistant Professor of Computer Science</i>	Austin, TX 2005-2010
Toyota Technological Institute <i>Visiting Professor of Computer Science</i>	Chicago, IL 2004-2005
Harvard University <i>Postdoctoral Associate</i>	Boston, MA 2002-2004

Title of Dissertation

A Complexity-Theoretic Approach to Learning

Dissertation Advisor

Professor Daniel Spielman

Postdoctoral Research Topic

Computational Learning Theory

Postdoctoral Advisor

Professor Leslie Valiant

Postdoctoral Advisees

Parikshit Gopalan (Senior Researcher, VMWare)

Prahladh Harsha (Faculty, TIFR Mumbai)

Homin Lee (NSF CI Fellow, Lead Data Scientist, Data Dog)

Graduated Students

Alexander Sherstov PhD 2008 (Associate Professor, UCLA)

Pravesh Kothari PhD 2015 (Assistant Professor, CMU)

Surbhi Goel PhD 2020 (Postdoctoral Fellow, Microsoft Research)

Current Students

Sushrut Karmalkar (expected 2021)

Aravind Gollakota (expected 2022)

Current Research Interests

Machine Learning, Theoretical Computer Science, Pseudorandomness

Grants

Previous Funding: PI

National Science Foundation (NSF); "Learning in Worst-Case Noise Models"; \$500,000; 2/2010–2/2016

Texas Advanced Research Program Award; "Efficient Algorithms for Complex Machine Learning Tasks"; \$150,000; 5/2008–5/2010

National Science Foundation (NSF) CAREER Award; "CAREER: The Computational Complexity of Halfspace-Based Learning"; \$400,000; 2/2007–2/2012

Current Funding: PI/Co-PI

National Science Foundation (NSF); "National Artificial Intelligence Institute for Foundations of Machine Learning", PI (Institute Director); \$20,000,000 10/2020 – 9/2025

National Science Foundation (NSF); “HDR Tripods: UT-Austin Institute for Foundations of Data Science”, co-PI; \$1,500,000 9/2019 – 9/2022

National Science Foundation (NSF); “Efficient Algorithms for Nonconvex Regression”, Sole PI; \$400,000 9/2019 – 9/2022

National Science Foundation (NSF); “Efficient Algorithms for Learning Neural Network Architectures with Applications”, Sole PI; \$450,000; 7/2017–7/2020

Awards and Honors

2019: Member, IAS School of Mathematics (special year on Machine Learning and Optimization)

2018: Long-Term Participant, Simons Institute Program on Foundations of Deep Learning

2017: Microsoft Azure Data Science Initiative Award

2013: College of Natural Sciences Teaching Excellence Award

2011: Research Professorship, MSRI Workshop on Quantitative Geometry

2007: National Science Foundation Faculty Early Career Development Award (NSF CAREER)

2004: National Science Foundation Postdoctoral Research Fellowship

1997: Andrew Carnegie Presidential Scholar; *Given to one graduating computer science major at CMU each year*

Paper Awards

2019: Spotlight Presentation (top 2% of papers), NeurIPS 2019 for “List-Decodable Linear Regression”

2019: Spotlight Presentation (top 2% of papers), NeurIPS 2019 for “Time/Accuracy Tradeoffs for Learning a ReLU with Gaussian Marginals”

2014: Oral Presentation (top 2% of papers), NIPS for “Sparse Polynomial Learning and Graph Sketching”

2010: Invited to Theory of Computing Journal for a special issue on Fourier Analysis in TCS for “Bounding the Sensitivity of Polynomial Threshold Functions”

2006: Invited to Journal of Computer and System Sciences, special issue for top papers in FOCS 2006 for “Cryptographic Hardness for Learning Intersections of Halfspaces”

2006: Invited to Journal of Computer and System Sciences, special issue for top papers in learning theory for “Efficient Learning Algorithms Yield Circuit Lower Bounds”

2006: COLT Best Student Paper Award (with A. Sherstov) for “Unconditional Lower Bounds for Learning Intersections of Halfspaces”

2006: Invited to Machine Learning Journal, special issue for top Learning Theory papers of 2006 for “Unconditional Lower Bounds for Learning Intersections of Halfspaces”

2005: Invited to Journal of Computer and System Sciences, special issue for top papers in FOCS 2005 for “Agnostically Learning Halfspaces”

2004: Invited to Journal of Computer and System Sciences, special issue for top papers in FOCS 2004 for “Learnability and Automatizability”

2004: Invited to Journal of Computer and System Sciences, special issue for top learning theory papers of 2004 for “Learning Intersections of Halfspaces with a Margin”

2002: Invited to Journal of Computer and System Sciences, special issue for top papers in FOCS 2002 for “Learning Intersections and Thresholds of Halfspaces”

2001: STOC Best Student Paper Award for “Learning DNF in Time $2O^{\sim}(n^{1/3})$ ”

2001: Invited to Journal of Computer and System Sciences, special issue for top papers in STOC 2001 for “Learning DNF in Time $2O^{\sim}(n^{1/3})$ ”

1999: Invited to Machine Learning Journal, special issue for top Learning Theory papers of 1999 for “Boosting and Hard-Core Sets”

Publications

All articles are refereed. For latest articles see “Articles in Conference Proceedings” below.

Publications while in Rank of Professor

See Articles in Conference Proceedings.

Publications while in Rank of Associate Professor

61. Prahladh Harsha, Adam Klivans, Raghu Meka. Bounding the Sensitivity of Polynomial Threshold Functions In Theory of Computing, Vol 10(1) pages 1–26, 2014.

60. Prahladh Harsha, Adam Klivans, Raghu Meka. An Invariance Principle for Polytopes. In Journal of the ACM, Vol. 59(6) pages 1–25, 2012.

See also Articles in Conference Proceedings.

Publications while in Rank of Assistant Professor

59. Adam Klivans, Alexander Sherstov. Lower Bounds for Agnostic Learning via Approximate Rank. In Computational Complexity, Vol. 19(4) pages 581–604, 2010.

58. Adam Klivans, Alexander Sherstov. Cryptographic Hardness for Learning Intersections of Halfspaces. In J. Comput. Syst. Sci., Vol 75(1) pages 2–12, 2009.

57. Lance Fortnow, Adam Klivans. Efficient Learning Algorithms Yield Circuit Lower Bounds. In J. Comput Syst. Sci., Vol75(1) pages 27–36, 2009.

56. Adam Klivans, Philip Long, Rocco Servedio. Learning Halfspaces with Malicious Noise. In Journal of Machine Learning Research, Vol 10 pages 2715–2740, 2009.

55. Michael Alekhnovich, Mark Braverman, Vitaly Feldman, Adam Klivans, Toniann Pitassi. The complexity of properly learning simple concept classes. In J. Comput. Syst. Sci., Vol 74(1) pages 16–34, 2008.

54. Adam Klivans, Rocco Servedio. Learning Intersections of Halfspaces with a Margin. In J. Comput. Syst Sci., Vol 74(1) pages 35–48, 2008.

53. Adam Kalai, Adam Klivans, Yishay Mansour, Rocco Servedio. Agnostically Learning Halfspaces. In SIAM J. Comput., Vol 37(6) pages 1777–1805, 2008.

52. Adam Klivans, Alexander Sherstov. Unconditional Lower Bounds for Learning Intersections of Halfspaces. In Machine Learning, Vol. 69(2-3) pages 97–114, 2007.

51. Adam Klivans, Rocco Servedio. Toward Attribute Efficient Learning of Decision Lists and Parities. In Journal of Machine Learning Research, Vol. 7 pages 587–602, 2006.

50. Adam Klivans, Amir Shpilka. Learning Restricted Models of Arithmetic Circuits. In Theory of Computing, Vol. 2(10) pages 185–206, 2006.

See also Articles in Conference Proceedings.

[Publications as a Postdoctoral Fellow](#)

49. Adam Klivans, Rocco Servedio. Learning DNF in Time $2O^{\tilde{}}(n^{1/3})$. In *J. Comput. Syst. Sci.*, Vol. 68(2) pages 303–318, 2004.

48. Adam Klivans, Dieter van Melkebeek. Graph Nonisomorphism has Subexponential Size Proofs Unless the Polynomial-Time Hierarchy Collapses. In *SIAM J. Comput.*, Vol. 31(5) pages 1501–1526, 2002.

See also Articles in Conference Proceedings.

[Publications as a Graduate Student](#)

See Articles in Conference Proceedings.

[Articles in Conference Proceedings as a Professor](#)

47. Ilias Diakonikolas, Surbhi Goel, Sushrut Karmalkar, Adam Klivans, Mahdi Soltanolkotabi. Approximation Schemes for Relu Regression. In *COLT*, 2020.

46. Surbhi Goel, Aravind Gollakota, Zhihan Jin, Sushrut Karmalkar, Adam Klivans. Superpolynomial Lower Bounds for Learning One Layer Neural Networks Using Gradient Descent. In *ICML*, 2020.

45. Sushrut Karmalkar, Pravesh Kothari, Adam Klivans. List-Decodable Linear Regression. In *NeurIPS*, 2019 (Spotlight).

44. Surbhi Goel, Sushrut Karmalkar, Adam Klivans. Time/Accuracy Tradeoffs for Learning a ReLU with Gaussian Marginals. In *NeurIPS*, 2019 (Spotlight).

43. Surbhi Goel, Adam Klivans. Learning Neural Networks with Two Nonlinear Layers in Polynomial-Time. In *COLT*, 2019.

42. Surbhi Goel, Daniel Kane, Adam Klivans. Learning Ising Models with Independent Failures. In *COLT*, 2019.

[Articles in Conference Proceedings as an Associate Professor](#)

41. Surbhi Goel, Adam Klivans. Learning Neural Networks with Two Nonlinear Layers in Polynomial Time. In *COLT*, 2019.

40. Adam Klivans, William Hoza. Preserving Randomness for Adaptive Algorithms. In *RANDOM*, pages 42:1–42:19, 2018.

39. Adam Klivans, Pravesh Kothari, Raghu Meka. Efficient Algorithms for Outlier-Robust Regression. In *COLT*, pages 1420–1430, 2018.

38. Surbhi Goel, Adam Klivans, Raghu Meka. Learning One Convolutional Layer with Overlapping Patches. In *ICML*, pages 1778–1786, 2018.

37. Elad Hazan, Adam Klivans, Yang Yuan. Hyperparameter Optimization: A Spectral Approach. In *ICLR*, 2018. Selected Oral Presentation, NIPS Workshop on Deep Learning: Theory and Practice.

36. Surbhi Goel, Adam Klivans. Eigenvalue Decay Implies Polynomial-Time Learnability for Neural Networks. In NIPS, pages 2189–2199, 2017.
 35. Adam Klivans, Raghu Meka. Learning Graphical Models Using Multiplicative Weights. In FOCS, pages 343–354, 2017.
 34. Surbhi Goel, Varun Kanade, Adam Klivans, Justin Thaler. Reliably Learning the ReLU in Polynomial Time. In COLT, pages 1004–1042, 2017.
 33. Erik Lindgren, Alex Dimakis, Adam Klivans. Exact MAP Inference by Avoiding Fractional Vertices. In ICML, pages 2120–2129, 2017.
 32. Murat Kocaoglu, Karithikeyan Shanmugan, Alex Dimakis, Adam Klivans. Sparse Polynomial Learning and Graph Sketching. In NIPS, pages 3122–3130, 2014.
 31. Adam Klivans, Pravesh Kothari. Embedding Hard Learning Problems into Gaussian Space. In RANDOM, pages 793–908, 2014.
 30. Adam Klivans, Pravesh Kothari, Igor Oliveira. Constructing Hard Functions Using Learning Algorithms. In Conference on Computational Complexity, pages 86–97, 2013.
 29. Daniel Kane, Adam Klivans, Raghu Meka. Learning Halfspaces Under Log-Concave Densities: Polynomial Approximations and Moment Matching. In COLT, pages 522–545, 2013.
 28. Eshan Chattopadhyay, Adam Klivans, Pravesh Kothari. An Explicit VC-Theorem for Low-Degree Polynomials. In RANDOM, pages 495–504, 2012.
 27. Mahdi Cheraghchi, Adam Klivans, Pravesh Kothari, Homin Lee. Submodular Functions are Noise Stable. In SODA, pages 1586–1592, 2012.
 26. Parikshit Gopalan, Adam Klivans, Raghu Meka. Learning Functions of Halfspaces Using Prefix Covers. In COLT, pages 15.1–15.10, 2012.
 25. Parikshit Gopalan, Adam Klivans, Raghu Meka. An FPTAS for #Knapsack and Related Counting Problems. (Merged with a similar result due to Stefankovic, Vempala, and Vigoda). In FOCS, pages 817–826, 2011.
- [Articles in Conference Proceedings as an Assistant Professor](#)
26. Adam Klivans, Homin Lee, Andrew Wan. Masour’s Conjecture is True for Random DNF Formulas. In COLT, pages 368–380, 2010.
 25. Ilias Diakonikolas, Prahladh Harsha, Adam Klivans, Raghu Meka, Prasad Raghavendra, Rocco Servedio, Li-Yang Tan. Bounding the Average Sensitivity and Noise Sensitivity of Polynomial Threshold Functions. In STOC, pages 533–542, 2010.
 24. Prahladh Harsha, Adam Klivans, Raghu Meka. An Invariance Principle for Polytopes. In STOC, pages 543–552, 2010.
 23. Adam Klivans, Philip Long, Alex Tang. Baum’s Algorithm Learns Intersections of Halfspaces with Respect to Log-Concave Distributions. In RANDOM, pages 588–600, 2009.

22. Adam Klivans, Philip Long, Rocco Servedio. Learning Halfspaces with Malicious Noise. In ICALP, pages 609–621, 2009.
 21. Adam Klivans, Ryan O'Donnell, Rocco Servedio. Learning Geometric Concepts via Gaussian Surface Area. In FOCS, pages 541–550, 2008.
 20. Parikshit Gopalan, Adam Klivans, David Zuckerman. List-decoding Reed-Muller Codes over Small Fields. In STOC, pages 265–274, 2008.
 19. Parikshit Gopalan, Adam Kalai, Adam Klivans. Agnostically Learning Decision Trees. In STOC, pages 527–536, 2008.
 18. Adam Klivans, Alexander Sherstov. A Lower Bound for Agnostically Learning Disjunctions. In COLT, pages 409–423, 2007.
 17. Adam Klivans, Alexander Sherstov. Improved Lower Bounds for Learning Intersections of Halfspaces. In COLT, pages 335–349, 2006.
 16. Lance Fortnow, Adam Klivans. Efficient Learning Algorithms Yield Circuit Lower Bounds. In COLT, pages 350–363, 2006.
 15. Adam Klivans, Alexander Sherstov. Cryptographic Hardness for Learning Intersections of Halfspaces. In FOCS, pages 553–562, 2006.
 14. Lance Fortnow, Adam Klivans. Linear Advice for Randomized Logarithmic Space. In STACS, pages 469–476, 2006.
 13. Lance Fortnow, Adam Klivans. NP with Small Advice. In Conference on Computational Complexity, pages 228–234, 2005.
 12. Adam Kalai, Adam Klivans, Yishay Mansour, Rocco Servedio. Agnostically Learning Halfspaces. In FOCS, pages 11–20, 2005.
- [Articles in Conference Proceedings as a Postdoctoral Fellow](#)
11. Adam Klivans, Rocco Servedio. Toward Attribute Efficient Learning of Decision Lists and Parities. In COLT, pages 224–238, 2004.
 10. Adam Klivans, Rocco Servedio. Learning Intersections of Halfspaces with a Margin. In COLT, pages 348–362, 2004.
 9. Michael Alekhnovich, Mark Braverman, Vitaly Feldman, Adam Klivans, Toniann Pitassi. Learnability and Automatizability. In FOCS, pages 621–630, 2004.
 8. Adam Klivans, Amir Shpilka. Learning Arithmetic Circuits via Partial Derivatives. In COLT, pages 463–476, 2003.
- [Articles in Conference Proceedings as a Graduate Student](#)
7. Jeffrey Jackson, Adam Klivans, Rocco Servedio. Learnability Beyond AC^0 . In FOCS, pages 177–186, 2002.
 6. Adam Klivans, Ryan O'Donnell, Rocco Servedio. Learning Intersections and Threshold of Halfspaces. In FOCS, pages 177–186, 2002.

5. Adam Klivans. On the Derandomization of Constant-Depth Circuits. In RANDOM, pages 249–260, 2002.
4. Adam Klivans, Daniel Spielman. Randomness Efficient Identity Testing of Multivariate Polynomials. In STOC, pages 216–223, 2001.
3. Adam Klivans, Rocco Servedio. Learning DNF in Time $2^{O(n^{1/3})}$. In STOC, pages 258–265, 2001.
2. Adam Klivans, Rocco Servedio. Boosting and Hard-Core Sets. In FOCS, pages 624–633, 1999.
1. Adam Klivans, Dieter van Melkebeek. Graph Nonisomorphism has Subexponential Size Proofs Unless the Polynomial-Time Hierarchy Collapses. In STOC, pages 659–667, 1999.

Service

Departmental Service

2019-present: Director, Online Masters' Degree Program in Computer Science
2017-present: GSC Chair
2017-2018: Undergraduate Studies Committee
2017: Fundraising Trip to Worldquant for Machine Learning Institute
2016-2017: Doctoral Admissions
2016-2017: GDC Advisory Board
2013-2014: Faculty Evaluation Committee 2012-2013: Doctoral Admissions (Chair) 2012-2013: Events (Chair)
2012-2013: Revamped Mathematics for CS curriculum; 2 semester course series; created online course for CS311
2011-2012: Revamped Mathematics for CS curriculum; 2 semester course series
2011-2012: Faculty Recruiting
2011-2012: Gates Building Design Committee
2010-2011: Undergraduate Studies
2010-2011: Gates Building Design Committee
2009-2010: Undergraduate Studies
2009-2010: Doctoral Admissions
2008-2009: Events
2007-2008: Faculty Evaluation
2006-2007: Faculty Evaluation

College Service

2017: Chair, Dean's committee to spearhead the creation of a Center for Machine Learning
2013: Created an online course (full video lectures and other written materials) for Associate Dean for Undergraduate Education's flipped classroom initiative
2013: Panelist for Associate Dean for Undergraduate Education's flipped classroom initiative

Community Service

2011: Interview, the Wall Street Journal for "Generation Jobless: Students Pick Easier Majors Despite Less Pay"

Seminars and Lectures

Conference Speaker Presentations

- 2018:** “Efficient Algorithms for Outlier-Robust Regression,” COLT, Stockholm, Sweden.
- 2017:** “Learning Undirected Graphical Models via Multiplicative Weights,” FOCS, Berkeley, CA.
- 2008:** “Learning Geometric Concepts via Gaussian Surface Area,” FOCS, Philadelphia, PA.
- 2006:** “Efficient Learning Algorithms Yield Circuit Lower Bounds,” COLT, Pittsburgh, PA. 2005: “NP with Small Advice,” Conference on Computational Complexity, San Jose, CA. 2004: “Learning Intersections of Halfspaces with a Margin,” COLT, Banff, Canada.
- 2003:** “Learning Arithmetic Circuits,” COLT, Washington D.C.
- 2001:** “On the Derandomization of Constant Depth Circuits,” RANDOM, Berkeley, CA.
- 1999:** “Graph Nonisomorphism has Subexponential Size Proofs Unless the Polynomial-Time Hierarchy Collapses,” STOC, Atlanta, GA.

Invited Conference Speaker

- 2017:** Rice Data Science Conference, Houston, TX.

Invited Workshop Speaker

- 2019:** Simons Institute Foundations of Deep Learning, Berkeley CA.
- 2018:** Simons Institute Workshop on Robust Learning, Berkeley, CA.
- 2018:** Georgia Tech Workshop on Foundations of Deep Learning (upcoming), Atlanta, GA.
- 2017:** Simons Institute Workshop on Pseudorandomness, Berkeley CA. 2017: Simons Institute Workshop on Machine Learning, Berkeley, CA. 2016: DIMACS Workshop on Learning and Cryptography, Piscataway, NJ.
- 2013:** Simons Institute “Learning Theory Bootcamp,” (Four Lectures), Berkeley, CA.
- 2013:** Simons Institute Workshop on Real Analysis in Testing, Learning and Inapproximability, Berkeley, CA.
- 2011:** MSRI Workshop on Quantitative Geometry in Computer Science, Berkeley, CA.
- 2009:** Princeton Barriers in Computational Complexity, Princeton, NJ.
- 2009:** ITA Workshop on Information Theory and Applications, San Diego, CA.
- 2008:** NSF Workshop on Probability and Computing, Ithaca, NY.
- 2008:** FoCM workshop on Learning Theory, Hong Kong.
- 2008:** BIRS workshop on Analytic Methods in Complexity, Banff, Canada.
- 2007:** Dagstuhl workshop Algebra and Complexity, Dagstuhl, Germany.
- 2006:** BIRS workshop on Advances in Complexity, Banff, Canada.
- 2003:** TTI Machine Learning Workshop on Reductions, Chicago, IL.
- 2003:** DIMACS Workshop on Complexity and Inference, Piscataway, NJ.
- 1999:** DIMACS Workshop on Pseudorandomness and Combinatorial Constructions, Piscataway, NJ.

Invited Departmental Colloquia

- 2019:** MIT, SDS (Statistics and Data Science) Colloquium, Cambridge MA.
- 2017:** MIT, TOC (Theory of Computing) Colloquium, Cambridge, MA.

Invited Talks Hosted by University Research Group

- 2018:** University of Texas at Austin Theory Seminar, Austin, TX.
- 2016:** Princeton University Theory Seminar, Princeton, NJ.
- 2012:** CMU Theory Seminar, Pittsburgh, PA.
- 2009:** University of Washington Theory Seminar, Seattle, WA.
- 2008:** Georgia Tech Theory Seminar, Atlanta, GA.

2008: MIT Theory Seminar, Cambridge, MA.
2007: Yale University Theory Seminar, New Haven, CT.
2006: Carnegie-Mellon University Theory Seminar, Pittsburgh, PA.
2005: University of Texas Theory Seminar, Austin, TX. 2004: University of Wisconsin Theory Seminar, Madison, WI. 2004: UIUC AI Seminar, Urbana, IL.
2004: Cornell University Theory Seminar, Ithaca, NY.
2003: Brown University Theory Seminar, Providence, RI.
2003: Harvard-Radcliffe Theory of Computation Seminar, Cambridge, MA.

Invited Talks Hosted by Industry/Government Labs or Professional Societies

2013: Microsoft Research Seminar, Mountain View, CA.
2004: Toyota Technological Institute, Chicago, IL.

Professional Service

Conference Chair Positions

2009: Program co-chair for COLT (Conference on Learning Theory).

Major Conference Program Committees

2020: Senior Program Committee, Conference on Learning Theory (COLT).
2019: Foundations of Computer Science (FOCS).
2019: Conference on Learning Theory (COLT).
2016: Randomization and Approximation (RANDOM).
2013: Conference on Learning Theory (COLT). 2013: Foundations of Computer Science (FOCS).
2012: Foundations of Computer Science (FOCS).
2012: Innovations in Theoretical Computer Science (ITCS).
2011: Conference on Learning Theory (COLT). 2009: Conference on Learning Theory (COLT).
2009: Symposium on Discrete Algorithms (SODA).
2008: European Conference on Machine Learning (ECML).
2008: Randomization and Approximation (RANDOM).
2007: Foundations of Computer Science (FOCS).
2007: International Conference on Machine Learning (ICML).
2007: Conference on Learning Theory (COLT).
2007: Conference on Computational Complexity (CCC).
2007: Algorithmic Learning Theory (ALT).
2004: Symposium on Theory of Computing (STOC).
2004: International Conference on Machine Learning (ICML).

Journal, Conference, and Book Reviewing

2006–present: Associate Editor, Machine Learning Journal.
2004–present: Editor, Theory of Computing Journal.

In addition to program committee service, the candidate has done several reviews for conferences and journals. Records of these are not kept.

Grant Proposal Reviewing

2010: National Science Foundation (NSF) CAREER Award Panel.
2008: National Science Foundation (NSF) Algorithmic Foundations Panel.
The candidate also reviews other grant proposals upon request by colleagues. Records of these are not kept.