Stanford



Gregory Valiant

Associate Professor of Computer Science

Curriculum Vitae available Online

Bio

ACADEMIC APPOINTMENTS

- Associate Professor, Computer Science
- Member, Bio-X
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)

HONORS AND AWARDS

- Young Investigator Award, Office of Naval Research (2018)
- Hellman Faculty Scholar, The Hellman Fellows Program (2017)
- Sloan Foundation Fellowship, The Sloan Foundation (2016)
- NSF CAREER Award, National Science Foundation (2014)
- ACM Doctoral Dissertation Award, Honorable Mention, Association for Computing Machinery (ACM) (2012)

PROFESSIONAL EDUCATION

- PhD, UC Berkeley , Computer Science (2012)
- BA, Harvard University , Mathematics (2006)

LINKS

- My academic website: http://theory.stanford.edu/~valiant/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My primary research interests lie at the intersection of algorithms, learning, applied probability, and statistics. I am particularly interested in understanding the algorithmic and information theoretic possibilities and limitations for many fundamental information extraction tasks that underly real-world machine learning and data-centric applications.

Teaching

COURSES

2026-27

- Randomized Algorithms and Probabilistic Analysis: CME 309, CS 265 (Aut)
- The Modern Algorithmic Toolbox: CS 168 (Win)

- Theory in the Age of LLMs: CS 369 (Win)

2023-24

- Randomized Algorithms and Probabilistic Analysis: CME 309, CS 265 (Aut)
- The Modern Algorithmic Toolbox: CS 168 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)

Spencer Compton

Doctoral Dissertation Co-Advisor (AC)

Steven Cao, Chirag Pabbaraju, Aidan Perreault

Doctoral (Program)

Spencer Compton, Mika Jain

Publications

PUBLICATIONS

- **ATTAINABILITY OF TWO-POINT TESTING RATES FOR FINITE-SAMPLE LOCATION ESTIMATION** *ANNALS OF STATISTICS*
  Compton, S., Valiant, G.
  2026; 54 (3): 1474-1501
- **ON THE STATISTICAL COMPLEXITY OF SAMPLE AMPLIFICATION** *ANNALS OF STATISTICS*
  Axelrod, B., Garg, S., Han, Y., Sharan, V., Valiant, G.
  2024; 52 (6): 2767-2790
- **Efficient Convex Optimization Requires Superlinear Memory** *JOURNAL OF THE ACM*
  Marsden, A., Sharan, V., Sidford, A., Valiant, G.
  2024; 71 (6)
- **Memory-Sample Tradeoffs for Linear Regression with Small Error** *Symposium on Theory of Computing (STOC)*
  Sharan, V., Sidford, A., Valiant, G.
  2019
- **Estimating the Unseen: Improved Estimators for Entropy and Other Properties** *JOURNAL OF THE ACM*
  Valiant, G., Valiant, P.
  2017; 64 (6)
- **SPECTRUM ESTIMATION FROM SAMPLES** *ANNALS OF STATISTICS*
  Kong, W., Valiant, G.
  2017; 45 (5): 2218–47
- **Quantifying unobserved protein-coding variants in human populations provides a roadmap for large-scale sequencing projects.** *Nature communications*
  Zou, J., Valiant, G., Valiant, P., Karczewski, K., Chan, S. O., Samocha, K., Lek, M., Sunyaev, S., Daly, M., MacArthur, D. G.
  2016; 7: 13293-?
- **Finding Correlations in Subquadratic Time, with Applications to Learning Parities and the Closest Pair Problem** *JOURNAL OF THE ACM*
  Valiant, G.
  2015; 62 (2)
- **Learning from Untrusted Data** *Proceedings of the 49th Annual ACM SIGACT Symposium on Theory of Computing (STOC)*
  Charikar, M., Steinhardt, J., Valiant, G.
  2017

- **Adaptive and Oblivious Statistical Adversaries Are Equivalent**
  Blanc, G., Valiant, G.
  edited by Koucky, M., Bansal, N.
  ASSOC COMPUTING MACHINERY.2025: 2031-2042
- **Generalized Trace Reconstruction Problem: Recovering a String of Probabilities**
  Rivkin, J., Valiant, G., Valiant, P.
  edited by Koucky, M., Bansal, N.
  ASSOC COMPUTING MACHINERY.2025: 1657-1667
- **Near-Optimal Mean Estimation with Unknown, Heteroskedastic Variances**
  Compton, S., Valiant, G.
  edited by Mohar, B., Shinkar, O'Donnell, R.
  ASSOC COMPUTING MACHINERY.2024: 194-200
- **Matrix Multiplication in Quadratic Time and Energy? Towards a Fine-Grained Energy-Centric Church-Turing Thesis**
  Valiant, G.
  edited by Guruswami
  SCHLOSS DAGSTUHL, LEIBNIZ CENTER INFORMATICS.2024
- **Efficient Convex Optimization Requires Superlinear Memory (Extended Abstract)**
  Marsden, A., Sharan, V., Sidford, A., Valiant, G.
  edited by Elkind, E.
  IJCAI-INT JOINT CONF ARTIF INTELL.2023: 6468-6473
- **Lexinvariant Language Models**
  Huang, Q., Zelikman, E., Li Chen, S., Wu, Y., Valiant, G., Liang, P.
  edited by Oh, A., Neumann, T., Globerson, A., Saenko, K., Hardt, M., Levine, S.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2023
- **One-sided Matrix Completion from Two Observations Per Row**
  Cao, S., Liang, P., Valiant, G.
  edited by Krause, A., Brunskill, E., Cho, K., Engelhardt, B., Sabato, S., Scarlett, J.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2023
- **ReporterSeq reveals genome-wide dynamic modulators of the heat shock response across diverse stressors.** *eLife*
  Alford, B. D., Tassoni-Tsuchida, E., Khan, D., Work, J. J., Valiant, G., Brandman, O.
  2021; 10
- **Misspecification in Prediction Problems and Robustness via Improper Learning**
  Marsden, A., Duchi, J., Valiant, G.
  edited by Banerjee, A., Fukumizu, K.
  MICROTOME PUBLISHING.2021
- **Stronger Calibration Lower Bounds via Sidestepping**
  Qiao, M., Valiant, G.
  edited by Khuller, S., Williams, V. V.
  ASSOC COMPUTING MACHINERY.2021: 456-466
- **Sinkhorn Label Allocation: Semi-Supervised Classification via Annealed Self-Training**
  Tai, K., Bailis, P., Valiant, G.
  edited by Meila, M., Zhang, T.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2021: 7067-7079
- **Beyond Laurel/Yanny: An Autoencoder-Enabled Search for Polyperceivable Audio**
  Chandra, K., Kabaghe, C., Valiant, G., Assoc Computat Linguist
  ASSOC COMPUTATIONAL LINGUISTICS-ACL.2021: 593-598

- **Sample Amplification: Increasing Dataset Size even when Learning is Impossible**
  Axelrod, B., Garg, S., Sharan, V., Valiant, G.
  edited by Daume, H., Singh, A.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2020

- **A Polynomial Time Algorithm for Log-Concave Maximum Likelihood via Locally Exponential Families**
  Axelrod, B., Diakonikolas, I., Sidiropoulos, A., Stewart, A., Valiant, G.
  edited by Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019

- **Memory-Sample Tradeoffs for Linear Regression with Small Error**
  Sharan, V., Sidford, A., Valiant, G.
  edited by Charikar, M., Cohen, E.
  ASSOC COMPUTING MACHINERY.2019: 890–901

- **Maximum Likelihood Estimation for Learning Populations of Parameters** *ICML*
  Vinayak, R., Kong, W., Valiant, G., Kakade, S.
  2019

- **Making AI Forget You: Data Deletion in Machine Learning**
  Ginart, A. A., Guan, M. Y., Valiant, G., Zou, J.
  edited by Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019

- **A Spectral View of Adversarially Robust Features**
  Garg, S., Sharan, V., Zhang, B., Valiant, G.
  edited by Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018

- **Approximating the Spectrum of a Graph**
  Cohen-Steiner, D., Kong, W., Sohler, C., Valiant, G., ACM
  ASSOC COMPUTING MACHINERY.2018: 1263–71

- **Prediction with a Short Memory**
  Sharan, V., Kakade, S., Liang, P., Valiant, G.
  edited by Diakonikolas, Kempe, D., Henzinger, M.
  ASSOC COMPUTING MACHINERY.2018: 1074–87

- **Estimating Learnability in the Sublinear Data Regime**
  Kong, W., Valiant, G.
  edited by Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018

- **Sketching Linear Classifiers over Data Streams**
  Tai, K., Sharan, V., Bailis, P., Valiant, G.
  edited by Das, G., Jermaine, C., Bernstein, P., Eldawy, A.
  ASSOC COMPUTING MACHINERY.2018: 757–72

- **AN AUTOMATIC INEQUALITY PROVER AND INSTANCE OPTIMAL IDENTITY TESTING** *SIAM JOURNAL ON COMPUTING*
  Valiant, G., Valiant, P.
  2017; 46 (1): 429-455

- **Learning Populations of Parameters**
  Tian, K., Kong, W., Valiant, G.
  edited by Guyon, Luxburg, U. V., Bengio, S., Wallach, H., Fergus, R., Vishwanathan, S., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2017

- **Learning Overcomplete HMMs**
  Sharan, V., Kakade, S., Liang, P., Valiant, G.

edited by Guyon, Luxburg, U. V., Bengio, S., Wallach, H., Fergus, R., Vishwanathan, S., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2017

- **Learning from Untrusted Data**
  Charikar, M., Steinhardt, J., Valiant, G.
  edited by Hatami, H., McKenzie, P., King
  ASSOC COMPUTING MACHINERY.2017: 47–60
- **Learning Sparse Polynomial Functions.**
  Andoni, A., Panigrahy, R., Valiant, G., Zhang, L.
  2014
- **Optimal Algorithms for Testing Closeness of Discrete Distributions.**
  Chan, S., Diakonikolas, I., Valiant, P., Valiant, G.
  2014
- **Computation in anonymous networks.** *CoRR abs/1306.4151*
  Mossel, E., Prakash, A., Valiant, G.
  2013
- **Instance-by-instance optimal identity testing.** *Electronic Colloquium on Computational Complexity (ECCC)*
  Valiant, G., Valiant, P.
  2013; 20: 111
- **Testing k-Modal Distributions: Optimal Algorithms via Reductions.**
  Daskalakis, C., Diakonikolas, I., Servedio, Rocco, A., Valiant, G., Valiant, P.
  2013
- **Optimal Algorithms for Testing Closeness of Discrete Distributions.** *CoRR abs/1308.3946*
  Chan, S., Diakonikolas, I., Valiant, G., Valiant, P.
  2013
- **Estimating the Unseen: Improved Estimators for Entropy and other Properties.**
  Valiant, P., Valiant, G.
  2013
- **Least Squares Revisited: Scalable Approaches for Multi-class Prediction.** *CoRR abs/1310.1949*
  Agarwal, A., Kakade, Sham, M., Karampatziakis, N., Song, L., Valiant, G.
  2013
- **Size and Treewidth Bounds for Conjunctive Queries.** *J. ACM*
  Gottlob, G., Lee, S. T., Valiant, G., Valiant, P.
  2012; 3 (59): 16
- **Finding Correlations in Subquadratic Time, with Applications to Learning Parities and Juntas.**
  Valiant, G.
  2012
- **Finding Correlations in Subquadratic Time, with Applications to Learning Parities and Juntas with Noise.** *Electronic Colloquium on Computational Complexity (ECCC)*
  Valiant, G.
  2012; 19: 6
- **Disentangling Gaussians.** *Commun. ACM*
  Kalai, A. T., Moitra, A., Valiant, G.
  2012; 2 (55): 113-120
- **Beating brute-force: Improved algorithms for finding correlations, and related problems.** *TinyToCS*
  Valiant, G.
  2012; 1

- **Testing k-Modal Distributions: Optimal Algorithms via Reductions.** *CoRR abs/1112.5659*
  Daskalakis, C., Diakonikolas, I., Servedio, Rocco, A., Valiant, G., Valiant, P.
  2011
- **Incentive-compatible distributed greedy protocols.**
  Nisan, N., Schapira, M., Valiant, G., Zohar, A.
  2011
- **The Power of Linear Estimators.**
  Valiant, G., Valiant, P.
  2011
- **Best-response auctions.**
  Nisan, N., Schapira, M., Valiant, G., Zohar, A.
  2011
- **When is it best to best-respond?** *SIGecom Exchanges*
  Nisan, N., Schapira, M., Valiant, G., Zohar, A.
  2011; 2 (10): 16-18
- **Estimating the unseen: an n/log(n)-sample estimator for entropy and support size, shown optimal via new CLTs.**
  Valiant, G., Valiant, P.
  2011
- **Incentive-compatible distributed greedy protocols.**
  Nisan, N., Schapira, M., Valiant, G., Zohar, A.
  2011
- **Braess's Paradox in Large Random Graphs** *RANDOM STRUCTURES & ALGORITHMS*
  Valiant, G., Roughgarden, T.
  2010; 37 (4): 495-515
- **DESIGNING NETWORK PROTOCOLS FOR GOOD EQUILIBRIA** *SIAM JOURNAL ON COMPUTING*
  Chen, H., Roughgarden, T., Valiant, G.
  2010; 39 (5): 1799-1832
- **Efficiently learning mixtures of two Gaussians.**
  Kalai, A. T., Moitra, A., Valiant, G.
  2010
- **A New Look at Selfish Routing.**
  Papadimitriou, Christos, H., Valiant, G.
  2010
- **Estimating the unseen: A sublinear-sample canonical estimator of distributions.** *Electronic Colloquium on Computational Complexity (ECCC)*
  Valiant, G., Valiant, P.
  2010; 17: 180
- **Settling the Polynomial Learnability of Mixtures of Gaussians.** *CoRR abs/1004.4223*
  Moitra, A., Valiant, G.
  2010
- **Settling the Polynomial Learnability of Mixtures of Gaussians.**
  Moitra, A., Valiant, G.
  2010
- **A CLT and tight lower bounds for estimating entropy.** *Electronic Colloquium on Computational Complexity (ECCC)*
  Valiant, G., Valiant, P.
  2010; 17: 183

- **On Learning Algorithms for Nash Equilibria.**
  Daskalakis, C., Frongillo, Rafael, M., Papadimitriou, Christos, H., Pierrakos, G., Valiant, G.
  2010
- **Size Bounds for Conjunctive Queries with General Functional Dependencies.** *CoRR abs/0909.2030*
  Valiant, G., Valiant, P.
  2009
- **On the complexity of Nash equilibria of action-graph games.**
  Daskalakis, C., Schoenebeck, G., Valiant, G., Valiant, P.
  2009
- **Size and treewidth bounds for conjunctive queries.**
  Gottlob, G., Lee, S. T., Valiant, G.
  2009
- **Designing Networks with Good Equilibria** *19th ACM-SIAM Symposium on Discrete Algorithms*
  Chen, H., Roughgarden, T., Valiant, G.
  SIAM.2008: 854–863
- **On the Complexity of Nash Equilibria of Action-Graph Games.** *CoRR abs/0802.1604*
  Daskalakis, C., Schoenebeck, G., Valiant, G., Valiant, P.
  2008
- **Braess's paradox in large random graphs.**
  Valiant, G., Roughgarden, T.
  2006