



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

2023-24

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

2022-23

- The Modern Algorithmic Toolbox: CS 168 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Guy Blanc

Orals Evaluator

Roshni Sahoo

Doctoral Dissertation Co-Advisor (AC)

Steven Cao, Chirag Pabbaraju, Aidan Perreault, Roshni Sahoo

Master's Program Advisor

Arjun Jain

Doctoral (Program)

Spencer Compton, Mika Jain

Publications

PUBLICATIONS

- **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
- **AN AUTOMATIC INEQUALITY PROVER AND INSTANCE OPTIMAL IDENTITY TESTING** *SIAM JOURNAL ON COMPUTING*
Valiant, G., Valiant, P.
2017; 46 (1): 429–455
- **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
- **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)
- **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
- **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
- **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
- **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
- **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 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
- **Approximating the Spectrum of a Graph**
Cohen-Steiner, D., Kong, W., Sohler, C., Valiant, G., ACM
ASSOC COMPUTING MACHINERY.2018: 1263-71
- **A Spectral View of Adversarial 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
- **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
- **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
- **Learning from Untrusted Data**
Charikar, M., Steinhardt, J., Valiant, G.
edited by Hatami, H., McKenzie, P., King
ASSOC COMPUTING MACHINERY.2017: 47-60
- **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 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
- **Optimal Algorithms for Testing Closeness of Discrete Distributions.** *CoRR abs/1308.3946*
Chan, S., Diakonikolas, I., Valiant, G., Valiant, P.
2013
- **Instance-by-instance optimal identity testing.** *Electronic Colloquium on Computational Complexity (ECCC)*
Valiant, G., Valiant, P.
2013; 20: 111
- **Computation in anonymous networks.** *CoRR abs/1306.4151*
Mossel, E., Prakash, A., Valiant, G.
2013
- **Testing k-Modal Distributions: Optimal Algorithms via Reductions.**
Daskalakis, C., Diakonikolas, I., Servedio, Rocco, A., 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
- **Disentangling Gaussians.** *Commun. ACM*
Kalai, A. T., Moitra, A., Valiant, G.
2012; 2 (55): 113-120
- **Finding Correlations in Subquadratic Time, with Applications to Learning Parities and Juntas.**
Valiant, G.
2012
- **Beating brute-force: Improved algorithms for finding correlations, and related problems.** *TinyToCS*
Valiant, G.
2012; 1
- **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 with Noise.** *Electronic Colloquium on Computational Complexity (ECCC)*
Valiant, G.
2012; 19: 6
- **Estimating the unseen: an $n/\log(n)$ -sample estimator for entropy and support size, shown optimal via new CLTs.**
Valiant, G., Valiant, P.

2011

- **Testing \mathbb{K} -Modal Distributions: Optimal Algorithms via Reductions.** *CoRR abs/1112.5659*
Daskalakis, C., Diakonikolas, I., Servedio, Rocco, A., Valiant, G., Valiant, P.
2011
- **When is it best to best-respond?** *SIGecom Exchanges*
Nisan, N., Schapira, M., Valiant, G., Zohar, A.
2011; 2 (10): 16-18
- **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