

# Stanford

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## Gregory Valiant

Associate Professor of Computer Science

 Curriculum Vitae available Online

### Bio

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#### 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

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#### 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

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#### 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)

#### 2021-22

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

#### 2020-21

- The Modern Algorithmic Toolbox: CS 168 (Spr)

### STANFORD ADVISEES

#### Doctoral Dissertation Reader (AC)

Margalit Glasgow, Lunjia Hu

#### Doctoral Dissertation Advisor (AC)

Annie Marsden, Roshni Sahoo

#### Doctoral Dissertation Co-Advisor (AC)

Steven Cao, Spencer Compton, Chirag Pabbaraju, Aidan Perreault

#### Master's Program Advisor

Anudeep Golla, Rayan Krishnan, Jean Rodmond Junior Laguerre, Yipeng Liu, Daniel Rebersky, Lauren Saue- Fletcher, Joe Tsai, Adrien Wu, Xiyu Zhang

#### Doctoral (Program)

Vijaykrishna Gurunathan, Annie Marsden

### Publications

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#### 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
- **Maximum Likelihood Estimation for Learning Populations of Parameters** *ICML*  
Vinayak, R., Kong, W., Valiant, G., Kakade, S.  
2019
  - **A Spectral View of Adversarially Robust Features**  
Garg, S., Sharan, V., Zhang, B., Valiant, G., 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
  - **Learning Overcomplete HMMs**  
Sharan, V., Kakade, S., Liang, P., Valiant, G., 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
  - **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
  - **Best-Response Mechanisms.**  
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