

Paul Valiant

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Research Interests

Statistics, learning and property testing; cryptography; auctions and game theory; protein folding; evolution; fluid dynamics; computational approaches to the other sciences.

Education

Massachusetts Institute of Technology, 2004 – 2008

- PhD in Computer Science: June 2008
Thesis Title: “Testing Symmetric Properties of Distributions”
Advisor: Silvio Micali
- MS in Computer Science: February 2007
Thesis Title: “Incrementally Verifiable Computation”

Stanford University, 2000 – 2004.

- MS Computer Science: June 2004
- BS Mathematics, and BS Physics: June 2004.

Awards

- NSF Mathematical Sciences Postdoctoral Research Fellowship 2009-2011.
- Best Student Paper Award, Theory of Cryptography Conference 2008.
- Machtey Award (Best Student Paper), Foundations of Computer Science Conference 2005 (co-winner).
- National Defense Science and Engineering Graduate Fellowship 2004-2007
- Stanford Mathematics Department Research Award for Undergraduate Honors Thesis on “General Relativity”.
- Three-time member of US International Mathematical Olympiad team.
- Gold Medalist, International Mathematical Olympiad, Bucharest 1999.

Publications

1. G. Gottlob, S.T. Lee, G. Valiant, and P. Valiant. Size and Treewidth Bounds for Conjunctive Queries. *Journal of the ACM*, to appear.
2. A. McGregor and P. Valiant. The Shifting Sands Algorithm. *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2012.
3. P. Valiant. Distribution Free Evolvability of Polynomial Functions over all Convex Loss Functions. *3rd Conference on Innovations in Theoretical Computer Science (ITCS)*, January, 2012.
4. P. Valiant. Testing Symmetric Properties of Distributions. *SIAM J. on Computing* 40(6), 2011, pp. 1927-1968.
5. G. Valiant and P. Valiant. The Power of Linear Estimators. *IEEE Symposium on Foundations of Computer Science (FOCS)*, 2011.
6. G. Valiant and P. Valiant. Estimating the Unseen: an $n/\log(n)$ -Sample Estimator for Entropy and Support Size, Shown Optimal via New CLTs. *ACM Symposium on Theory of Computing (STOC)* 2011, pp. 685-694.
7. A. Bhattacharyya, E. Fischer, R. Rubinfeld, and P. Valiant. Testing Monotonicity of Distributions over General Partial Orders. *2nd Conference on Innovations in Computer Science (ICS)*, January, 2011, pp. 239-252.
8. J. Chen, S. Micali, and P. Valiant. Robustly Leveraging Collusion in Combinatorial Auctions. *1st Conference on Innovations in Computer Science (ICS)*, January, 2010, pp. 81-93.
9. C. Daskalakis, G. Schoenebeck, G. Valiant, and P. Valiant. On the Complexity of Nash Equilibria of Action-Graph Games. *ACM-SIAM Symposium on Discrete Algorithms (SODA)* 2009, pp. 710-719.
10. P. Valiant. Testing Symmetric Properties of Distributions, *ACM Symposium on Theory of Computing (STOC)* 2008, pp. 383-392.
11. P. Valiant: Incrementally Verifiable Computation or Proofs of Knowledge Imply Time/Space Efficiency. *Theory of Cryptography Conference (TCC)* 2008, pp. 1-18. **Winner of the Best Student Paper Award.**
12. X. Chen, S.-H. Teng, P. Valiant. The Approximation Complexity of Win-Lose Games. *ACM-SIAM Symposium on Discrete Algorithms (SODA)* 2007, pp. 159-168.
13. M. Vutukuru, P. Valiant, S. Kopparty, H. Balakrishnan. How to Construct a Correct and Scalable iBGP Configuration. *IEEE International Conference on Computer Communications (INFOCOM)* 2006.
14. T. Abbot, D. Kane, P. Valiant. On the Complexity of Two-Player Win-Lose Games *IEEE Symposium on Foundations of Computer Science (FOCS)* 2005, pp. 113-122. **Co-winner of the Best Student Paper award.**

15. P. Valiant. The Tensor Product of Two Codes Is Not Necessarily Robustly Testable. *9th International Workshop on Randomization and Computation (RANDOM)* 2005, pp. 472-481.
16. M. de Graaf and P. Valiant, Polynomial Representations of Symmetric Partial Boolean Functions. *SIAM Journal on Discrete Math* 19(2) 2005, pp. 481-488.
17. P. Valiant, Linear Bounds on the North-East Model and Higher Dimensional Analogs. *Advances in Applied Mathematics* 33(1), 2004, pp. 40-50.
18. P. Valiant, The Log-Rank Conjecture and Low Degree Polynomials. *Information Processing Letters* 89(2), 2004, pp. 99-103.

Invited Lectures

“The Power of Linear Estimators”

- Banff workshop: Information Theory and Statistics for Large Alphabets, Oct 2011
- IBM Almaden, Oct 2011

“Estimating the Unseen: Sublinear Statistics”

- Bertinoro Workshop on Sublinear Algorithms, May 2011

“Central Limit Theorems and Tight Lower Bounds for Entropy Estimation”

- Microsoft Research Silicon Valley, May 2011
- UC Berkeley, April 2011

“How to Design Profitable Auctions”

- Stanford, November 2009
- UC Berkeley, October 2009

“Leveraging Collusion in Unrestricted Combinatorial Auctions”

- STOC “Valiant Day”, May 2009

“Resilient Mechanism Design and Truly Combinatorial Auctions”

- Institute for Advanced Study, January 2009

“High Revenue in Combinatorial Auctions”

- UC Berkeley, September 2008

“Cryptographic Game Theory” (mini-course of 3 lectures)

- Lipari Summer School, Lipari, Italy, July 2008

“Testing Symmetric Properties of Distributions”

- Microsoft New England, January 2009
- Institute for Advanced Study, Princeton, March 2008
- UC Berkeley, January 2008
- Stanford, January 2008
- Tel Aviv University, December 2007

- Weizmann Institute, December 2007
- Hebrew University, Jerusalem, December 2007
“Lower Bounds for Distribution Testing”
- China Theory Week, Tsinghua University, Beijing, September 2007
“Incrementally Verifiable Computation”
- Advances in Complexity Theory, Banff, August 2006
“Win-Lose Games are as Hard as General Games”
- Workshop on Game Theory and Computer Science, Stony Brook, July 2005

Work Experience

2009 Sept.-Present Postdoctoral Fellow, EECS, Berkeley

2008 - 2009 Postdoctoral Fellow, EECS, MIT

2007 Fall Teaching Assistant in new course on Cryptographic Game Theory; gave 4 of the lectures, EECS, MIT

2003-4 Summers Intern at Grantham, Mayo, Van Otterloo: Quantitative Finance.

2002 Summer Laboratory for Computer Science, MIT, Cambridge, MA: Research Assistant to Professor Madhu Sudan. Research on complexity theory.

2001 Summer Laboratory for Computer Science, MIT, Cambridge, MA: Research Assistant to Professor Alan Edelman. Research on numerical analysis.

2000-01 Intermittently Akamai Technologies, Cambridge, MA, Data analysis and modeling.