

## David M. Pennock

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### Highlights

Currently Principal Research Scientist at Yahoo! Research

60+ journal and conference publications, including *PNAS*, *Science*, *IEEE Computer*, *Theoretical Computer Science*, *Electronic Commerce Research*, *Electronic Markets*, *AAAI*, *EC*, *WWW*, *STOC*, *KDD*, *UAI*, *SIGIR*, *ICML*, *NIPS*, *INFOCOM*, *SAINT*, *VLDB*

3 patents, 13 patent applications; over 40 presentations

Press interviews include *New York Times*, *Newsweek*, *Washington Post*, *The New Yorker*, *Investors Business Daily*, *LA Business Journal*, *Dow Jones/Wall Street Journal*

Reports on my research have appeared in *Discover Magazine*, *New Scientist*, *CNN/Money*, *New York Times*, *E! Online*, *Slate*, *Tech TV*, Surowiecki's "The Wisdom of Crowds"

Named Top 35 Technology Innovator Under Age 35 by *MIT Technology Review*, 2005

### Research Interests

– Chance Tech: technology for prediction, finance, insurance, and gambling

– Design and analysis of new online markets, including prediction markets

**Topics:** electronic commerce, artificial intelligence, prediction markets, probability, decision theory, machine learning

### Education

**Ph.D. Computer Science** UNIVERSITY OF MICHIGAN, ANN ARBOR, MI, DEC 1999

Concentration in Artificial Intelligence; Graduate Certificate in Complex Systems

**M.S. Computer Science** DUKE UNIVERSITY, DURHAM, NC, AUG 1994

**B.S. Physics**, 2nd Major: Computer Science DUKE UNIVERSITY, DURHAM, NC, MAY 1993

### Activities

Santa Fe Institute Complex Systems Summer School, June 1996

Duke in Cambridge Program in England, Summer 1992

Pi Kappa Alpha Fraternity, 1990–1993; Community Service Chair, 1991–1992

### Honors

Outstanding Paper Award, ACM Conference on Electronic Commerce, 2008

ACM Senior Member, 2006

MIT Technology Review's TR35: Top 35 Technology Innovator Under Age 35, 2005

Fellowship, Michigan Decision Behavior Consortium, 1998

Best Student Paper Finalist, Decision Analysis Society, 1998

Graduated magna cum laude, 1993

Dean's List, 1989–1993

Golden Key National Honors Society, 1991

Phi Eta Sigma Freshman Honors Society, 1990

## Journal and Conference Publications

- A. Beygelzimer, J. Langford, and D.M. Pennock (2012). **Learning performance of prediction markets with Kelly bettors**. *International Conference on Autonomous Agents and Multiagent Systems*
- S. Goel, M. Mahdian, D.M. Pennock, and D.M. Reeves (2012). **TrustBets: Operating a prediction market on an IOU network**. *International Conference on Autonomous Agents and Multiagent Systems*
- L. Xia and D.M. Pennock (2011). **An efficient Monte-Carlo algorithm for pricing combinatorial prediction markets for tournaments**. *International Joint Conference on Artificial Intelligence*: 452-457
- D.M. Pennock and L. Xia (2011). **Price updating in combinatorial prediction markets with Bayesian networks**. *Conference on Uncertainty in Artificial Intelligence*: 581-588
- S. Goel, J. Hofman, S. Lahaie, D.M. Pennock, and D.J. Watts (2010). **Predicting consumer behavior with web search**. *Proceedings of the National Academy of Sciences*, 107(41): 17486-17490
- S. Goel, D.M. Reeves, D.J. Watts, D.M. Pennock (2010). **Prediction without markets**. *ACM Conference on Electronic Commerce*: 357-366
- A. Othman, T. Sandholm, D.M. Pennock, and D.M. Reeves (2010). **A practical liquidity-sensitive automated market maker**. *ACM Conference on Electronic Commerce*: 377-386
- Y. Chen and D.M. Pennock (2010). **Designing Markets for Prediction**. *AI Magazine*, 31(4): 42-52
- Y. Chen, S. Dimitrov, R. Sami, D.M. Reeves, D.M. Pennock, R.D. Hanson, L. Fortnow, and R. Gonen (2010). **Gaming prediction markets: Equilibrium strategies with a market maker**. *Algorithmica*, 58(4): 930-969
- S. Goel, D.M. Reeves, and D.M. Pennock (2009). **Collective revelation: A mechanism for self-verified, weighted, and truthful predictions**. *ACM Conference on Electronic Commerce*: 265-274
- M. Guo and D.M. Pennock (2009). **Combinatorial prediction markets for event hierarchies**. *International Conference on Autonomous Agents and Multiagent Systems*, (1): 201-208
- X. Gao, Y. Chen, and D.M. Pennock (2009). **Betting on the real line**. *Workshop on Internet and Network Economics*: 553-560
- J. Feigenbaum, D.C. Parkes, and D.M. Pennock (2009). **Computational challenges in e-commerce**. *Communications of the ACM*, 52(1): 70-74
- S. Goel, J. Hofman, J. Langford, D.M. Pennock, and D.M. Reeves (2009). **Centmail: Rate limiting via certified micro-donations**. *Conference on Email and Anti-Spam*
- N.S. Lambert, J. Langford, J. Wortman, Y. Chen, D.M. Reeves, Y. Shoham, and D.M. Pennock (2008). **Self-financed wagering mechanisms for forecasting**. *ACM Conference on Electronic Commerce*: 170-179. Won **Outstanding Paper Award**
- N.S. Lambert, D.M. Pennock, and Y. Shoham (2008). **Eliciting properties of probability distributions**. *ACM Conference on Electronic Commerce*: 129-138
- Y. Chen, L. Fortnow, N.S. Lambert, D.M. Pennock, and J. Wortman (2008). **Complexity of combinatorial market makers**. *ACM Conference on Electronic Commerce*: 190-199
- Y. Chen, S. Goel, D.M. Pennock (2008). **Pricing combinatorial markets for tournaments**. *ACM Symposium on Theory of Computing*: 305-314
- S. Lahaie, D.C. Parkes, and D.M. Pennock (2008). **An expressive auction design for online display advertising**. *National Conference on Artificial Intelligence*: 108-113
- Y. Chen, A. Ghosh, R.P. McAfee, and D.M. Pennock (2008). **Sharing online advertising revenue with consumers**. *Workshop on Internet and Network Economics*: 556-565
- M. Mahdian, R.P. McAfee, and D.M. Pennock (2008). **The secretary problem with a hazard rate condition**. *Workshop on Internet and Network Economics*: 708-715
- Y. Chen, L. Fortnow, E. Nikolova, and D.M. Pennock (2007). **Betting on permutations**. *ACM Conference on Electronic Commerce*: 326-335
- S. Lahaie and D.M. Pennock (2007). **Revenue analysis of a family of ranking rules for keyword auctions**. *ACM Conference on Electronic Commerce*: 50-56

## Journal and Conference Publications (cont'd)

- S.-T. Park and D.M. Pennock (2007). **Applying collaborative filtering techniques to movie search for better ranking and browsing.** *ACM Conference on Knowledge Discovery and Data Mining*: 550-559
- A. Ghosh, M. Mahdian, D.M. Reeves, D.M. Pennock, and R. Fugger (2007). **Mechanism design on trust networks.** *Workshop on Internet and Network Economics*: 257-268
- J. Feng, H. Bhargava, and D.M. Pennock (2007). **Implementing sponsored search in web search engines: Computational evaluation of alternative mechanisms.** *Inform Journal on Computing*, 19(1): 137-148
- V. Dani, O. Madani, D.M. Pennock, S.K. Sanghai, and B. Galebach (2006). **An empirical comparison of algorithms for aggregating expert predictions.** *Conference on Uncertainty in Artificial Intelligence*
- S.-T. Park, D. Pennock, O. Madani, N. Good, and D. DeCoste (2006). **Naïve filterbots for robust cold-start recommendations.** *ACM Conference on Knowledge Discovery and Data Mining*: 699-705
- B. Mangold, M. Dooley, G.W. Flake, H. Hoffman, T. Kasturi, D.M. Pennock, and R. Dornfest (2005). **The Tech Buzz Game.** *IEEE Computer*, 38(7): 94-97
- Y. Chen, T. Mullen, C.-H. Chu and D.M. Pennock (2005). **Information markets vs. opinion pools: An empirical comparison.** *ACM Conference on Electronic Commerce*
- A.I. Schein, A. Popescul, L.H. Ungar, and D.M. Pennock (2005). **CROC: A new evaluation criterion for recommender systems.** *Electronic Commerce Research*, 5(1): 51-74
- D.M. Pennock (2004). **A Dynamic pari-mutuel market for hedging, wagering, and information aggregation.** *ACM Conference on Electronic Commerce*
- O. Madani, D.M. Pennock, and G.W. Flake (2004). **Co-validation: Using disagreement on unlabeled data to validate classification algorithms.** *Neural Information Processing Systems*
- E. Servan-Schreiber, J. Wolfers, D.M. Pennock, and B. Galebach (2004). **Prediction markets: Does Money Matter?** *Electronic Markets*, 14(3)
- G.W. Flake and D.M. Pennock (2004). **Self-organization, self-regulation, and self-similarity on the fractal web.** Chapter in *The Colours of Infinity*, Clear Press, UK
- J. Feigenbaum, L. Fortnow, D.M. Pennock, and R. Sami (2004). **Computation in a distributed information market.** *Theoretical Computer Science*  
Conference version: *ACM Conference on Electronic Commerce, 2003*
- L. Fortnow, J. Kilian, D.M. Pennock, and M.P. Wellman (2004). **Betting boolean-style: A framework for trading in securities based on logical formulas.** *Decision Support Systems*, 39(1):87-104  
Conference version: *ACM Conference on Electronic Commerce, 2003*
- S.-T. Park, D.M. Pennock, C.L. Giles, and R. Krovetz (2004). **Analysis of lexical signatures for improving information persistence on the World Wide Web.** *ACM Transactions on Information Systems*, 22(4): 540-572  
Conference version: *ACM Conference on Information Retrieval, 2002*
- D. Pavlov, E. Manavoglu, D.M. Pennock and C.L. Giles (2004). **Collaborative filtering with maximum entropy.** *IEEE Intelligent Systems*, 19(6): 40-48
- A. De Bruyn, C.L. Giles, and D.M. Pennock (2004). **Offering collaborative-like recommendations when data is sparse: The case of attraction-weighted information filtering.** *Conference on Adaptive Hypermedia*
- S.-T. Park, D.M. Pennock, and C.L. Giles (2004). **Comparing static and dynamic measurements and models of the Internet's AS topology.** *Joint Conference of the IEEE Computer and Communications Societies*
- G.W. Flake, D.M. Pennock, and D.C. Fain (2003). **The self-organized web: The yin to the semantic web's yang.** *IEEE Intelligent Systems*
- S. Debnath, D.M. Pennock, S. Lawrence, and C.L. Giles (2003). **Information incorporation in online in-game sports betting markets.** *ACM Conference on Electronic Commerce*

**Journal and  
Conference  
Publications  
(cont'd)**

- K. Dave, S. Lawrence and D.M. Pennock (2003). **Mining the peanut gallery: Opinion extraction and semantic classification of product reviews.** *World Wide Web Conference*
- D. Pavlov, A. Popescul, D.M. Pennock and L.H. Ungar (2003). **Mixtures of Conditional Maximum Entropy Models.** *International Conference on Machine Learning*
- S.K. Lam, D.M. Pennock, D. Cosley, and S. Lawrence (2003). **1 Billion Pages = 1 Million Dollars? Mining the Web to Play "Who Wants to be a Millionaire?"**. *Conference on Uncertainty in Artificial Intelligence*
- S.-T Park, A. Khrabrov, D.M. Pennock, S. Lawrence, C.L. Giles, and L.H. Ungar (2003). **Static and Dynamic Analysis of the Internet's Susceptibility to Faults and Attacks.** *Joint Conference of the IEEE Computer and Communications Societies*
- A. Popescul, L.H. Ungar, S. Lawrence, and D.M. Pennock (2003). **Statistical relational learning for document mining.** *International Conference on Data Mining*, pp. 275-282
- D.Y. Pavlov and D.M. Pennock (2002). **A maximum entropy approach to collaborative filtering in dynamic, sparse, high dimensional domains.** *Neural Information Processing Systems*
- E.J. Glover, D.M. Pennock, S. Lawrence, and B. Krovetz (2002). **Inferring hierarchical descriptions.** *Conference on Information and Knowledge Management*
- D.M. Pennock, G.W. Flake, S. Lawrence, E.J. Glover, C.L. Giles (2002). **Winners don't take all: Characterizing the competition for links on the web.** *Proceedings of the National Academy of Sciences*, 99 (8): 5207-5211
- D.M. Pennock, S. Debnath, E.J. Glover, C.L. Giles (2002). **Modeling information incorporation in markets with application to detecting and explaining events.** *Conference on Uncertainty in Artificial Intelligence*
- E. Glover, K. Tsioutsoulouklis, S. Lawrence, D. Pennock, G. Flake (2002). **Using web structure for classifying and describing web pages.** *World Wide Web Conference*
- S. Chakrabarti, M. Joshi, K. Punera, D.M. Pennock (2002). **The structure of broad topics on the Web.** *World Wide Web Conference*
- A.I. Schein, A. Popescul, L.H. Ungar, D.M. Pennock (2002). **Methods and metrics for cold-start recommendations.** *ACM Conference on Information Retrieval*
- D. Cosley, S. Lawrence, D.M. Pennock (2002). **REFEREE: An open framework for practical testing of recommender systems using ResearchIndex.** *Conference on Very Large Data Bases*
- D.M. Pennock, S. Lawrence, F.Å. Nielsen, C. Lee Giles (2001). **Extracting collective probabilistic forecasts from web games.** *ACM Conference on Knowledge Discovery and Data Mining*, pp. 174-183
- A. Popescul, L.H. Ungar, D.M. Pennock, S. Lawrence (2001). **Probabilistic models for unified collaborative and content-based recommendation in sparse-data environments.** *Conference on Uncertainty in Artificial Intelligence*, pp. 437-444
- D.M. Pennock, S. Lawrence, C.L. Giles, F.Å. Nielsen (2001). **The real power of artificial markets.** *Science*, 291(5506): 987-988
- S. Lawrence, D.M. Pennock, G.W. Flake, R. Krovetz, F.M. Coetzee, E. Glover, F.Å. Nielsen, A. Kruger, C.L. Giles (2001). **Persistence of web references in scientific research.** *Computer*, 34(2), pp. 26-31
- E.J. Glover, G.W. Flake, S. Lawrence, W.P. Birmingham, A. Kruger, C.L. Giles, D.M. Pennock (2001). **Improving category specific web search by learning query modifications.** *Symposium on Applications and the Internet*, pp. 23-31
- D.M. Pennock and M.P. Wellman (2000). **Compact securities markets for Pareto optimal reallocation of risk.** *Conference on Uncertainty in Artificial Intelligence*, pp. 481-488
- D.M. Pennock, E. Horvitz, S. Lawrence, C.L. Giles (2000). **Collaborative filtering by personality diagnosis: A hybrid memory- and model-based approach.** *Conference on Uncertainty in Artificial Intelligence*, pp. 473-480
- D.M. Pennock, P. Maynard-Reid, C.L. Giles (2000). **A normative examination of ensemble learning algorithms.** *International Conference on Machine Learning*, pp. 735-742

## Journal and Conference Publications (cont'd)

- D.M. Pennock, E. Horvitz, C.L. Giles (2000). **Social choice theory and recommender systems: Analysis of the axiomatic foundations of collaborative filtering.** *National Conference on Artificial Intelligence*, pp. 729–734
- D.M. Pennock and M.P. Wellman (1999). **Graphical representations of consensus belief.** *Conference on Uncertainty in Artificial Intelligence*, pp. 531–540
- D.M. Pennock (1998). **Logarithmic time parallel Bayesian inference.** *Conference on Uncertainty in Artificial Intelligence*, pp. 431–438
- D.M. Pennock and M.P. Wellman (1997). **Representing aggregate belief through the competitive equilibrium of a securities market.** *Conference on Uncertainty in Artificial Intelligence*, pp. 392–400
- D.M. Pennock and Q.F. Stout (1996). **Exploiting a theory of phase transitions in three-satisfiability problems.** *National Conference on Artificial Intelligence*, pp. 253–258
- D.M. Pennock and M.P. Wellman (1996). **Toward a market model for Bayesian inference.** *Conference on Uncertainty in Artificial Intelligence*, pp. 405–413
- C. Connelly, A.W. Biermann, D. Pennock, P. Wu (1996). **Homestudy software: Flexible, interactive and distributed software for independent study.** *ACM SIGCSE Symposium on Computer Science Education*, 28(1), pp. 63–67
- C. Connelly, A.W. Biermann, D. Pennock, P. Wu (1996). **Homestudy software: Complementary systems for computer science courses.** *Computer Science Education*, 7, pp. 53–71
- A.W. Biermann, A.F. Fahmy, C. Guinn, D. Pennock, D. Ramm, P. Wu (1995). **A Computer animated system for demonstrating hardware and software principles.** *Journal of Computing in Small Colleges*, 10(3), p. 34.
- A.W. Biermann, D. Ramm, D. Pennock, A.F. Fahmy, P. Wu (1994). **Visualizing computation: Full color and motion demonstration of computer mechanisms.** *National Conference on College Teaching and Learning*
- A.W. Biermann, A.F. Fahmy, C. Guinn, D. Pennock, D. Ramm, P. Wu (1994). **Teaching a hierarchical model of computation with animation software in the first course.** *ACM SIGCSE Symposium on Computer Science Education*, 26(1), pp. 295–299

## Other Publications

- D.M. Pennock and R. Sami (2007). **Computational aspects of prediction markets.** In *Algorithmic Game Theory* (N. Nisan, T. Roughgarden, E. Tardos, V. Vazirani, editors), Cambridge University Press.
- Y. Chen, L. Fortnow, E. Nikolova, and D.M. Pennock (2007). **Combinatorial betting.** *ACM SIGecom Exchanges*, 7(1): 61–64
- D.M. Pennock (2004). **The Eudaemonic Pie: A review.** *AI Magazine*, 25(2): 125–128
- D.M. Pennock (2004). **Conference report: The fifth ACM conference on electronic commerce.** *SIGecom Exchanges*, 5(1): 48–56
- D.M. Pennock (2001). **NP markets, or How to get everyone else to solve your intractable problems.** *Workshop on Economic Agents, Models, and Mechanisms at the International Joint Conference on Artificial Intelligence*, pp. 89–98
- D.M. Pennock (2001). **Conference report: The second ACM conference on electronic commerce.** *SIGecom Exchanges*, 2(1): 33–38
- P. Rusmevichientong, D.M. Pennock, S. Lawrence, C.L. Giles (2001). **Methods for sampling pages uniformly from the World Wide Web.** *AAAI Fall Symposium on Using Uncertainty Within Computation*
- D.M. Pennock and M.P. Wellman (1999). **The observability of independence under monetary-based elicitation.** *Workshop on Conditional Independence Structures and Graphical Models*, pp. 56–57

## Patents

### Granted

Patent no. 7,788,158: Dynamic pari-mutuel market

Patent no. 7,457,768: Methods and apparatus for predicting and selectively collecting preferences based on personality diagnosis

Patent no. 7,165,024: Inferring hierarchical descriptions of a set of documents

### Applications

20090254475 Prediction market making method and apparatus

20100070322 Method and apparatus for administering a bidding language for online advertising

20100058249 System and method for providing a graphical user interface for prediction markets

20090198613 Method and apparatus for group decision making

20090070873 Safe web based interactions

20090024510 System and method of making markets for a finite subset of orders placed across continuous and countably infinite outcome spaces

20080306819 System and method for shaping relevance scores for position auctions

20080220855 System and method for permutation betting

20080133347 System and method for providing semantic captchas for online advertising

20080133321 System and method for measuring awareness of online advertising using captchas

20050021461 Term-based concept market

20050021442 Term-based concept instruments

20050021441 Concept valuation in a term-based concept market

## Selected Presentations

### Designing Markets for Prediction

*Carnegie Mellon University*, Pittsburgh, PA, November 2011

*eBay*, Santa Clara, CA, June 2011

*Wharton Risk Roundtable*, Philadelphia, PA, May 2010

### Market Madness: Implementing a 9.2 quintillion outcome prediction market

*Google*, New York, NY, January 2010

*Harvard University*, Cambridge, MA, February 2010

*Northwestern University*, Evanston, IL, April 2010

*New York University*, New York, NY, November 2010

### Crowdsourcing predictions

*University of Texas*, Austin, TX, March 2011

*Massachusetts Institute of Technology*, Cambridge, MA, May 2010

*Harvard Business School*, Cambridge, MA, March 2009

*University of California, Irvine*, CA, March 2009

*University of Pennsylvania*, Philadelphia, PA, March 2009

### The automated economy

*University of Pennsylvania*, Philadelphia, PA, March 2009

*Stanford University*, Stanford, CA, March 2009

*Yahoo! Big Thinkers India*, Bangalore, India, June 2009 (over 500 attendees)

*Microsoft Research*, Redmond, WA, January 2009

**The evolution of online advertising.** *NBER Working Group on Market Design*, Boston, MA, May 2009

**Selected  
Presentations  
(cont'd)**

**Combinatorial betting**

*Morgan Stanley Process Driven Trading*, New York, NY, May 2008

*Cornell University*, Ithaca, NY, December 2008

*Duke University*, Durham, NC, 2007

*University of Chicago*, Chicago, IL, 2007

*Brooklyn Polytechnic*, New York, NY, 2007

**Prediction markets and the wisdom of crowds.** *Symposium on Statistical Challenges in Electronic Commerce Research*, July 2007 (Keynote Speaker)

**Markets in uncertainty: Risk, gambling, and information aggregation**

Tutorial at *National Conference on Artificial Intelligence (AAAI)*, San Jose, CA, July 2004

Tutorial at *ACM Conference on Electronic Commerce*, San Diego, CA, June 2003

**A Dynamic pari-mutuel market for hedging, wagering, and information aggregation**

*Microsoft Research*, Redmond, WA, July, 2004

*University of Michigan*, Ann Arbor, MI, March, 2004

**Sports betting markets: Characteristics and information aggregation.** *International Conference on Gambling and Risk Taking*, Vancouver, Canada, May 2003

**Information and forecast accuracy in markets and market games.**

*Google, Inc.*, Mountain View, CA, September 2002

*Overture Services, Inc.*, Pasadena, CA, August 2002

**Modeling information incorporation in markets and market games.** *Markets and Decisions Workshop*, Arlington, VA, June 2002

**Semantic explanations of market forecasts.** *Controlled Market Economies Symposium*, Cambridge, MA, May 2002

**The power of play: Efficiency, information aggregation, and forecast accuracy in market games.** *Institute for Operations Research and the Management Sciences National Meeting*, Miami, FL, November 2001

**Maximizing information, optimizing risk, and leveraging forecasts in securities markets.** *NEC Research Symposium*, Bonn, Germany, May 2001

**Recommender systems.** *Penn State eBusiness Research Center Academic Workshop on Personalization Issues in e-Business*, Arlington, VA, April 2001

**Winners don't take all: A model of web link accumulation.** *Workshop on Data Mining and Learning on the Web at the 14th Conference on Neural Information Processing Systems*, Breckenridge, CO, December 2000

**E-markets and uncertainty, or What Bayesians can learn by watching market prices.**

*Microsoft Research*, Redmond, WA, June 2000

**Introduction to auctions.** *University of Pennsylvania*, Philadelphia, PA, April, 2000

**Group Coordination: A History of Paradox and Impossibility.**

*NEC Research Institute*, Princeton, NJ, February 2000

*Microsoft Research*, Redmond, WA, August, 1998

**Efficient representations for aggregate belief and compact securities markets.** *Institute for Operations Research and the Management Sciences National Meeting*, Philadelphia, PA, November 1999

## Professional Experience

### Principal Research Scientist

YAHOO! RESEARCH, NEW YORK, NY, NOV 2002 TO PRESENT

Manage a research group focused on algorithmic economics, or the intersection of computer science and economics. Conduct basic and applied research on prediction markets, auctions, advertising, and artificial intelligence. Develop creative and innovative technologies to help position Yahoo! as a leader in Internet ecommerce and related scientific endeavors. Publish in top journals and conferences; serve the academic community.

### Research Scientist

NEC LABORATORIES AMERICA, PRINCETON, NJ, OCT 1999 TO OCT 2002

Conducted research on information markets, Web games, recommender systems, Web hyperlinks, social networks, consensus Bayesian networks, and ensemble learning algorithms

### Adjunct Assistant Professor of Computer Science and Engineering

PENNSYLVANIA STATE UNIVERSITY, STATE COLLEGE, PA, JUN 2001

Taught CSE 597B, Computational aspects of e-commerce

### Research Intern

MICROSOFT RESEARCH, REDMOND, WA, JUN 1998 TO AUG 1998

Conducted research on impossibility theorems in group coordination, recommender systems, and Bayesian networks

### Research Assistant UNIVERSITY OF MICHIGAN, ANN ARBOR, MI, SEP 1995 TO MAY 1999

Conducted research on computationally efficient and decentralized mechanisms for aggregating information using markets

### Teaching Assistant UNIVERSITY OF MICHIGAN, ANN ARBOR, MI, SEP 1994 TO DEC 1994

Taught CS 380: Data Structures and Algorithms

### Research Assistant

DUKE UNIVERSITY, DURHAM, NC, SEP 1993 TO AUG 1994

Co-developed an educational software program titled "This is How a Computer Works", currently still in use at Duke University and elsewhere.



## Professional Services

**Chair**, ACM Special Interest Group on Electronic Commerce, 2007-2011

**General Chair**, Auctions, Market Mechanisms and their Applications, 2009 (inaugural year)

**Co-Editor**, Economic Inquiry, 2008-11; ACM Transactions on Internet Technology, 2006-8

**Editorial Board**, ACM Transactions of Economics and Computation, 2011-present

**Program Co-Chair**, ACM Conference on Electronic Commerce, 2006

**Track Co-Chair**, International World Wide Web Conference, 2002, 2008

### Organizing Committee

Ad Auctions Workshop (a workshop series I co-founded) 2005,2007,2009; Prediction Markets Workshop (a workshop series I co-founded) 2007,2008; DIMACS Workshop on Information Markets, 2005; Session on Markets in Uncertainty at the Institute for Operations Research and the Management Sciences National Meeting, 2001; Workshop on Data Mining and Learning on the Web, 2000

### Senior Program Committee

ACM Conference on Electronic Commerce, 2009

Conference on Uncertainty in Artificial Intelligence, 2003

### Program Committee

International Joint Conference on Artificial Intelligence 2003,2005,2009,2011; Auctions, Market Mechanisms and their Applications, 2011; CrowdConf, 2010; Recommenders 2008; International World Wide Web Conference, 2005; ACM Conference on Electronic Commerce, 2004,2007-2011; Conference on Uncertainty in Artificial Intelligence, 2000-2009,2011; Conference on Email and Anti-Spam, 2004,2005; Conference on Very Large Databases, 2005; ACM Conference on Knowledge Discovery and Data Mining 2003,2008; National Conference on Artificial Intelligence, 2002,2005,2008; International Joint Conference on Autonomous Agents and Multi-Agent Systems, 2002,2003,2012; Web Dynamics Workshop at the International World Wide Web Conference, 2002; Workshop on Agent Mediated Electronic Commerce at the International Joint Conference on Autonomous Agents and Multi-Agent Systems, 2002,2003; Workshop on Economic Agents, Models, and Mechanisms at the 17th International Joint Conference on Artificial Intelligence, 2001; Workshop on Internet Bots: Systems and Applications at the 12th International Conference on Database and Expert Systems Applications, 2001; International Symposium on Imprecise Probabilities and Their Applications, 2001

### Other Peer Reviewing Services

Artificial Intelligence; Journal of Artificial Intelligence Research; Proceedings of the National Academy of Sciences; Algorithmic Finance; Journal of Machine Learning Research; ACM Transactions on Information Systems; IEEE Internet Computing; IEEE Intelligent Systems; IEEE Transactions on Knowledge and Data Engineering; Decision Analysis; Journal of Parallel and Distributed Computing; Management Science; Organizational Behavior and Human Decision Processes; ACM Conference on Electronic Commerce, 2005; National Conference on Artificial Intelligence, 2002; International Joint Conference on Autonomous Agents and Multi-Agent Systems, 2002; International Joint Conference on Artificial Intelligence, 1999, 2001; Conference on Uncertainty in Artificial Intelligence, 1998, 1999; International Conference on Distributed Computing Systems, 1998

## Professional Services (cont'd)

### Professional Society Memberships

Association for Computing Machinery (ACM) Senior Member  
American Association for Artificial Intelligence (AAAI)

### Post-Doctoral Scientists Managed

Rugiero Cavallo  
David Rothschild  
Yiling Chen (now Assistant Professor at Harvard University)  
Seung-Taek Park (now Research Scientist at Samsung)  
Tracy Mullen (now Assistant Professor at Pennsylvania State University)  
Dmitry Pavlov (now Research Scientist at Yandex)

### Students Managed or Co-Managed

Abe Othman, Carnegie Mellon (dissertation committee); Mingyu Guo & Lirong Xia, Duke; Dan Cosley & Shyong Lam, U. Minnesota; Varsha Dani, U. Chicago; Kushal Davé & Rahul Sami, Yale; Sandip Debnath, Jane Feng, Seung-Taek Park, & Secil Ugurel, Pennsylvania State; Rodrigo Lopes Cançado Fonseca, U. Federal de Minas Gerais; Eric Glover & Quang Duong, U. Michigan; A. Khrabrov, Alexandrin Popescul, & Jenn Wortman Vaughn, U. Pennsylvania; Finn Årup Nielsen, Technical U. Denmark; Nicolas Lambert & Paat Rusmevichientong, Stanford; Sumit Sanghai, U. Washington

## Technical Background

### Computer Science

#### Artificial Intelligence

Electronic commerce, recommender systems, machine learning, information retrieval, decision theory, Bayesian networks, game theory, complex systems, constraint satisfaction, satisfiability, and neural networks

#### Theory

Parallel algorithms, cellular automata, and computational complexity

#### Languages

C++, C, PERL, PASCAL, PROLOG, LISP, C\*, BASIC, Fortran, assembly, SuperCard, others

### Physics

Chaos, non-linear dynamics, quantum mechanics, relativity, optics, holography, percolation theory, thermal (statistical) physics, electronics, classical dynamics, and electricity and magnetism

### Math

Probability, non-linear time series analysis, differential equations, financial engineering, fractals, topology, linear algebra, and calculus

## References

Available on request