Nicole Immorlica

PERSONAL INFORMATION

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RESEARCH INTERESTS

Algorithmic Game Theory, Auction Design, E-Commerce
Structure, Formation, and Design of Social Networks
Approximation Algorithms, Network Design, Clustering

EDUCATION

Massachusetts Institute of Technology, Cambridge, Massachusetts.

Ph.D., June 2005
Thesis: "Computing with Strategic Agents"
Advisors: Prof. D. Karger and Prof. E. Demaine

Massachusetts Institute of Technology, Cambridge, Massachusetts.

Masters of Engineering in Computer Science, December 2001
Thesis: "Data Acquisition System Design for the Alpha Magnetic Spectrometer"
Advisor: Prof. P. Fisher

Massachusetts Institute of Technology, Cambridge, Massachusetts.

B.Sc. in Electrical Engineering and Computer Science, June 2000
B.Sc. in Mathematics, June 2000

HONORS AND AWARDS

- ◇ Best Student Paper Award, SODA 2005
- ◇ National Science Foundation (NSF) Fellowship (Sept. 2002 - Sept. 2005)
- ◇ Presidential Fellowship, MIT (Sept. 2001 - Sept. 2002)

RESEARCH EXPERIENCE

PostDoc, Microsoft Research Redmond, April 2005 - present.
Research Intern, Microsoft Research Redmond, Jan. - March 2005.
Research Visitor, Microsoft Research Redmond, September 2004.
Worked on problems in algorithmic game theory with a focus on issues arising in the design of ad auctions such as bid optimization, budget constraints, and click fraud.

Research Intern, Microsoft Research Silicon Valley, Summer 2004.
Performed research under the mentorship of S. Chien in online sublinear time algorithms for trend analysis of search engine query streams (joint work with Chien), worm prevention in peer-to-peer networks (joint work with Chien, McSherry, Zhang, and Zhou), and competitive auction design (joint work with Aggarwal, Fiat, Goldberg, Hartline, and Sudan).

Research Assistant, MIT Laboratory for Computer Science, 2002 - 2005.
Researched several problems in the areas of algorithmic game theory, market design, approximation algorithms, network design, clustering, and stochastic optimization under the joint supervision of Prof. D. Karger and Prof. E. Demaine.

Research Visitor, IBM Watson Research Center, August 2003.
Worked on approximation algorithms for a network augmentation problem (joint work with Kimbrel, Mirrokni, Naor, and Schieber). Work supported by a DIMACS grant under the Special Focus: Next Generation Networks Technologies and Applications.

Research Mentor, Research Science Institute (RSI), July 2003.
Mentored high school student Julie Finkelstein, who became a semifinalist in the Siemens-Westinghouse competition for her resulting project on game theoretic models for the internet. RSI is conducted by the Center for Excellence in Education in collaboration with MIT to promote research among talented high school students worldwide.

Research Intern, Lucent Bell Labs Research, Summer 2002.
Researched approximation algorithms for location area (LA) design in cellular networks, a type of clustering problem (joint work with Bejerano, Naor, and Smith).

Teaching Experience

Instructor, University of Washington, Fall 2005.
Designed and co-taught a course entitled *Algorithmic and Economic Aspects of the Internet*. Topics included the structure of social networks, network formation, link analysis algorithms, and topics motivated by e-commerce such as reputation systems, recommendation systems, and ad auctions.

Teaching Assistant, MIT, Fall 2000.
Responsibilities included designing and teaching tutorials and occasional recitations as well as grading for the course *Structure and Interpretation of Computer Programs*. Topics included iteration, recursion, environment models, object-oriented programming, state, evaluators, and compilers.

Community Involvement

- Designed and co-taught tutorial entitled *Mechanism Design for Online Advertisement*, ACM Conference on Electronic Commerce (EC) 2006.
- Program committee member: ACM Conference on Electronic Commerce (EC) 2007; European Symposium on Algorithms (ESA) 2007; National Conference on Artificial Intelligence (AAAI) 2007; ACM-SIAM Symposium on Discrete Algorithms (SODA) 2008.

Publications

All of the following publications are refereed. A complete list of publications with a short description for each paper is available through my homepage.

1. N. Immorlica, J. Kleinberg, M. Mahdian, and T. Wexler, *The Role of Compatibility in the Diffusion of Technology through Social Networks*, EC 2007.
2. C. Borgs, J. Chayes, O. Etesami, N. Immorlica, K. Jain, and M. Mahdian, *Dynamics of bid optimization in online advertisement auctions*, WWW 2007.
3. M. Babaioff, N. Immorlica, and R. Kleinberg, *Matroids, Secretary Problems, and Online Mechanisms*, SODA 2007.
4. N. Immorlica, K. Jain, and M. Mahdian, *Designing Hyperlink Structures: Optimization and Game-Theoretic Questions*, WINE 2006.
5. N. Immorlica, R. Kleinberg, and M. Mahdian, *Secretary Problems with Competing Employers*, WINE 2006.
6. B. Dean, M. Goemans, and N. Immorlica, *Finite Termination of "Augmenting Path" Algorithms in the Presence of Irrational Problem Data*, ESA 2006.
7. B. Dean, M. Goemans, and N. Immorlica, *The Unsplittable Stable Marriage Problem*, IFIP TCS 2006.
8. N. Immorlica, L. Li, V. Mirrokni, and A. Schulz, *Coordination Mechanisms for Selfish Scheduling*, WINE 2005.
9. N. Immorlica, K. Jain, M. Mahdian, and K. Talwar, *Click Fraud Resistant Methods for Learning Click-Through Rates*, WINE 2005.

10. G. Aggarwal, A. Fiat, N. Immorlica, A. Goldberg, J. Hartline, and M. Sudan, *Derandomization of Auctions*, STOC 2005.
11. C. Borgs, J. Chayes, N. Immorlica, M. Mahdian, and A. Saberi, *Multi-Unit Auctions with Budget-Constrained Bidders*, EC 2005.
12. N. Immorlica, D. Karger, E. Nikolova, and R. Sami, *First-Price Path Auctions*, EC 2005.
13. S. Chien and N. Immorlica, *Semantic Similarity between Search Engine Queries Using Temporal Correlation*, WWW 2005.
14. R. Bhatia, N. Immorlica, T. Kimbrel, V.S. Mirrokni, S. Naor, B. Schieber, *Traffic Engineering of Management Flows by Link Augmentations on Confluent Trees*, SPAA 2005, full version to appear in *ACM Transactions on Computer Systems.*
15. N. Immorlica, M. Mahdian, and V.S. Mirrokni, *Cycle Cover with Short Cycles*, STACS 2005.
16. N. Immorlica, M. Mahdian, and V.S. Mirrokni, *The Limitations of Cross-monotonic Cost Sharing Schemes*, SODA 2005,[1] full version to appear in *ACM Transactions on Algorithms*
17. N. Immorlica, and M. Mahdian, *Marriage, Honesty, and Stability*, SODA 2005.
18. L. Zhou, L. Zhang, F. McSherry, N. Immorlica, and S. Chien, *A First Look at Peer-to-Peer Worms: Threats and Defenses*, IPTPS 2005.
19. N. Immorlica, D. Karger, M. Minkoff,and V.S. Mirrokni. *On the Costs and Benefits of Procrastination: Approximation Algorithms for Stochastic Combinatorial Optimization Problems*, SODA 2004.
20. M. Datar, N. Immorlica, P. Indyk, and V.S. Mirrokni. *Locality-Sensitive Hashing Scheme Based on p-Stable Distributions*, SoCG 2004.
21. E. D. Demaine and N. Immorlica *Correlation Clustering with Partial Information*, APPROX 2003. Full version with D. Emanuel and A. Fiat: *Correlation clustering in general weighted graphs*, *Theoretical Computer Science*, volume 361, number 2-3, September 2006, pages 172-187. Special issue on approximation and online algorithms.
22. Y. Bejerano, N. Immorlica, S. Naor, and M. Smith. *Location Area Design in Cellular Networks*, MOBICOM 2003. Full version: *Efficient Location Area Planning for Personal Communication Systems*, *IEEE/ACM Transactions on Networking*, volume 14, number 2, April 2006, pages 438-450.
23. M. Hajiaghayi, N. Immorlica, and V.S. Mirrokni. *Power Optimization in Fault-Tolerant Topology Control Algorithms for Wireless Multi-hop Networks*, MOBICOM 2003.

PAPERS IN PREPARATION

- ◇ N. Immorlica, A. Karlin, M. Mahdian, and K. Talwar, *Balloon popping with applications to ascending auctions*, 2006.

PATENTS

- ◇ C. Borgs, J. Chayes, G. Flake, N. Immorlica, K. Jain, and M. Mahdian, Designing Hyperlink Structures, U.S. patent filed, 2006.
- ◇ C. Borgs, J. Chayes, N. Immorlica, K. Jain, and M. Mahdian, User-Associated, Interactive Advertising Monetization Schemes, U.S. patent filed, 2006.
- ◇ C. Borgs, J. Chayes, M. Chickering, O. Etesami, N. Immorlica, K. Jain, M. Mahdian, and C. Meek, Tools for Campaign Optimization, U.S. patent filed, 2005.

[1] Winner of the best student paper award.

- ◇ N. Immorlica, K. Jain, M. Mahdian, and K. Talwar, Click-Fraud Resistant Learning of Click- Through Rates, U.S. patent filed, 2005.
- ◇ C. Borgs, J. Chayes, U. Feige, N. Immorlica, M. Mahdian, and A. Saberi, Posted Price Market for Online Search and Content Ads, U.S. patent filed, 2005.
- ◇ C. Borgs, J. Chayes, N. Immorlica, M. Mahdian, and A. Saberi, Revenue-Maximizing Algorithm for Multi-Unit Auctions with Private Budgets, U.S. patent filed, 2005.
- ◇ C. Borgs, J. Chayes, U. Feige, N. Immorlica, M. Mahdian, and A. Saberi, Mechanism for Allocating Advertisements of Varying Intervals, U.S. patent filed, 2005.
- ◇ C. Borgs, J. Chayes, U. Feige, J. Goodman, N. Immorlica, M. Mahdian, and A. Saberi, Evaluation and Pricing of User Interactions with Online Advertisements, U.S. patent filed, 2005.
- ◇ S. Chien and N. Immorlica, Methods for Finding Semantically Related Search Engine Queries, U.S. patent filed, 2005.

Letters of Reference

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