Mohsen Bayati

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ACADEMIC AND INDUSTRY EXPERIENCE

Stanford University — **Stanford, CA**
Assistant Professor of Operations, Information and Technology, Graduate School of Business — *Jul 2011-Present*
Assistant Professor of Electrical Engineering (by courtesy)
Advising Faculty in Biomedical Informatics

Postdoctoral Scholar in Electrical Engineering — *Aug 2009-June 2011*

Microsoft Research — Redmond, WA and Cambridge, MA
Postdoctoral Researcher — *Jul 2007-Aug 2009*
Intern – theory group — *Summer 2006*

IBM Watson Research — Yorktown Heights, NY
Intern — *Summer 2005*

EDUCATION

Stanford University — Stanford, CA
Ph.D. in Electrical Engineering — *2003-2007*
Advisors: Balaji Prabhakar and Amin Saberi
Ph.D. Minor and M.S. in Mathematics — *2000-2003*

Sharif University of Technology — Tehran, Iran
B.Sc. in Mathematics — *1997-2000*

RESEARCH INTERESTS

- Data-driven healthcare: incentives, predictive models, optimization, and decisions.
- Design and analysis of algorithms for large-scale data.
- Graphical models and message-passing algorithms.
- Theory of algorithms, applied probability and statistics.

HONORS and DISTINCTIONS

- Gold Medal in International Mathematics Olympiad (IMO) — Mar del Plata, Argentina *1997*
- MBA Class of '69 Faculty Scholar — Stanford, CA *2012-2013*

JOURNAL PAPERS

M. Bayati, C. Borgs, J. Chayes, Y. Kanoria, and A. Montanari, "Bargaining dynamics in exchange networks", *Accepted to Journal of Economic Theory (JET)*, Jan 2014

M. Bayati, M. Lelarge and A. Montanari, "Universality in polytope phase transitions and message passing algorithms", *Accepted to Annals of Applied Probability*, Jan 2014.

M. Bayati, D. Gamarnik, and P. Tetali, "Combinatorial approach to the interpolation method and scaling limits in sparse random graphs", *Annals of Probability*, Vol. 41, No 6, 2013.

M Bayati, D. F. Gleich, A. Saberi, Y. Wang, "Message-passing algorithms for sparse network alignment", *ACM*

Transactions of Knowledge Discovery and Data mining (TKDD), Vol. 7, Pages 3:1-3:31, 2013

M. Bayati, A. Montanari, "The LASSO risk for gaussian matrices", *IEEE Transactions on Information Theory,* Vol. 58, No. 4, 2012.

M. Bayati, C. Borgs, J. Chayes, and R. Zecchina, "Belief-Propagation for Weighted b-Matchings on Arbitrary Graphs and its Relation to Linear Programs with Integer Solutions", *SIAM J. in Discrete Math (SIDMA)*, 25, pp. 989-1011, 2011.

M. Bayati, A. Montanari, "The dynamics of message passing on dense graphs, with applications to compressed sensing", *IEEE Transactions on Information Theory*, Vol 57, Issue 2 pp. 764-785, 2011.

M. Bayati, J. H. Kim and A. Saberi, "A sequential algorithm for generating random graphs", *Algorithmica*, Vol. 58, No. 4, 2010.

M. Bayati, A. Braunstein, and R. Zecchina, "On the exactness of cavity equations for the minimum spanning tree", *Journal of Mathematical Physics*, 2009.

M. Bayati, C. Borgs, J. Chayes, and R. Zecchina, "On the exactness of the cavity method for weighted b-matching on arbitrary graphs and its relation to linear programs", *Journal of Statistical* Physics (JSTAT), 2008.

M. Bayati, C. Borgs, A. Braunstein, J. Chayes, A. Ramezanpour, and R. Zecchina, "Statistical Mechanics of Steiner Trees", *Physical Review Letters (PRL),* 2008.

M. Bayati, D. Shah and M. Sharma, "Max-product for maximum weight matching: convergence, correctness, and LP duality", *IEEE Transactions on Information Theory*, March 2008.

SUBMITTED & WORKING PAPERS

J. Goh, Margret V. Bjarnadottir, M. Bayati, and S. Zenios, "Active Postmarketing Drug Surveillance for Multiple Adverse Events", *Submitted*, 2013

M. Bayati, A. Montanari, and A. Saberi, "Generating Random Graphs without Short Cycles", *Submitted*, 2013

M. Bayati, M. A. Erdogdu, and A. Montanari, "Estimating LASSO risk and noise level", In preparation.

J. Goh, M. Bayati, S. Zenios, S. Singh, and D. Moore, "Data Uncertainty in Markov Chains: Application to Cost-effectiveness Analyses of Medical Innovations", *In preparation*, 2014.

M. Bayati, M. Braverman, M. Gillam, K. Mack, G. Ruiz, M. Smith, and E. Horvitz, "Predictive Models and Policies for Minimizing Rehospitalizations for Congestive Heart Failure", *In preparation.*

REFEREED CONFERENCE PAPERS

M. Bayati, M. A. Erdogdu, and A. Montanari, "Estimating LASSO risk and noise level", Accepted to *Neural Information Processing Systems (NIPS)*, 2013.

M. Bayati, M. Lelarge and A. Montanari, "Universality in Polytope Phase Transitions and Iterative Algorithms", *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, 2012

Y. Kanoria, M. Bayati, C. Borgs, J. Chayes, and A. Montanari, "Fast Convergence of Natural Bargaining Dynamics for Exchange Networks", *Proceedings of ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2011.

M. Bayati, J. Bento, A. Montanari, "The LASSO risk for gaussian matrices: asymptotic results and real world examples", *Proceedings of Neural Information Processing Systems (NIPS)*, 2010.

M. Bayati, A. Montanari, "The dynamics of message passing on dense graphs, with applications to compressed sensing", *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, 2010.

M. Bayati, D. Gamarnik, and P. Tetali, "Combinatorial approach to the interpolation method and scaling limits in sparse random graphs", *Proceedings of ACM Symposium on Theory of Computing (STOC)*, 2010.

M. Bayati, M.Gerritsen, D. Gleich, A. Saberi, and Y. Wang, "Algorithms for Large, Sparse Network Alignment", *Proceedings of IEEE International Conference on Data Mining (ICDM)*, 2009.

M. Bayati, A. Montanari, and A. Saberi, "Generating random graphs with large girth", *Proceedings of ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2009.

M. Bayati, J. H. Kim and A. Saberi, "A sequential algorithm for generating random graphs", *International Workshop on Randomized Techniques in Computation (RANDOM)*, 2007.

M. Bayati, D. Gamarnik, D. Katz, C. Nair and P. Tetali, "Simple deterministic approximation algorithms for counting matchings", *ACM Symposium on Theory of Computing (STOC)*, 2007.

M. Bayati, B. Prabhakar, D. Shah and M. Sharma, "Iterative Scheduling Algorithms", *IEEE Conference on Computer Communications (INFOCOM)*, 2007.

M. Bayati, Chandra Nair, "A rigorous proof of the cavity method for counting matchings", (*Allerton) conference on communication, control and computing*, 2006.

M. Bayati, D. Shah and M. Sharma, "A simpler max-product maximum weight matching algorithm and the auction algorithm", *IEEE International Symposium on Information Theory (ISIT)*, 2006.

M. Bayati, M. Squillante and M. Sharma, "Optimal scheduling in multi-server queuing network", *ACM (SIGMETRICS)*, 2006.

M. Bayati, D. Shah and M. Sharma, "Maximum weight matching via max-product belief propagation", *IEEE International Symposium on Information Theory (ISIT)*, 2005.

N. Kumar, S. Nabar, M. Bayati, A. Keshavarzian, "Achieving stability in networks of input queued switches using a local online scheduling policy", *IEEE (GLOBECOM)*, 2005.

M. Bayati, N. Beheshti, "Stability of the maximum size matching in input queued switches", (*Allerton) conference on communication, control and computing*, 2004.

TEACHING

- Spring 2014, OIT 637 Data-driven Decision Making in Healthcare (PhD)
- Winter 2014, OIT 367 Analytics from Big Data (MBA Core)
- Winter 2013, OIT 367 Analytics from Big Data (MBA Core)
- Spring 2012, OIT 267 Data and Decisions – Accelerated (MBA Core)

PATENTS

- Integrated system for healthcare analytics, decision support, alerts and experimentation (with M. Braverman and E. Horvitz), 2009.
- Predicting Web Advertisement Click Success by Using Head-To-Head Ratings (with. M. Braverman, S. Kale and Y. Makarychev), 2009.
- Network analysis with Steiner trees (with C. Borgs, A. Braunstein, J. Chayes, and R. Zecchina), 2008.

PROFESSIONAL SERVICE

Session chair:	Session on Learning and Marketing in Social Networks in INFORMS 2011. Session on Message-passing Algorithms and Network Optimization in INFORMS 2008.
Co-organizer:	Workshop on Computational Aspects of Biological Information, 2007.

Reviewer for journals: Operations Research
Management Science
Manufacturing & Services Operations Management
IEEE/ACM Transactions on Networking
IEEE Transactions on Information Theory
SIAM Journal in Discrete Math (SIDMA)

INVITED TALKS

Data-driven decision making with applications to healthcare systems
- November 2011, INFORMS, Charlotte, NC
- October 2011, Kellogg Operations Seminar Series, Evanston, IL
- October 2011, UT Austin Seminar, Austin TX
- September 2011, Microsoft Research 20th Anniversary, Cambridge, MA
- July 2011, INFORMS Applied Probability Society conference, Stockholm, Sweden
- February 2011, Information Theory and Applications workshop, UCSD, San Diego, CA
- February 2011, Stanford GSB Operations, Information, and Technology seminar, Stanford, CA
- December 2010, MIT Sloan School of Management, Cambridge, MA
- November 2010, Berkeley Networking, Communications, and DSP seminar, Berkeley, CA

Analysis of Approximate Message Passing and the Risk of LASSO
- November 2011, INFORMS, Charlotte, NC
- July 2011, INFORMS Applied Probability Society conference, Stockholm, Sweden
- February 2011, Berkeley Probability seminar, Berkeley, CA
- November 2010, INFORMS, Austin, TX

Predicting and Minimizing Rehospitalizations through Machine Learning
- November 2010, INFORMS, Austin, TX
- November 2010, Biomedical Informatics Colloquium, Stanford, CA
- April 2010, Information Systems Colloquium, Stanford University, CA

Generating Random Graphs with Large-Girth
- October 2009, Information Theory Workshop (ITW), Taormina, Italy
- October 2008, DIMACS workshop on message-passing algorithms, Rutgers University, Piscataway, NJ

Algorithms for Large, Sparse Network Alignment
- September 2009, Physics of Algorithms workshop, Santa Fe, NM

Graphical Models And Message Passing Algorithms: Theory and Applications
- March 2009, Yahoo! Research, Sunnyvale, CA
- May 2008, Google Research, Mountain View, CA
- February 2007, Theory group at Microsoft research, Redmond, WA

A Sequential Algorithm for Generating Random Graphs
- March 2009, MIT Stochastic Seminar, Cambridge, MA
- October 2008, INFORMS, Washington, DC
- July 2007, Common Concepts in Statistical Physics and Computer Science, Trieste, Italy
- May 2006, Theory Seminar, University of Washington, Seattle, WA

Matching Wikipedia categories to the library of congress subject headings with network alignment
- February 2009, Information Theory and Applications Workshop, San Diego, CA
- November 2008, Microsoft Search Labs Tech Talk, Mountain View, CA

Belief Propagation and Linear Programming
- October 2008, INFORMS, Washington, DC
- June 2008, Workshop on: Phase Transitions, Hard Combinatorial Problems and Message Passing Algorithms, Banff, CA

Sequential Importance sampling and message-passing algorithms

- February 2008, Theory Seminar, University of Washington, Seattle, WA

Message-passing scheduling algorithms
- January 2008, Information Theory and Applications workshop, UCSD, San Diego, CA
- July 2007, Applied Probability Society of INFORMS, Eindhoven, Netherlands

A rigorous analysis of the Cavity Method for counting matchings
- May 2007, 1st Canadian Discrete and Algorithmic Mathematics Conference, Calgary, Canada
- April 2007, 3rd Kailath Lecture and Colloquium, Stanford, CA
- December 2006, Theory seminar, Berkeley, CA

Maxim Weight Matching via Max-Product Belief Propagation
- January 2006, Stanford Theory Lunch, Stanford, CA
- August 2005, Applied probability lunch, IBM Watson, Yorktown Heights, NY

Solving Switching Problem via Auction Algorithm
- May 2005, Cisco systems, San Jose, CA