Noah D. Stein
Curriculum Vitae

Massachusetts Institute of Technology
Laboratory for Information and Decision Systems
77 Massachusetts Avenue
Cambridge, MA 02139

Phone: (860) 214-2137
Email: nstein@mit.edu
Web: http://www.mit.edu/~nstein

Personal

Born: June 29, 1983.

Citizenship: United States of America.

Education

Ph.D., Electrical Engineering & Computer Science. MIT, June 2011.

S.M., Electrical Engineering & Computer Science. MIT, June 2007.

B.S., Electrical and Computer Engineering. Cornell University, May 2005.

Research Interests

Machine learning: nonnegative tensor factorization methods; directional audio source separation; neural networks.

Game theory: geometry of equilibria; algorithms; continuous games.

Optimization: linear, semidefinite, and convex programming; algebraic methods.

Awards

Ernst A. Guillemin Thesis Award (1^{st} place) for best electrical engineering S.M. thesis. MIT, May 2007.

Baccalaureate Service Award for "intellectual integrity, commitment to a pluralistic community, excellence in scholarship, and active citizenship." Cornell University, May 2005.

Pertsch Prize for the highest cumulative GPA upon the completion of junior-level electrical and computer engineering coursework. Cornell University, May 2003 (sophomore year).

Professional Experience

Analog Devices | Lyric Labs: intern, 2007; research scientist, 2011 – 2014; senior research scientist, 2015 – present. My main role is to lead audio source separation algorithm development. To this end I have designed the Directional Nonnegative Tensor Factorization algorithm and developed various improvements to its separation performance and robustness. I also supervise a team of five other research scientists and software engineers working on improving, extending, evaluating, and tuning the algorithm. My additional responsibilities include organizing weekly symposia or reading groups, leading the hiring efforts for the Lyric Labs theory team, and maintaining contacts with academia by attending conferences and hosting interns.

Professional Service

Supervised seven summer internships, 2011 – present.

Game theory invited session organizer. International Symposium on Mathematical Programming, 2009.

EE&CS representative to the Graduate Student Council. MIT, 2006 - 2007.

EE&CS Graduate Student Association Executive Committee member. MIT 2006 - 2007.

Dean's Advisory Committee for the College of Engineering. Cornell University, 2004 - 2005.

Reviewer for NIPS; IEEE Signal Processing Letters; International Journal of Game Theory; Mathematical Social Sciences; Mathematical Programming; Automatica; European Control Conference; IEEE Conference on Decision and Control; Systems, Man, and Cybernetics – Part B; and the Bulletin of the Section of Logic; ongoing.

Publications

Patents

N. Stein. Computationally Efficient Method for Filtering Noise. U.S. Application 15/102,623 pending.

D. Wingate and N. Stein. Signal Source Separation. U.S. Patent 9,460,732 issued October 4, 2016.

N. Stein, J. Traa, and D. Wingate. Time-Frequency Directional Processing of Audio Signals. U.S. Patent 9,420,368 issued August 16, 2016.

J. Ranieri, D. Wingate, and N. Stein. Microphone Calibration. U.S. Patent 9,232,332 issued January 5, 2016 and German Patent 112014003443 issued December 29, 2016.

J. Ranieri, D. Wingate, and N. Stein. Apparatus, Systems, and Methods for Calibration of Microphones. U.S. Patent 9,232,333 issued January 5, 2016.

Theses

Exchangeable Equilibria. Doctoral thesis advised by Asuman Ozdaglar and Pablo A. Parrilo, MIT, May 2011 (projected).

Characterization and Computation of Equilibria in Infinite Games. Master's thesis advised by Asuman Ozdaglar and Pablo A. Parrilo, MIT, May 2007. Ernst A. Guillemin Thesis Award, 1st place.

Journal Articles

J. Traa, N. D. Stein, D. Wingate, and P. Smaragdis. Robust Source Localization and Enhancement With a Probabilistic Steered Response Power Model. *IEEE/ACM Transactions on Audio, Speech, and Language Processing (TASLP)*, in review.

N. D. Stein, A. Ozdaglar, and P. A. Parrilo. Structure of Extreme Correlated Equilibria: a Zero-Sum Example and its Implications. *International Journal of Game Theory*, 40(4): 749 – 767, November 2011.

N. D. Stein, P. A. Parrilo, and A. Ozdaglar. Correlated Equilibria in Continuous Games: Characterization and Computation. *Games and Economic Behavior*, 71(2):436 – 455, March 2011.

C. Dodd, P. Jeasakul, A. Jirapattanakul, D. M. Kane, B. Robinson, N. D. Stein, and C. E. Silva. Ergodic Properties of a Class of Discrete Abelian Group Extensions of Rank-One Transformations. *Colloquium Mathematicum*, 119: 1 – 22, 2010.

N. D. Stein, A. Ozdaglar, and P. A. Parrilo. Separable and Low-Rank Continuous Games. *International Journal of Game Theory*, 37(4):475 – 504, December 2008.

Working Papers

N. D. Stein. Nonnegative Tensor Factorization for Directional Blind Audio Source Separation.

N. D. Stein, A. Ozdaglar, and P. A. Parrilo. Exchangeable Equilibria Part I: Symmetric Bimatrix Games.

N. D. Stein, P. A. Parrilo, and A. Ozdaglar. A Partial Proof of Nash's Theorem via Exchangeable Equilibria.

N. D. Stein, P. A. Parrilo, and A. Ozdaglar. Games on Manifolds.

Conference Proceedings

E. Creager, N. D. Stein, R. Badeau. Nonnegative Tensor Factorization with Frequency Modulation Cues for Blind Audio Source Separation, *Proceedings of International Society for Music Information Retrieval (ISMIR) conference*, 2016.

J. Traa, N. D. Stein, D. Wingate, and P. Smaragdis. Directional NMF for Joint Source Localization and Separation. *Proceedings of the IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2015.

N. D. Stein, A. Ozdaglar, and P. A. Parrilo. Computing Correlated Equilibria of Polynomial Games via Adaptive Discretization. *Proceedings of the IEEE Conference on Decision and Control*, 2008.

N. D. Stein, P. A. Parrilo, and A. Ozdaglar. Characterization and Computation of Correlated Equilibria in Infinite Games. *Proceedings of the IEEE Conference on Decision and Control*, 2007.

N. D. Stein, A. Ozdaglar, and P. A. Parrilo. Separable and Low-Rank Continuous Games. *Proceedings of the IEEE Conference on Decision and Control*, 2006.

Talks

Blind Audio Source Separation With Nonnegative Tensor Factorization. *Analog Devices General Technical Conference*, April 2014.

Exchangeable Equilibria in Symmetric Bimatrix Games. *Brazilian Workshop on Game Theory*, July 2010.

A Fixed Point Free Proof of Nash's Theorem via Exchangeable Equilibria. *Stony Brook Conference on Game Theory*, July 2010.

Exchangeable Equilibria. *Laboratory for Information and Decision Systems Student Conference*, MIT, January 2010.

Polynomial Games: Computation of Nash and Correlated Equilibria. *International Symposium on Mathematical Programming*, August 2009.

Games on Manifolds. *Stony Brook Conference on Game Theory*, July 2009.

Adaptive Discretization Methods for Computing Correlated Equilibria of Polynomial Games. *IEEE Conference on Decision and Control*, December 2008.

Adaptive Discretization Methods for Computing Correlated Equilibria of Polynomial Games. *Games 2008*, July 2008.

Adaptive Discretization Methods for Computing Correlated Equilibria of Polynomial Games. *Laboratory for Information and Decision Systems Student Conference*, MIT, February 2008.

Computation and Characterization of Equilibria in Polynomial Games. *Stony Brook Conference on Game Theory*, July 2007.

Computation of ϵ-Equilibria in Separable Games. *IEEE Conference on Decision and Control*, December 2006.

Computation of ϵ-Equilibria in Separable Games. *Laboratory for Information and Decision Systems Student Conference*, MIT, January 2006.

Teaching

Teaching assistant for "Algebraic Techniques and Semidefinite Optimization," taught by Pablo A. Parrilo, Spring 2008 at MIT. Held office hours and graded student assignments.

Recitation facilitator for "Electromagnetic Fields and Waves," taught by Donald T. Farley, Fall 2003 and 2004 at Cornell University. Worked examples at the blackboard and guided students as they solved practice problems in groups.

Private tutor for courses ranging from middle and high school math and chemistry, to undergraduate calculus, computer programming, signal processing, and electromagnetism, to graduate level linear programming; 1996 - 2011.

References from time at Analog Devices

Théophane Weber (former colleague)

Senior Research Scientist at Google DeepMind – theophane@google.com

David Wingate (former technical supervisor)

Assistant Professor at BYU – wingated@cs.byu.edu

Brian Donnelly (former supervisor)

Director of Analog Garage Startups – brian.donnelly@analog.com

References from time at MIT

Asuman Ozdaglar (thesis co-advisor)

Professor / Associate Department Head of EECS at MIT – asuman@mit.edu

Pablo Parrilo (thesis co-advisor)

Professor at MIT – parrilo@mit.edu