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Benjamin Recht

Academic Employment

Postdoctoral Fellow, 2006-present
California Institute of Technology, Pasadena, CA
Center for the Mathematics of Information

Research Assistant, 2000-2006
Massachusetts Institute of Technology, Cambridge, MA
Media Laboratory/Center for Bits and Atoms
Advisor: Neil Gershenfeld

Education

PhD, 2006
Massachusetts Institute of Technology, Cambridge, MA
Thesis: Convex Modeling with Priors
Advisor: Neil Gershenfeld

Master of Science, 2002
Massachusetts Institute of Technology, Cambridge, MA
Thesis: Spingineering: Quantum Control in the Presence of Relaxation
Advisor: Neil Gershenfeld

Bachelor of Science, 2000
University of Chicago, Chicago, IL

Awards

Industrial Design Excellence Award, Industrial Designers Society of America, 2004
Best in Show, Best in Academic Category, and Best Interactivity in Designing Interactive Systems Design Competition, 2004
3rd place, Vida 6.0 Art & Artificial Life International Competition, 2003
MIT Presidential Fellowship, 2000-2001
Paul Cohen Prize as outstanding graduating senior in Mathematics, 2000
Goldwater Scholarship, 1998-2000
Phi Beta Kappa, 1999
University of Chicago College Honor Scholarship, 1996-2000

Teaching Experience

CDS213 - Robust Control. California Institute of Technology, Winter 2007. Instructor: John Doyle. Delivered a series of lectures on Modern System Identification.

The Nature of Mathematical Modeling. Massachusetts Institute of Technology, Spring 2005. Instructor: Neil Gershenfeld. Wrote and delivered lectures on applications of convex optimization to mathematical modeling. Ran weekly recitation sections.

Analysis. University of Chicago, 1998-2000. Instructor: Diane Hermann. Ran weekly recitation sections and graded problem sets.

Young Scholars Program. University of Chicago, 1996-2000. Tutor at enrichment program

for talented high school students in the Chicago Schools.

Journal Publications

1. “Guaranteed Minimum Rank Solutions to Linear Matrix Equations via Nuclear Norm Minimization.” Benjamin Recht, Maryam Fazel, and Pablo A. Parrilo. Submitted to *SLAM Review*.
2. “Gliomas undergo a distinct phenotypic change at the time of MRI detection.” Taichang Jang, Binulal Sathy, Yi-Hua Hsu, Milton Merchant, Benjamin Recht, Chen Chang, and Lawrence Recht. *Journal of Neurosurgery*. To appear.
3. “Learning to Transform Time Series with a Few Examples.” Ali Rahimi, Benjamin Recht, and Trevor Darrell. *IEEE Transactions on Pattern Analysis and Machine Intelligence*. Vol 29, no 10, pages 1759 - 1775. 2007.
4. “Distributed Control of Systems over Discrete Groups.” Benjamin Recht and Raffaello D'Andrea. *IEEE Transactions on Automatic Control*. Vol 49, no 9, pages 1446 - 1452. 2004.
5. “Efficient Discrete Approximations of Quantum Gates.” Aram W. Harrow, Benjamin Recht, and Isaac L. Chuang. *Journal of Mathematical Physics*. Vol 43, no 9, pages 4445-4451. 2002.
6. “Physical One-Way Functions.” Ravikanth Pappu, Benjamin Recht, Jason Taylor, and Neil Gershenfeld, *Science*. Vol 297, no 5589, pages 2026-2030. 2002.

Refereed Conference Proceedings

1. “A Nash-type Dimensionality Reduction for Discrete Subsets of L_2 .” Yair Bartal, Benjamin Recht, and Leonard Schulman. Submitted to the *Symposium on Theory of Computing Conference* 2008.
2. “Random Features for Large-Scale Kernel Machines.” Ali Rahimi and Benjamin Recht. *Advances in Neural Information Processing Systems*. 2007
3. “Guaranteed Minimum Rank Solutions to Linear Matrix Equations via Nuclear Norm Minimization.” Benjamin Recht, Maryam Fazel, and Pablo A. Parrilo. *45th annual Allerton Conference*, 2007.
4. “Determining Interconnections in Chemical Reaction Networks.” Antonis Papachristodoulou and Benjamin Recht. *American Control Conference*. July, 2007. New York, NY.
5. “Estimating Observation Functions in Dynamical Systems using Unsupervised Regression.” Ali Rahimi and Benjamin Recht. *Advances in Neural Information Processing Systems*. 2006.
6. “Interaction Techniques for Musical Performance with Tabletop Tangible Interfaces.” James Patten, Benjamin Recht, and Hiroshi Ishii. *Advances in Computer Entertainment*, June, 2006. Hollywood, California.
7. “Learning Appearance Manifolds from Video.” Ali Rahimi, Benjamin Recht, and Trevor Darrell. In *Computer Vision and Pattern Recognition*. 2005.
8. “Clustering with Normalized Cuts is Clustering with a Hyperplane.” Ali Rahimi and Benjamin Recht. In *Statistical Learning in Computer Vision*. 2004.
9. “Exploiting Symmetry for the Distributed Control of Spatially Interconnected Systems.” Benjamin Recht and Raffaello D'Andrea. In *Proceedings of the 42nd IEEE Conference on Decision and Control*. 2003.

10. “Musically Expressive Sound Textures from Generalized Audio.” Benjamin Recht and Brian Whitman. In *Proceedings of the 6th International Conference on Digital Audio Effects*. 2003.

11. “Audiopad: A Tag-based Interface for Musical Performance.” James Patten, Benjamin Recht, Hiroshi Ishii. In *Proceedings of the Conference on New Interfaces for Musical Expression*. 2002.

Invited Talks

1. “Rank Minimization over Affine Sets.” Center for the Mathematics of Information Seminar. Caltech. November 2007.

2. “A Convex Approach to Semi-supervised and Unsupervised Learning.” MIT, April 2007.

3. “Statistical Learning.” Center for the Mathematics of Information Seminar. Caltech. November 2006.

4. “A Convex Approach to Semi-supervised and Unsupervised Learning.” AI Seminar. University of California, San Diego. October 2006.

5. “Diffeomorphic Warping.” Connections Workshop. Caltech. August 2006.

6. “Semi-supervised Regression.” Control and Dynamical Systems. Caltech. June 2005.

7. “Data-driven modeling.” Department of Neurology. University of Massachusetts. January 2005.

8. “Duality, Decomposition, and Dynamics.” Center for Bits and Atoms. MIT. December 2004.

9. “Positivstellensatz: A tutorial.” Connections Conference. Caltech. July 2004.

10. “Semidefinite Relaxations for Clustering.” Stochastic Systems Group Seminar. MIT. February 2004.

11. “Distributing Semidefinite Relaxations.” Avogadro Scale Engineering Meeting. MIT. November 2003.

12. “Semidefinite Relaxations for Combinatorial Optimization Problems.” Center for Bits and Atoms. MIT. October 2003.

13. “Chiclet: A tiny and powerful hardware platform for algorithmic synthesis and composition, coming soon to a record store near you.” Dorkbot NYC. Columbia University. November 2002.

Selected Exhibitions

1. “Rope and Sound.” Cooper Hewitt Museum, New York. 2005.

2. “Frequency Reallocation Project.” with Noah Vawter and Brian Whitman. Spectropolis Festival. New York. 2004.

3. “Concrete Music.” with Brian Whitman, Noah Vawter, and Ethan Bordeaux. ARCO Festival. Madrid, Spain. 2004.

4. “Audiopad.” with James Patten. Museu d'Art Contemporani de Barcelona, Barcelona Spain. 2003. Ars Electronica Center. Linz, Austria. 2003.

5. “a meow mix.” with Ethan Bordeaux, Noah Vawter, and Brian Whitman. Cyberarts Festival.

Boston, Massachusetts. 2003.

Professional Music Experience

Extensive experience performing, composing, and producing electronic music. Released music on labels Adhesive, Barge Records, Beat Research, Unfoundsound, Unlockedgroove, and Zero G Sounds. Performed throughout U.S. and Europe with The Fun Years, Localfields, Mike Uzzi, and The Dan Bensons Project.

Consulting

Technical Consulting on Data Processing, Mathematical Modeling, and Machine Learning for The Echo Nest, Inc. (2005-present), Makani Power, (2007-present), and All Protect, Inc. (2007-present). Advisory Board, Adozu, Inc. 2006-present.