Jeffrey W. Miller

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Education

Brown University, Providence, RI
PhD, Applied Mathematics. Advisers: Matthew T. Harrison and Stuart Geman — 2008-2014
Master of Science, Mathematics — 2008-2010

PhD Dissertation: *Nonparametric and Variable-Dimension Bayesian Mixture Models: Analysis, Comparison, and New Methods.* Brown University, Division of Applied Mathematics, 2014.

Stanford University, Stanford, CA — 2001-2002
Master of Science, Mechanical Engineering

Georgia Institute of Technology, Atlanta, GA — 1997-2001
Bachelor of Science, Mechanical Engineering

Professional Experience

Duke University, Durham, NC — 2014-present
Postdoctoral Associate, Department of Statistical Science

Brown University, Providence, RI — Summer 2014
Postdoctoral Associate, Division of Applied Mathematics

Draper Laboratory, Cambridge, MA — 2005-2008
Member of Technical Staff, Cognitive Robotics Group

United States Air Force, Air Force Research Lab, Tyndall AFB, FL — 2002-2005
Highest rank: Captain. Project Manager, Robotics Research Group

Research Interests

Nonparametric Bayesian methods. Robustness to model misspecification. Efficient algorithms for inference in complex models. Frequentist analysis of Bayesian methods. Applications in genomics, neuroscience, and diseases of aging.

Publications

J. W. Miller, B. Betancourt, A. Zaidi, H. Wallach, and R. C. Steorts. *Microclustering: When the cluster sizes grow sublinearly with the size of the data set.* Advances in Neural Information Processing Systems (NIPS), Bayesian Nonparametrics: The Next Generation workshop, 2015.

J. W. Miller and M. T. Harrison. *Inconsistency of Pitman–Yor process mixtures for the number of components.* **Journal of Machine Learning Research**, Vol. 15, 2014, pp. 3333-3370.

J. W. Miller and M. T. Harrison. *A simple example of Dirichlet process mixture inconsistency for the number of components.* **Advances in Neural Information Processing Systems (NIPS)**, Full oral presentation, Vol. 26, 2013.

J. W. Miller and M. T. Harrison. *Exact sampling and counting for fixed-margin matrices.* **The Annals of Statistics**, Vol. 41, No. 3, 2013, pp. 1569-1592.

J. W. Miller. *Reduced criteria for degree sequences.* **Discrete Mathematics**, Vol. 313, Issue 4, 2013, pp. 550-562.

Preprints and Work-in-progress

J. W. Miller and M. T. Harrison. *Mixture models with a prior on the number of components.* Revision submitted (JASA), 2015, arXiv:1502.06241.

J. W. Miller and D. B. Dunson. *Robust Bayesian inference via coarsening.* Submitted (JRSSB), 2015, arXiv:1506.06101.

M. T. Harrison and J. W. Miller. *Importance sampling for weighted binary random matrices with specified margins.* In preparation, arXiv:1301.3928.

J. W. Miller and D. B. Dunson. *Concentration and asymptotic normality of generalized posteriors.* In preparation, 2015+.

Awards

Brown University Outstanding Dissertation Award in the Physical Sciences, generously sponsored by the Joukowsky Family Foundation (2014).

1st Prize for Poster by a Young Participant, June 14, 2013, BNP9 (9th Conference on Bayesian Nonparametrics, Amsterdam).

Sigma Xi Outstanding Graduate Student Award, May 9, 2013, Brown University chapter of Sigma Xi. "For excellence in research and high potential for further contributions to science." One of three recipients.

Presidential Award for Excellence in Teaching, May 7, 2012, Brown University. One graduate student is selected for the award each year, out of approximately 400 with teaching positions.

IBM Thomas J. Watson Research Center Student Research Award, April 16, 2011, New England Statistics Symposium (NESS). One of four winners of this award for "outstanding research in the field of Statistics and Probability."

Grants and Fellowships

Travel grant for Advances in Neural Information Processing Systems (NIPS) "Bayesian Nonparametrics: The Next Generation" workshop, 2015.

Graduate School Travel Grant, 2011-2013, Brown University. (Supplemental funding for travel.)

Supported in part by NSF, NIH, and DARPA grants, under advisor supervision, 2011-2015.

National Defense Science and Engineering Graduate (NDSEG) Fellowship, 2001-2002, 2008-2011.

Air Force ROTC Full Scholarship, 1997-2001.

Talks and Posters

Harvard Statistics Departmental Colloquium, Sept 21, 2015, Harvard University. *Robust Bayesian inference via coarsening.* (Invited talk)

Joint Statistical Meetings (JSM), August 11, 2015, Seattle, WA. *Robust Bayesian inference via coarsening.* (Speed talk, poster)

Bayesian Nonparametrics: Synergies between Statistics, Probability and Mathematics, June 30, 2015, SAMSI. *Robust Bayesian inference via coarsening.* (Poster)

10th Conference on Bayesian Nonparametrics (BNP10), June 23, 2015, Raleigh, NC. *An approach to inference under misspecification.* (Talk)

G70: A Celebration of Alan Gelfand's 70th Birthday, April 20, 2015, Duke University. *The small clustering problem: What if the clusters don't grow with N?* (Poster)

Texas A&M Statistics Departmental Colloquium, October 31, 2014, Texas A&M University. *Combinatorial stochastic processes for variable-dimension models.* (Invited talk)

International Society for Bayesian Analysis (ISBA) World Meeting, July 14-18, 2014, Cancún, Mexico. *Combinatorial stochastic processes for variable-dimension models.* (Invited talk)

New England Statistics Symposium (NESS), April 25-26, 2014, Harvard School of Public Health. *Combinatorial stochastic processes for variable-dimension models.* (Talk)

Duke Statistical Science Seminar, February 7, 2014, Duke University. *Combinatorial stochastic processes for variable-dimension models.* (Invited talk)

Neural Information Processing Systems (NIPS), December 5-8, 2013, Lake Tahoe, NV. *A simple example of Dirichlet process mixture inconsistency for the number of components.* **Full oral presentation.**

Pattern Theory Seminar, November 6, 2013, Brown University. *Dirichlet process mixture inconsistency for the number of components, and dimension mixture models.* (Invited talk)

REU Seminar (Research Experience for Undergraduates), June 28, 2013, Brown University, Division of Applied Mathematics. *Random matrices with fixed row and column sums.* (Invited talk)

9th Conference on Bayesian Nonparametrics (BNP9), June 10-14, 2013, Amsterdam. *Dimension mixtures of finite-dimensional models.* (Poster) **Winner of 1st place in poster competition.**

New England Machine Learning day (NEML), May 1, 2013, Cambridge, MA. *Posterior consistency for the number of components in a finite mixture.* (Poster)

New England Statistics Symposium (NESS), April 27, 2013, Storrs, CT. *Posterior consistency for the number of components in a finite mixture.* (Poster)

MathSlam, March 22, 2013, Brown University, Division of Applied Mathematics. *Exact sampling and counting for fixed-margin binary matrices.* (Invited talk)

Brown University Symposium for Undergraduates in the Mathematical Sciences (SUMS), March 9, 2013. *High-dimensional parameter spaces and Fisher information.* (Invited talk)

Neural Information Processing Systems (NIPS), Workshop on Modern Nonparametric Methods in Machine Learning, December 3-8, 2012, Lake Tahoe, NV. *Posterior consistency for the number of components in a finite mixture.* (Speed talk, poster)

Graduate Student Statistics Seminar (GSSS), October 12, 2012, Brown University. *Doob's remarkable theorem on posterior consistency.* (Talk)

ICERM Bayesian Nonparametrics Workshop, September 17-21, 2012, Providence, RI. *Dirichlet process mixtures are inconsistent for the number of components in a finite mixture.* (Talk)

New England Statistics Symposium (NESS), April 16, 2011, Storrs, CT. *A practical algorithm for exact inference on tables.* (Talk) **One of four winners of the IBM Student Research Award.**

Joint Statistical Meetings (JSM), July 31-August 5, 2010, Vancouver, BC. *A practical algorithm for exact inference on tables.* (Talk)

Teaching Experience

Bayesian and Modern Statistics (Duke, STA 360/601), Spring 2015. **Primary instructor**.

Information Theory (Brown, APMA 1710), Fall 2011. **Primary instructor**.

Introduction to Machine Learning (Brown, CSCI 1950-F), Summer 2011. **Primary instructor**.

Bayesian and Modern Statistics (Duke, STA 360/601), Fall 2014 & 2015. Alternate lecturer.

Recent Applications of Probability and Statistics (Brown, APMA 2610), Spring 2013. Teaching assistant.

Computational Probability and Statistics (Brown, APMA 1690), Fall 2012. Teaching assistant.

Essential Statistics (Brown, APMA 0650), Spring 2012. Teaching assistant.

Math Resource Center (MRC), Fall 2009. Tutor. (Tutoring undergraduates for one evening each week.)

Professional Development and Memberships

Sheridan Teaching Certificate I, 2012-2013.

Membership in professional societies: Sigma Xi, ASA, ISBA, AMS, MAA, SIAM.

Peer-review Activity

Journal of the Royal Statistical Society: Series B, Journal of the American Statistical Association, Bayesian Analysis, Statistics and Computing, Neural Information Processing Systems (NIPS), Australasian Combinatorics, SIAM Journal on Discrete Mathematics (SIDMA).

Service

Founder and organizer of the Graduate Student Seminar for Applied Mathematics, 2012-2014. This is a forum for graduate students from Applied Math and other departments to present and discuss their research.

Co-organizer of the Pattern Theory Group Seminar, 2012-2013. Researchers from Brown and other universities speak about statistics-related topics at this pizza seminar.

Created over 250 short video lectures (each around 10-15 minutes), freely available online at the *mathematicalmonk* YouTube channel. Topics covered include introductory probability, machine learning, and information theory. To date, the total number of views exceeds 3 million.