

ERIK B. SUDDERTH

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School of Information & Computer Sciences
Irvine, CA 92697-3435

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Tel: (949) 824-8169

RESEARCH EXPERTISE: STATISTICAL COMPUTATION & PERCEPTION _____

Machine Learning Graphical & Hierarchical Models, Bayesian Nonparametrics, Approximate Inference

Computer Vision Object Recognition & Scene Understanding, Segmentation, Motion & Tracking

Signal Processing Nonlinear Dynamical Systems, Image & Video Analysis, Multiscale Models

EDUCATION _____

Doctor of Philosophy, Massachusetts Institute of Technology *May 2006*

Electrical Engineering and Computer Science

Thesis: *Graphical Models for Visual Object Recognition and Tracking*

Supervisors: Profs. William Freeman and Alan Willsky

Master of Science, Massachusetts Institute of Technology *Feb. 2002*

Electrical Engineering and Computer Science

Thesis: *Embedded Trees: Estimation of Gaussian Processes on Graphs with Cycles*

Supervisor: Prof. Alan Willsky

Bachelor of Science, University of California, San Diego *June 1999*

Electrical Engineering (*summa cum laude*)

Thesis: *A Kinematic Model Compiler for the Estimation of Articulated Motion from Video Sequences*

Supervisor: Prof. Kenneth Kreutz-Delgado

PROFESSIONAL APPOINTMENTS _____

Professor, University of California, Irvine *July 2020 to present*

Associate Professor, University of California, Irvine *January 2017 to June 2020*

Department of Computer Science and (by courtesy) Department of Statistics

Adjunct Associate Professor, Brown University *January 2017 to present*

Associate Professor, Brown University *July 2016 to December 2016*

Assistant Professor, Brown University *July 2009 to June 2016*

Department of Computer Science

Postdoctoral Scholar, University of California, Berkeley *July 2006 to June 2009*

Department of Electrical Engineering and Computer Science

Supervisors: Profs. Michael Jordan and Stuart Russell

Research Assistant, Massachusetts Institute of Technology *Sept. 1999 to May 2006*

Laboratory for Information & Decision Systems (LIDS), and

Computer Science & Artificial Intelligence Laboratory (CSAIL)

Supervisors: Profs. William Freeman and Alan Willsky

Internship, Mitsubishi Electric Research Laboratories *June–Nov. 2001*

Project: *Design and analysis of error correcting codes using graphical models*

Supervisor: Dr. Jonathan Yedidia

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Summer Research Program, Howard Hughes Institute, UC San Diego Summer 1998
Project: *Design and implementation of an adaptive, real-time video segmentation algorithm*
Supervisors: Prof. Ramesh Jain and Dr. Edward Hunter, Visual Computing Lab

Internship, Metricom, Inc., software test department Summer 1996, 1997
Project: *Low-level test automation (in Perl and C++) for "Ricochet" wireless modems*

ACADEMIC HONORS & FELLOWSHIPS _____

- UC Irvine Chancellor's Fellow 2020–2023
- ISBA Mitchell Prize for Bayesian analysis of an important applied problem 2014
- National Science Foundation CAREER Award 2014
- IEEE Intelligent Systems Magazine's "Ten to Watch" in Artificial Intelligence 2008
- MIT George M. Sprowls Doctoral Thesis Award (honorable mention) 2006
- Intel Foundation Doctoral Fellowship 2004–2005
- National Defense Science and Engineering Graduate (NDSEG) Fellowship 1999–2002
- National Science Foundation Graduate Fellowship (declined) 1999
- Revelle College Outstanding Senior (UC San Diego Alumni Association) 1999
- Barry Goldwater Scholar 1998–1999
- Achievement Rewards for College Scientists (ARCS) Scholarship 1998–1999
- University of California Regent's Scholarship 1995–1999
- Member of Tau Beta Pi and Phi Beta Kappa honor societies

SCIENTIFIC PUBLICATIONS _____

REFEREED JOURNAL ARTICLES

- J15. *Clouds of Oriented Gradients for 3D Detection of Objects, Surfaces, and Indoor Scene Layouts.*
Zhile Ren & Erik B. Sudderth,
IEEE Trans. on Pattern Analysis & Machine Intelligence, June 2019.
- J14. *Refinery: An Open Source Topic Modeling Web Platform.*
Dae Il Kim, Benjamin F. Swanson, Michael C. Hughes, & Erik B. Sudderth,
Journal of Machine Learning Research, vol. 18, Mar. 2017.
- J13. *A spectral clustering search algorithm for predicting shallow landslide size and location.* Dino Bellugi,
David Milledge, William E. Dietrich, Jim McKean, J. Taylor Perron, Erik Sudderth, & Brian Kazian,
Journal of Geophysical Research — Earth Surface, vol. 120, 2015.
- J12. *Joint Modeling of Multiple Time Series via the Beta Process with Application to Motion Capture Segmentation.* Emily B. Fox, Michael C. Hughes, Erik B. Sudderth, & Michael I. Jordan,
Annals of Applied Statistics, vol. 8(3), pp. 1281-1313, 2014.
- J11. *Quantifying aphid behavioral responses to environmental change.*
Erika A. Sudderth & Erik B. Sudderth,
Entomologia Experimentalis et Applicata, vol. 150, pp. 7–18, 2014.
- J10. *NET-VISA: Network Processing Vertically Integrated Seismic Analysis.*
Nimar S. Arora, Stuart Russell, & Erik B. Sudderth,
Bulletin of the Seismological Society of America, vol. 103(2a), pp. 709–729, Apr. 2013.

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- J9. *Annual grassland resource pools and fluxes: Sensitivity to precipitation and dry periods on two contrasting soils*. Erika A. Sudderth, Samuel B. St. Clair, Sarah A. Placella, Stephanie M. Swarbreck, Cristina Castanha, Donald J. Herman, Marc L. Fischer, Markus Kleber, Erik B. Sudderth, Margaret S. Torn, Mary K. Firestone, Gary L. Andersen, & David D. Ackerly, *Ecosphere*, vol. 3(8), Aug. 2012.
- J8. *A Sticky HDP-HMM with Application to Speaker Diarization*. Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky, *Annals of Applied Statistics*, vol. 5(2A), pp. 1020-1056, 2011.
- J7. *Bayesian Nonparametric Inference of Switching Dynamic Linear Models*. Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky, *IEEE Transactions on Signal Processing*, vol. 59(4), pp. 1569–1585, Apr. 2011.
- J6. *Bayesian Nonparametric Learning of Markov Switching Processes*. Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky, *IEEE Signal Processing Magazine*, vol. 27(6), pp. 43–54, Nov. 2010.
- J5. *Nonparametric Belief Propagation*. Erik B. Sudderth, Alexander T. Ihler, Michael Isard, William T. Freeman, & Alan S. Willsky, *Communications of the ACM*, vol. 53(10), pp. 95–103, Oct. 2010.
- J4. *Describing Visual Scenes using Transformed Objects and Parts*. Erik B. Sudderth, Antonio Torralba, William T. Freeman, & Alan S. Willsky, *Int. Journal of Computer Vision*, vol. 77, pp. 291–330, May 2008.
- J3. *Signal and Image Processing with Belief Propagation*. Erik B. Sudderth & William T. Freeman, *IEEE Signal Processing Magazine, DSP Applications Column*, Mar. 2008.
- J2. *Embedded Trees: Estimation of Gaussian Processes on Graphs with Cycles*. Erik B. Sudderth, Martin J. Wainwright, & Alan S. Willsky, *IEEE Trans. on Signal Processing*, vol. 52(11), pp. 3136–3150, Nov. 2004.
- J1. *Statistical and Information-Theoretic Methods for Self-Organization and Fusion of Multimodal, Networked Sensors*. John W. Fisher III, Martin J. Wainwright, Erik B. Sudderth, & Alan S. Willsky, *Int. Journal of High Performance Computing Applications*, vol. 16(3), pp. 337–353, Fall 2002.

NON-REFEREED JOURNAL ARTICLES

- NJ3. *Guest Editors' Introduction to the Special Issue on Bayesian Nonparametrics*. Ryan P. Adams, Emily B. Fox, Erik B. Sudderth, & Yee Whye Teh, *IEEE Trans. on Pattern Analysis & Machine Intelligence*, vol. 37(2), Feb. 2015.
- NJ2. *Major Advances and Emerging Developments of Graphical Models*. Michael I. Jordan, Erik B. Sudderth, Martin J. Wainwright, & Alan S. Willsky, *IEEE Signal Processing Magazine, Guest Editorial*, Nov. 2010.
- NJ1. *Guest Editors' Introduction to the Special Section on Probabilistic Graphical Models*. Qiang Ji, Jiebo Luo, Dimitris Metaxas, Antonio Torralba, Thomas S. Huang, & Erik B. Sudderth, *IEEE Trans. on Pattern Analysis & Machine Intelligence*, vol. 31(10), pp. 1729–1732, Oct. 2009.

REFEREED CONFERENCE PROCEEDINGS

- C53. *3D Scene Reconstruction with Multi-layer Depth and Epipolar Transformers*. Daeyun Shin, Zhile Ren, Erik B. Sudderth, & Charless C. Fowlkes, *International Conf. on Computer Vision*, pp. 2172–2182, 2019.

- C52. *Variational Training for Large-Scale Noisy-OR Bayesian Networks.*
Geng Ji, Dehua Cheng, Huazhong Ning, Changhe Yuan, Hanning Zhou, Liang Xiong, Erik Sudderth,
Conf. on Uncertainty in Artificial Intelligence, July 2019.
- C51. *A Fusion Approach for Multi-Frame Optical Flow Estimation.*
Zhile Ren, Orazio Gallo, Deqing Sun, Ming-Hsuan Yang, Erik B. Sudderth, & Jan Kautz,
IEEE Winter Conf. on Applications of Computer Vision, Jan. 2019.
- C50. *3D Object Detection with Latent Support Surfaces.*
Zhile Ren & Erik B. Sudderth,
IEEE Conf. on Computer Vision & Pattern Recognition, June 2018.
- C49. *Semi-Supervised Prediction-Constrained Topic Models.*
Michael C. Hughes, Gabriel Hope, Leah Weiner, Thomas McCoy, Roy Perlis, Erik B. Sudderth, &
Finale Doshi-Velez, International Conf. on Artificial Intelligence & Statistics, April 2018.
- C48. *Multiscale Semi-Markov Dynamics for Intracortical Brain-Computer Interfaces.*
Daniel J. Milstein, Jason L. Pacheco, Leigh R. Hochberg, John D. Simeral, Beata Jarosiewicz, &
Erik B. Sudderth, Neural Information Processing Systems, Dec. 2017.
- C47. *Cascaded Scene Flow Prediction using Semantic Segmentation.*
Zhile Ren, Deqing Sun, Jan Kautz, & Erik B. Sudderth,
International Conf. on 3D Vision, Oct. 2017.
- C46. *From Patches to Images: A Nonparametric Generative Model.*
Geng Ji, Michael C. Hughes, & Erik B. Sudderth,
International Conf. on Machine Learning, Aug. 2017.
- C45. *Three-Dimensional Object Detection and Layout Prediction using Clouds of Oriented Gradients.*
Zhile Ren & Erik B. Sudderth,
IEEE Conf. on Computer Vision & Pattern Recognition, June 2016.
- C44. *Scalable Adaptation of State Complexity for Nonparametric Hidden Markov Models.*
Michael C. Hughes, William Stephenson, & Erik B. Sudderth,
Neural Information Processing Systems, Dec. 2015.
- C43. *Proteins, Particles, and Pseudo-Max-Marginals: A Submodular Approach.*
Jason Pacheco & Erik B. Sudderth,
International Conf. on Machine Learning, July 2015.
- C42. *Layered RGBD Scene Flow Estimation.*
Deqing Sun, Erik B. Sudderth, & Hanspeter Pfister,
IEEE Conf. on Computer Vision & Pattern Recognition, June 2015.
- C41. *Reliable and Scalable Variational Inference for the Hierarchical Dirichlet Process.*
Michael C. Hughes, Dae Il Kim, & Erik B. Sudderth,
International Conf. on Artificial Intelligence & Statistics, May 2015.
- C40. *Nonparametric Clustering with Distance Dependent Hierarchies.*
Soumya Ghosh, Michalis Raptis, Leonid Sigal, & Erik B. Sudderth,
Conf. on Uncertainty in Artificial Intelligence 30, July 2014.
- C39. *Preserving Modes and Messages via Diverse Particle Selection.*
Jason Pacheco, Silvia Zuffi, Michael J. Black, & Erik B. Sudderth,
International Conf. on Machine Learning, June 2014.
- C38. *Memoized Online Variational Inference for Dirichlet Process Mixture Models.*
Michael C. Hughes & Erik B. Sudderth
Neural Information Processing Systems 26, pp. 1133–1141, 2013.

- C37. *Efficient Online Inference for Bayesian Nonparametric Relational Models.*
Dae Il Kim, Prem Gopalan, David Blei, & Erik B. Sudderth
Neural Information Processing Systems 26, pp. 962–970, 2013.
- C36. *A Fully-Connected Layered Model of Foreground and Background Flow.*
Deqing Sun, Jonas Wulff, Erik B. Sudderth, Hanspeter Pfister, & Michael J. Black,
IEEE Conf. on Computer Vision & Pattern Recognition, pp. 2451–2458, 2013.
- C35. *Truly Nonparametric Online Variational Inference for Hierarchical Dirichlet Processes.*
Michael Bryant & Erik B. Sudderth,
Neural Information Processing Systems 25, pp. 2708–2716, 2012.
- C34. *From Deformations to Parts: Motion-based Segmentation of 3D Objects.*
Soumya Ghosh, Erik B. Sudderth, Matthew Loper, & Michael J. Black,
Neural Information Processing Systems 25, pp. 2006–2014, 2012.
- C33. *Effective Split-Merge Monte Carlo Methods for Nonparametric Models of Sequential Data.*
Michael C. Hughes, Emily B. Fox, & Erik B. Sudderth,
Neural Information Processing Systems 25, pp. 1304–1312, 2012.
- C32. *Minimization of Continuous Bethe Approximations: A Positive Variation.*
Jason L. Pacheco & Erik B. Sudderth,
Neural Information Processing Systems 25, pp. 2573–2581, 2012.
- C31. *Improved Variational Inference for Tracking in Clutter.*
Jason L. Pacheco & Erik B. Sudderth,
IEEE Statistical Signal Processing Workshop, 2012.
- C30. *The Nonparametric Metadata Dependent Relational Model.*
Dae Il Kim, Michael C. Hughes, & Erik B. Sudderth,
International Conf. on Machine Learning, June 2012.
- C29. *Nonparametric Learning for Layered Segmentation of Natural Images.*
Soumya Ghosh & Erik B. Sudderth,
IEEE Conf. on Computer Vision & Pattern Recognition, pp. 2272–2279, 2012.
- C28. *Layered Segmentation and Optical Flow Estimation Over Time.*
Deqing Sun, Erik B. Sudderth, & Michael J. Black,
IEEE Conf. on Computer Vision & Pattern Recognition, pp. 1768–1775, 2012.
- C27. *Nonparametric Discovery of Activity Patterns from Video Collections.*
Michael C. Hughes & Erik B. Sudderth,
CVPR Workshop on Perceptual Organization in Computer Vision, pp. 25–32, 2012.
- C26. *The Doubly Correlated Nonparametric Topic Model.*
Dae Il Kim & Erik B. Sudderth,
Neural Information Processing Systems 24, pp. 1980–1988, 2011.
- C25. *Spatial Distance Dependent Chinese Restaurant Processes for Image Segmentation.*
Soumya Ghosh, Andrei B. Ungureanu, Erik B. Sudderth, & David M. Blei,
Neural Information Processing Systems 24, pp. 1476–1484, 2011.
- C24. *Global Seismic Monitoring: A Bayesian Approach.*
Nimar S. Arora, Stuart Russell, Paul Kidwell, & Erik B. Sudderth,
25th AAAI Conf. on Artificial Intelligence, Nectar track, pp. 1533–1536, 2011.
- C23. *Layered Image Motion with Explicit Occlusions, Temporal Consistency, and Depth Ordering.*
Deqing Sun, Erik B. Sudderth, & Michael J. Black,
Neural Information Processing Systems 23, pp. 2226–2234, 2010.

- C22. *Global Seismic Monitoring as Probabilistic Inference*.
Nimar S. Arora, Stuart Russell, Paul Kidwell, & Erik B. Sudderth,
Neural Information Processing Systems 23, pp. 73–81, 2010.
- C21. *Gibbs Sampling in Open-Universe Stochastic Languages*.
Nimar S. Arora, Rodrigo de Salvo Braz, Erik B. Sudderth, & Stuart Russell,
Conf. on Uncertainty in Artificial Intelligence 26, July 2010.
- C20. *Sharing Features among Dynamical Systems with Beta Processes*.
Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky,
Neural Information Processing Systems 22, pp. 549–557, 2009.
- C19. *Nonparametric Belief Propagation for Distributed Tracking of Robot Networks with Noisy Inter-Distance Measurements*. Jeremy Schiff, Erik B. Sudderth, & Ken Goldberg,
IEEE International Conf. on Intelligent Robots and Systems, pp. 1369–1376, Oct. 2009.
- C18. *Nonparametric Bayesian Identification of Jump Systems with Sparse Dependencies*.
Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky,
15th IFAC Symposium on System Identification, July 2009.
- C17. *Shared Segmentation of Natural Scenes Using Dependent Pitman-Yor Processes*.
Erik B. Sudderth & Michael I. Jordan,
Neural Information Processing Systems 21, pp. 1585–1592, MIT Press, 2009.
- C16. *Nonparametric Bayesian Learning of Switching Linear Dynamical Systems*.
Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky,
Neural Information Processing Systems 21, pp. 457–464, MIT Press, 2009.
- C15. *An HDP-HMM for Systems with State Persistence*.
Emily B. Fox, Erik B. Sudderth, Michael I. Jordan, & Alan S. Willsky,
International Conf. on Machine Learning, July 2008.
- C14. *Loop Series and Bethe Variational Bounds in Attractive Graphical Models*.
Erik B. Sudderth, Martin J. Wainwright, & Alan S. Willsky,
Neural Information Processing Systems 20, pp. 1425–1432, MIT Press, 2008.
- C13. *Learning Multiscale Representations of Natural Scenes using Dirichlet Processes*.
Jyri J. Kivinen, Erik B. Sudderth, & Michael I. Jordan,
IEEE International Conf. on Computer Vision, Oct. 2007.
- C12. *Image Denoising with Nonparametric Hidden Markov Trees*.
Jyri J. Kivinen, Erik B. Sudderth, & Michael I. Jordan,
IEEE International Conf. on Image Processing, vol. 3, pp. 121–124, Sept. 2007.
- C11. *Hierarchical Dirichlet Processes for Tracking Maneuvering Targets*.
Emily B. Fox, Erik B. Sudderth, & Alan S. Willsky,
International Conf. on Information Fusion, July 2007.
- C10. *Depth from Familiar Objects: A Hierarchical Model for 3D Scenes*.
Erik B. Sudderth, Antonio Torralba, William T. Freeman, & Alan S. Willsky,
IEEE Conf. on Computer Vision & Pattern Recognition, vol. II, pp. 2410–2417, June 2006.
- C9. *Describing Visual Scenes using Transformed Dirichlet Processes*.
Erik B. Sudderth, Antonio Torralba, William T. Freeman, & Alan S. Willsky,
Neural Information Processing Systems 18, pp. 1297–1304, MIT Press, 2006.
- C8. *Learning Hierarchical Models of Scenes, Objects, and Parts*.
Erik B. Sudderth, Antonio Torralba, William T. Freeman, & Alan S. Willsky,
IEEE International Conf. on Computer Vision, vol. II, pp. 1331–1338, Oct. 2005.

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- C7. *Distributed Occlusion Reasoning for Tracking with Nonparametric Belief Propagation.*
Erik B. Sudderth, Michael I. Mandel, William T. Freeman, & Alan S. Willsky,
Neural Information Processing Systems 17, pp. 1369–1376, MIT Press, 2005.
- C6. *Visual Hand Tracking using Nonparametric Belief Propagation.*
Erik B. Sudderth, Michael I. Mandel, William T. Freeman, & Alan S. Willsky,
CVPR Workshop on Generative Model Based Vision, June 2004.
- C5. *Efficient Multiscale Sampling from Products of Gaussian Mixtures.*
Alexander T. Ihler, Erik B. Sudderth, William T. Freeman, & Alan S. Willsky,
Neural Information Processing Systems 16, MIT Press, 2004.
- C4. *Nonparametric Belief Propagation.*
Erik B. Sudderth, Alexander T. Ihler, William T. Freeman, & Alan S. Willsky,
IEEE Conf. on Computer Vision & Pattern Recognition, vol. 1, pp. 605–612, June 2003.
- C3. *Projection Algebra Analysis of Error-Correcting Codes.*
Jonathan Yedidia, Erik B. Sudderth, & Jean-Philippe Bouchaud,
Allerton Conf. on Communication, Control, and Computing, 2001.
- C2. *Tree-Based Modeling and Estimation of Gaussian Processes on Graphs with Cycles.*
Martin J. Wainwright, Erik B. Sudderth, & Alan S. Willsky,
Neural Information Processing Systems 13, pp. 661–667, MIT Press, 2001.
- C1. *Adaptive Video Segmentation: Theory and Real-Time Implementation.*
Erik Sudderth, Edward Hunter, Kenneth Kreutz-Delgado, Patrick Kelly, & Ramesh Jain,
DARPA Image Understanding Workshop, pp. 177-181, 1998.

REFEREED ABSTRACTS

- A12. *Multi-layer and Virtual-view 3D Scene Reconstruction from a Single Image.*
Daeyun Shin, Zhile Ren, Erik B. Sudderth, & Charles C. Fowlkes,
CVPR Workshop on 3D Scene Understanding for Vision, Graphics, and Robotics, June 2019.
- A11. *A Simple and Effective Fusion Approach for Multi-Frame Optical Flow Estimation.*
Zhile Ren, Orazio Gallo, Deqing Sun, Ming-Hsuan Yang, Erik B. Sudderth, & Jan Kautz,
ECCV Workshop on What is Optical Flow For?, Sep. 2018.
- A10. *Bayesian Paragraph Vectors.*
Geng Ji, Robert Bamler, Erik B. Sudderth, & Stephan Mandt,
NIPS Workshop on Advances in Approximate Bayesian Inference, Dec. 2017.
- A9. *Approximate Bayesian Computation for Distance-Dependent Learning.*
Soumya Ghosh & Erik B. Sudderth,
NIPS Workshop on Bayesian Nonparametrics: The Next Generation, Dec. 2015.
- A8. *Bayesian Monitoring for the Comprehensive Nuclear-Test-Ban Treaty.*
Stuart Russell, Erik B. Sudderth, & Nimar S. Arora,
International Conference on Artificial Intelligence & Statistics, April 2014.
- A7. *NET-VISA Model and Inference Improvements, & Signal-based Bayesian Monitoring.*
Nimar S. Arora, Stuart Russell, Paul Kidwell, & Erik B. Sudderth,
CTBTO International Scientific Studies Conference, Vienna, Austria, June 2011.
- A6. *Automatic Inference in BLOG.*
Nimar S. Arora, Stuart Russell, & Erik B. Sudderth,
AAAI Workshop on Statistical Relational AI, Atlanta, GA, July 2010.

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- A5. *Controls on Shallow Landslide Size, Location, Shape, and Frequency.*
Dino Bellugi, Erik Sudderth, Brian Kazian, William E. Dietrich, Jim McKean, & Taylor Perron,
American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2009.
- A4. *Vertically Integrated Seismological Analysis I: Modeling, &
Vertically Integrated Seismological Analysis II: Inference.*
Stuart Russell, Nimar S. Arora, Michael I. Jordan, & Erik B. Sudderth,
American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2009.
- A3. *Grassland responses to global change: Soil type controls the impact of altered precipitation pattern
on ecosystem function in Avena barbata grasslands.* E. A. Sudderth, S. B. St. Clair, R. Salve,
M. L. Fischer, M. Kleber, E. B. Sudderth, M. S. Torn, & D. D. Ackerly.
Botany Meeting, Snowbird, Utah, 2009.
- A2. *Joint Probabilistic Detection, Association, & Localization I: Hierarchical Modeling, &
Joint Probabilistic Detection, Association, & Localization II: MCMC Inference.*
Nimar S. Arora, Michael I. Jordan, Stuart Russell, & Erik B. Sudderth,
CTBTO International Scientific Studies Conference, Vienna, Austria, June 2009.
- A1. *Searching for the Optimal Landslide Size.*
Dino Bellugi, Erik Sudderth, William E. Dietrich, Jim McKean, Taylor Perron, David R. Montgomery,
& Kevin M. Schmidt, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2008.

INVITED LECTURES

- Scalable Variational Inference for Probabilistic Programs*
Probability and Programming Workshop, Bellevue, WA. Sept. 2019
- Diverse Particle Selection for High-Dimensional Inference in Graphical Models*
Dept. of Computer Science, University of California, Riverside, CA. Apr. 2019
Southern California Machine Learning Symposium, Los Angeles, CA. Oct. 2017
Dept. of Computer Science, University of California, Irvine, CA. Oct. 2017
Dept. of Computer Science, Boston University, Boston, MA. Apr. 2016
Machine Learning Seminar Series, University of Washington, Seattle, WA. May 2015
Machine Learning Seminar Series, Duke University, Durham, NC. Apr. 2015
- Multiscale Semi-Markov Dynamics for Brain-Computer Interfaces*
Dept. of Computer Science, Pomona College, Claremont, CA. Nov. 2018
Institute for Mathematical Behavioral Sciences, University of California, Irvine, CA. May 2018
- Flexible, Reliable, and Scalable Nonparametric Learning*
Dept. of Computer Science, University of California, Irvine, CA. Apr. 2016
Dept. of Statistics, University of Washington, Seattle, WA. May 2015
Dept. of Computer Science, Princeton University, Princeton, NJ. Nov. 2014
- Scalable and Flexible Nonparametric Models of Sequential Data*
10th Conference on Bayesian Nonparametrics, Raleigh, NC. June 2015
- Reliable Variational Learning for Hierarchical Dirichlet Processes*
NIPS workshop on *Advances in Variational Inference.* Dec. 2014
International Society for Bayesian Analysis World Meeting, Cancun, Mexico. July 2014
- Toward Reliable Bayesian Nonparametric Learning*
New England Machine Learning Day, Microsoft Research, Cambridge, MA. May 2013
NIPS workshop on *Bayesian Nonparametric Models for
Reliable Planning and Decision-Making Under Uncertainty.* Dec. 2012

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<i>Uncertainty in Natural Image Segmentation</i>	
Computer Science & Artificial Intelligence Laboratory, MIT, Cambridge, MA.	Apr. 2012
Dept. of Statistics, Yale University, New Haven, CT.	Feb. 2012
Dept. of Computer Science, Princeton University, Princeton, NJ.	Nov. 2011
<i>Spatial Bayesian Nonparametrics for Natural Image Segmentation</i>	
NIPS workshop on <i>Bayesian Nonparametric Methods: Hope or Hype?</i>	Dec. 2011
<i>Improving the Flexibility and Reliability of Nonparametric Topic Models</i>	
Division of Statistics & Scientific Computing, University of Texas, Austin, TX.	Oct. 2011
<i>Representation in Low-Level Visual Learning</i>	
Workshop on Frontiers in Computer Vision, Cambridge, MA.	Aug. 2011
<i>Reliable Inference in Hierarchical Nonparametric Bayesian Models</i>	
8th Workshop on Bayesian Nonparametrics, Veracruz, Mexico.	June 2011
<i>Visual Learning via Topics, Transformations, and Trees</i>	
NIPS workshop on <i>Transfer Learning via Rich Generative Models</i> .	Dec. 2010
<i>Hierarchical Dirichlet Process Hidden Markov Trees for Multiscale Image Analysis</i>	
Stochastic Systems Group, Massachusetts Institute of Technology, Cambridge, MA.	May 2010
<i>Temporal Segmentation with Hierarchical Dirichlet Processes</i>	
NIPS workshop on <i>Temporal Segmentation</i> .	Dec. 2009
<i>Shared Segmentation of Natural Scenes using Dependent Pitman–Yor Processes</i>	
Dept. of Computer Science, Boston University, Boston, MA.	Apr. 2010
Dept. of Statistical Science, Duke University, Durham, NC.	Nov. 2009
7th Workshop on Bayesian Nonparametrics, Collegio Carlo Alberto, Torino, Italy.	June 2009
Center for Machine Learning & Intelligent Systems, University of California, Irvine, CA.	May 2009
Dept. of Statistics, University of California, Los Angeles, CA.	May 2009
Dept. of Applied Mathematics & Statistics, University of California, Santa Cruz, CA.	Nov. 2008
Dept. of Engineering, University of Cambridge, UK.	Oct. 2008
Gatsby Computational Neuroscience Unit, University College London, UK.	Oct. 2008
<i>Segmentation of Natural Scenes with Non-Markov Random Fields</i>	
MSR Symposium on Markov Random Fields in Computer Vision, Cambridge, UK.	Oct. 2008
<i>Shared Denoising and Segmentation of Natural Scenes</i>	
Dept. of Electrical & Computer Engineering, Rice University, Houston, TX.	Oct. 2008
Dept. of Electrical & Computer Engineering, University of Texas, Austin, TX.	Oct. 2008
<i>Learning Hierarchical, Nonparametric Models for Visual Scenes</i>	
Dept. of Computer Science, Brown University, Providence, RI.	Mar. 2008
Dept. of Computer Science, University of Massachusetts, Amherst, MA.	Mar. 2008
Depts. of Electrical Engineering & Computer Science, University of Washington.	Feb. 2008
Dept. of Computer Science, Cornell University, Ithaca, NY.	Feb. 2008
<i>Learning Models for Visual Scenes using Hierarchical Dirichlet Processes</i>	
Dept. of Electrical Engineering, University of California, Santa Cruz, CA.	Nov. 2007
Neyman Seminar, Dept. of Statistics, University of California, Berkeley, CA.	Oct. 2007
<i>Loop Series and Bethe Variational Bounds in Attractive Graphical Models</i>	
Allerton Conference on Communication, Control, & Computing.	Sept. 2007
<i>Learning Object Appearance Models via Transformed Dirichlet Processes</i>	
Googleplex, Mountain View, CA.	Mar. 2007

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- Probabilistic Artificial Intelligence Lunch, Stanford University, CA. Jan. 2007
Machine Learning & Friends Lunch, University of Massachusetts, Amherst, MA. Sept. 2006
Joint Statistical Meeting (JSM) session on *Graphical Models & Variational Methods*. Aug. 2006
- Nonparametric Belief Propagation for Tracking Hands*
CVPR workshop on *Learning, Representation & Context for Human Sensing in Video*. June 2006
- Transformed Dirichlet Processes*
NIPS workshop on *Nonparametric Bayesian Methods in Machine Learning*. Dec. 2005
Center for Intelligent Systems Seminar, University of California, Berkeley, CA. Oct. 2005
- Visual Tracking using Nonparametric Belief Propagation*
Institut National de Recherche en Informatique et en Automatique, Rennes, France. June 2005
MIT Lincoln Laboratory, Lexington, MA. Apr. 2005
Intel Research, Seattle, WA. Dec. 2004
- Learning Hierarchical Models of Scenes, Objects, and Parts*
Mathematical Sciences Research Institute (MSRI) workshop on *Visual Recognition*. Mar. 2005
- Visual Tracking of People: Bodies, Faces, and Hands*
MIT Women's Technology Program (summer program for high school students). July 2004
- Nonparametric Belief Propagation*
Dept. of Earth, Atmospheric, & Planetary Sciences, MIT, Cambridge, MA. Nov. 2004
Vision & Learning Seminar, Brown University, Providence, RI. Feb. 2004
NIPS workshop on *Propagation Algorithms on Graphs with Cycles*. Dec. 2002
- Embedded Trees: Estimation of Gaussian Processes on Graphs with Cycles*
ICTP workshop on *Statistical Physics & Capacity-Approaching Codes*, Trieste, Italy. May 2001

SCIENTIFIC PATENTS

- P2. *Evaluating and Optimizing Error-Correcting Codes using Projective Analysis*.
Jonathan S. Yedidia, Erik B. Sudderth, & Jean-Philippe Bouchaud,
United States Patent 6,842,872, Jan. 11, 2005.
- P1. *Method and Apparatus for Evaluating Data and Implementing Training Based on the Evaluation of the Data*. Darius K. Shayegan, Stephen M. Stahl, Tucker S. McElroy, & Erik B. Sudderth,
United States Patent 6,795,793, Sept. 21, 2004.

RESEARCH GRANTS

CURRENT GRANTS

3. *Scalable Variational Inference for Probabilistic Programs*.
Facebook Probability and Programming research award,
\$54,500, Principal Investigator, May 2019.
2. *Diverse Particles for Continuous Learning and Inference*.
NSF Information & Intelligent Systems: Robust Intelligence,
\$449,100, Principal Investigator, Aug. 2018 to July 2021.
1. *Bayesian Nonparametric Learning for Large-Scale Structure Discovery*.
NSF CAREER Program, Information & Intelligent Systems: Robust Intelligence,
\$510,000, Principal Investigator, March 2014 to Feb. 2021.

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COMPLETED GRANTS

5. *ASAP: Automated SIGINT Analysis for Prediction.*
IARPA Mercury Program (sub-contract from Systems & Technology Research),
\$375,000, Principal Investigator, June 2016 to Nov. 2018.
4. *Weakly Supervised Scene and Activity Understanding via Nonparametric Learning.*
Office of Naval Research: Mathematics, Computer and Information Sciences Division,
\$380,000, Principal Investigator, Aug. 2013 to Dec. 2017.
3. *Bodies from Scans: Analysis of Rigid and Non-Rigid Body Motion.*
U.S. Army Natick Soldier Research, Development, & Engineering Center,
\$1,147,000, Co-Principal Investigator, Oct. 2010 to Sept. 2013.
2. *MERLIN: Multisource Enrichment to Reveal Latent and Inferred Nexuses.*
IARPA Knowledge Discovery & Dissemination Program (sub-contract from BAE Systems),
\$220,000, Principal Investigator, Oct. 2010 to Dec. 2012.
1. *NET-VISA and SIG-VISA Prototypes using Markov Chain Monte Carlo Method for
Detection, Identification, and Association.*
United Nations CTBTO Preparatory Commission (sub-contract from University of California),
\$100,000, Principal Investigator, Sept. 2010 to Dec. 2011.

SERVICE

PROFESSIONAL SERVICE

<i>Action Editor</i>	Journal of Machine Learning Research (JMLR)	2019 onward
<i>Associate Editor</i>	IEEE Transactions on Pattern Analysis & Machine Intelligence	2016 onward
<i>Sponsorship Chair</i>	International Conference on Machine Learning (ICML)	2018 & 2019
<i>Guest Editor</i>	IEEE Transactions on Pattern Analysis & Machine Intelligence Special Issue on <i>Bayesian Nonparametrics</i> .	2012–2014
<i>Co-Organizer</i>	Workshop on Bayesian Nonparametrics ICERM Program on Computational Challenges in Probability, Brown University.	2012
<i>Instructor</i>	Tutorial on Applied Bayesian Nonparametrics IEEE Conf. on Computer Vision & Pattern Recognition (CVPR).	2012
<i>Guest Editor</i>	IEEE Signal Processing Magazine Special Issue on <i>Graphical Models in Signal Processing</i> .	2009–2010
<i>Guest Editor</i>	IEEE Transactions on Pattern Analysis & Machine Intelligence Special Section on <i>Probabilistic Graphical Models in Computer Vision</i> .	2008–2009
<i>Conference Area Chair or Senior Program Committee Member</i>	Conference on Bayesian Nonparametrics (BNP)	2019
	Neural Information Processing Systems (NeurIPS/NIPS)	2008–2009, 2016, 2019
	IEEE Conf. on Computer Vision & Pattern Recognition (CVPR)	2013, 2015, 2019
	International Conf. on Machine Learning (ICML)	2015, 2017
	International Conf. on Computer Vision (ICCV)	2015
	International Conf. on Artificial Intelligence & Statistics (AISTATS)	2010
	International Joint Conf. on Artificial Intelligence (IJCAI)	2009

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Outstanding Reviewer Awards

Neural Information Processing Systems (NeurIPS)	2018
IEEE International Conf. on Computer Vision (ICCV)	2009
European Conf. on Computer Vision (ECCV)	2008

Conference Reviewer or Program Committee Member

AAAI Conf. on Artificial Intelligence
International Conf. on Artificial Intelligence & Statistics (AISTATS)
IEEE Conf. on Computer Vision & Pattern Recognition (CVPR)
European Conf. on Computer Vision (ECCV)
IEEE International Conf. on Computer Vision (ICCV)
International Conf. on Machine Learning (ICML)
International Joint Conf. on Artificial Intelligence (IJCAI)
International Conf. on Intelligent Robots and Systems (IROS)
Neural Information Processing Systems (NeurIPS/NIPS)
ACM Special Interest Group on Graphics & Interactive Techniques (SIGGRAPH)

Journal Reviewer

Proceedings of the National Academy of Sciences
IEEE Transactions on Image Processing
IEEE Transactions on Information Theory
IEEE Transactions on Pattern Analysis & Machine Intelligence
IEEE Transactions on Signal Processing
ACM Transactions on Knowledge Discovery from Data
Annals of Applied Statistics
Bayesian Analysis
Computational Statistics & Data Analysis
Computer Vision & Image Understanding
International Journal of Computer Vision
Journal of the American Statistical Association
Journal of the Royal Statistical Society, series B: Statistical Methodology
Journal of Computational & Graphical Statistics
Journal of Machine Learning Research
SIAM Journal on Imaging Sciences
Statistics & Computing

UNIVERSITY SERVICE

<i>Director</i>	Center for Machine Learning and Intelligent Systems School of Information & Computer Sciences, UC Irvine.	2019 onward
<i>Director</i>	HPI Research Center in Machine Learning and Data Science at UC Irvine School of Information & Computer Sciences, UC Irvine.	2020 onward
<i>ICS Representative</i>	Graduate Council Academic Senate, University of California, Irvine.	2019 onward
<i>Chair</i>	Data Science and Theory Faculty Search Committee School of Information & Computer Sciences, UC Irvine.	2018–2020
<i>Member</i>	Data Science Faculty Search Committee School of Information & Computer Sciences, UC Irvine.	2017–2018

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<i>Member</i>	Master of Data Science Working Group School of Information & Computer Sciences, UC Irvine.	2017–2019
<i>Member</i>	Initiatives & Vision Committee Department of Computer Science, Brown University.	2011–2012, 2015–2016
<i>Member</i>	Lecture Series Committee Department of Computer Science, Brown University.	2014–2016
<i>Member</i>	Curriculum Committee Department of Computer Science, Brown University.	2014–2015
<i>Chair</i>	Doctoral Admissions Committee Department of Computer Science, Brown University.	2014
<i>Member</i>	Doctoral Admissions Committee Department of Computer Science, Brown University.	2010–2013
<i>Co-Organizer</i>	Symposium on Visual Computing Industrial Partners Program, Department of Computer Science, Brown University.	2011
<i>External Member</i>	Computer Vision Faculty Search Committee School of Engineering, Brown University.	2011
<i>Chair</i>	Working Group on Competing Globally External review of the Department of Computer Science, Brown University.	2010

TEACHING

REGULAR COURSES

• UC Irvine CS 177: Applications of Probability in CS (300 students)	Fall 2020
• UC Irvine CS 178: Machine Learning and Data Mining (315 students)	Spring 2020
• UC Irvine CS 274B: Learning in Graphical Models (14 students)	Spring 2020
• UC Irvine CS 177: Applications of Probability in CS (252 students)	Fall 2019
• UC Irvine CS 274B: Learning in Graphical Models (17 students)	Spring 2019
• UC Irvine CS 177: Applications of Probability in CS (138 students)	Fall 2018
• UC Irvine CS 274B: Learning in Graphical Models (41 students)	Spring 2018
• UC Irvine CS 178: Machine Learning and Data Mining (254 students)	Winter 2018
• UC Irvine CS 177: Applications of Probability in CS (134 students)	Fall 2017
• Brown CSCI 2420: Probabilistic Graphical Models (22 students)	Fall 2016
• Brown CSCI 1450: Probability and Computing (71 students)	Spring 2016
• Brown CSCI 1420 & ENGN 2520: Machine Learning (94 students)	Fall 2015
• Brown CSCI 1450: Probability and Computing (69 students)	Spring 2015
• Brown CSCI 2420: Probabilistic Graphical Models (30 students)	Fall 2014
• Brown CSCI 1420 & ENGN 2520: Machine Learning (65 students)	Fall 2013
• Brown CSCI 2950-P: Probabilistic Graphical Models (17 students)	Spring 2013
• Brown CSCI 1950-F: Machine Learning (32 students)	Spring 2012
• Brown CSCI 2950-P: Applied Bayesian Nonparametrics (22 students)	Fall 2011
• Brown CSCI 1950-F: Machine Learning (45 students)	Spring 2011
• Brown CSCI 2950-P: Learning & Inference in Graphical Models (19 students)	Spring 2010
• Brown CSCI 1950-F: Machine Learning (33 students)	Fall 2009

GRADUATE SUPERVISION: DOCTORAL THESES

9. *Learning with Fairness Constraints.*
Harry Bendekgey, UC Irvine Dept. of Computer Science.
8. *Particle-Based Learning for Graphical Models.*
Debora Sujono, UC Irvine Dept. of Computer Science.
7. *Prediction-Constrained Latent Variable Models.*
Gabriel Hope, UC Irvine Dept. of Computer Science.
6. *Efficient Variational Inference for Hierarchical Models of Images, Text, and Networks.*
Geng Ji, UC Irvine Dept. of Computer Science, 2019.
5. *Semantic Three-Dimensional Understanding of Dynamic Scenes.*
Zhile Ren, Brown University Dept. of Computer Science, May 2018.
4. *Scalable Bayesian Nonparametric Models for Networks and Documents.*
Dae Il Kim, Brown University Dept. of Computer Science, August 2016.
3. *Reliable and Scalable Variational Inference for Nonparametric Mixtures, Topics, and Sequences.*
Michael Hughes, Brown University Dept. of Computer Science, May 2016.
2. *Variational Approximations with Diverse Applications.*
Jason Pacheco, Brown University Dept. of Computer Science, May 2016.
1. *Bayesian Nonparametric Discovery of Layers and Parts from Scenes and Objects.*
Soumya Ghosh, Brown University Dept. of Computer Science, May 2015.

GRADUATE SUPERVISION: MASTER'S PROJECTS AND THESES

10. *Prediction Constraints for Dimensionality Reduction.*
Madina Abdrakhmanova, UC Irvine Dept. of Computer Science, June 2019.
9. *Multiscale Semi-Markov Models for Intracortical Brain-Computer Interfaces.*
Daniel Milstein, Brown University Dept. of Computer Science, May 2017.
8. *Scalable Inference for Supervised Bayesian Nonparametric Models.*
Leah Weiner, Brown University Dept. of Computer Science, May 2017.
7. *Scene Category Context for 3D Object Detection with RGBD Cameras.*
Carl Olsson, Brown University Dept. of Computer Science, May 2016.
6. *Variational Inference for Beta-Bernoulli Dirichlet Process Mixture Models.*
Mengrui Ni, Brown University Dept. of Computer Science, May 2015.
5. *Hidden Markov Tree Models.*
Mert Terzihan, Brown University Dept. of Computer Science, February 2015.
4. *Musical Machine Learning Methods Using Cepstral Features.*
Justin Satriano, Brown University Dept. of Computer Science, Dec. 2014.
3. *Improving Online Inference for the Hierarchical Dirichlet Process via Split-Merge Moves.*
Michael Bryant, Brown University Dept. of Computer Science, May 2012.
2. *Max-Product Particle Belief Propagation.*
Rajkumar Kothapa, Brown University Dept. of Computer Science, May 2011.
1. *Image and Audio Annotation: Approximate Inference in Dense Conditional Random Fields.*
Andrew Miller, Brown University Dept. of Computer Science, May 2010.

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UNDERGRADUATE SUPERVISION: HONORS THESES

7. *Protein Structure Prediction from Low-Resolution Electron Density Data using Particle Belief Propagation*. Roshan Rao, Brown University Dept. of Computer Science, May 2017.
6. *Applications and Extensions of the Diverse Particle Max-Product Algorithm*. Samuel Ainsworth, Brown University Dept. of Computer Science, May 2016.
5. *Assumed Density Filtering for Fast Tracking of Neural Firing Rates*. Daniel Milstein, Brown University Dept. of Computer Science, Dec. 2015.
4. *Variational Inference for Hierarchical Dirichlet Process Based Nonparametric Models*. William Stephenson, Brown University Dept. of Computer Science, May 2015.
3. *Parallelization of Variational Inference for Bayesian Nonparametric Topic Models*. Sonia Phene, Brown University Dept. of Computer Science, May 2015.
2. *Scalable Online Signal Processing with Non-Parametric Hidden Markov Models*. Oussama Fadil, Brown University School of Engineering, April 2015.
1. *Learning Image Attributes using the Indian Buffet Process*. Soravit Changpinyo, Brown University Dept. of Computer Science, May 2012.