

David Wingate

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Education

Ph.D. Computer Science, University of Michigan. April, 2008.
M.S. Computer Science, Brigham Young University. April, 2004.
B.S. Computer Science, Brigham Young University. December, 2002.

Research Experience

Research Scientist Laboratory for Information Decision Systems, MIT	<i>June 2010 - Present</i>
Postdoctoral Research Associate Computational Cognitive Science Group, MIT	<i>Jan. 2008 - June 2010</i>
Research Fellow Reinforcement Learning Group, University of Michigan	<i>Aug. 2004 - Dec. 2007</i>
Research Assistant BYU Applied Machine Learning Laboratory	<i>Aug. 2001 - Aug. 2004</i>

Entrepreneurial Experience

Chief Technology Officer, Orangatango, Inc.	<i>Nov. 1999 - Jan. 2003</i>
Chief Technology Officer, Akopia, Inc.	<i>June 1999 - Jan. 2001</i>
Technical Director, ICentral, Inc.	<i>Dec. 1995 - Dec. 1996</i>

Honors

Best poster award, *International Joint Conference on Artificial Intelligence (IJCAI)*, 2011
Best paper award, *International Conference on Autonomic Computing and Communications (ICAC)*, 2010
NSF Graduate Research Fellow, 2004-2007
Honorable mention, CSE Google Honors Competition, University of Michigan, 2007
Best paper award, *International Conference on Machine Learning and Applications (ICMLA)*, 2003

Skills and Research Interests

1. Expert in the development and use of probabilistic programming languages. Expert in hierarchical Bayesian modeling and probabilistic inference (sample-based, variational, and sequential Monte-Carlo), with emphasis on structured generative models and nonparametric distributions.
2. Core research interests include reinforcement learning, machine learning, and dynamical systems modeling. I draw upon techniques from planning, control theory, high performance computing, machine vision, predictive representations of state and optimization.

3. Thorough understanding of statistical machine learning algorithms. Strengths include support-vector methods, kernel methods, density estimation, regressions and manifold learning.
4. Strong interest in robotic applications at the intersection of perception, learning, cognition and control.
5. Strong CS background. Significant interests in machine vision, massively parallel processing, GPU-based computing, cloud computing and the application of machine learning to complex systems.

Publications

- [1] D. Wingate, T. Weber, J. Kane. A Reinforcement Learning Approach to Variational Inference in Probabilistic Programming. In *Artificial Intelligence and Statistics (AISTATS)*, 2012 (in submission).
- [2] D. Wingate, S. Gershman, C. Diuk, T. O'Donnell, J. Tenenbaum. A Probabilistic Foundation for Compositional Policy Priors. In *Artificial Intelligence and Statistics (AISTATS)*, 2012 (in submission).
- [3] D. Wingate, N. Goodman, A. Stuhlmüller, J. Siskind. Nonstandard Interpretations of Probabilistic Programs for Efficient Inference. In *Neural Information Processing Systems (NIPS)*, 2011.
- [4] D. Wingate, N. Goodman, D. Roy, L. Kaelbling, J. Tenenbaum. Bayesian Policy Search with Policy Priors. In *International Joint Conference on Artificial Intelligence (IJCAI)*, 2011. **Best poster award.**
- [5] D. Wingate, A. Stuhlmüller, N. Goodman. Lightweight Implementations of Probabilistic Programming Languages Via Transformational Compilation. In *Artificial Intelligence and Statistics (AISTATS)*, 2011.
- [6] F. Doshi-Velez, D. Wingate, N. Roy and J. Tenenbaum. Infinite Dynamic Bayesian Networks. In *International Conference on Machine Learning (ICML)*, 2011.
- [7] J. Eastep, D. Wingate, M. Santambrogio, A. Agarwal. Smart Data Structures: An Online Machine Learning Approach to Multicore Data Structures In *IEEE International Conference on Autonomic Computing and Communications (ICAC)*, 2011.
- [8] D. Wingate (M. Wiering and M. van Otterlo, Eds). Predictively Defined Representations of State. In *Reinforcement Learning: State of the Art*, 2011 (to appear).
- [9] F. Doshi-Velez, D. Wingate, N. Roy and J. Tenenbaum. Nonparametric Bayesian Policy Priors for Reinforcement Learning. In *Neural Information Processing Systems (NIPS)*, 2010.
- [10] J. Eastep, D. Wingate, M. Santambrogio, and A. Agarwal. Smartlocks: Lock Acquisition Scheduling for Self-Aware Synchronization In *IEEE International Conference on Autonomic Computing and Communications (ICAC)*, 2010. **Best paper award.**
- [11] D. Wingate, N. D. Goodman, D. M. Roy, and J. B. Tenenbaum. The infinite latent events model. In *Uncertainty in Artificial Intelligence (UAI)*, 2009.
- [12] J. Asmuth, L. Li, M. L. Littman, A. Nouri, and D. Wingate. A Bayesian sampling approach to exploration in reinforcement learning. In *Uncertainty in Artificial Intelligence (UAI)*, 2009.
- [13] J. Eastep, D. Wingate, M.D. Santambrogio, and A. Agarwal. Smartlocks: Self-Aware Synchronization through Lock Acquisition Scheduling In *Workshop on Statistical and Machine learning approaches to Architectures and Compilation (SMART)*, 2009.
- [14] D. Wingate and S. Singh. Efficiently Learning Linear-Linear Exponential Family Predictive Representations of State. In *International Conference on Machine Learning (ICML)*, 2008.

- [15] M. Bowling, A. Geramifard, and D. Wingate. Sigma point policy iteration. In *Autonomous Agents and Multiagent Systems (AAMAS)*, 2008.
- [16] D. Wingate. *Exponential Family Predictive Representations of State*. PhD thesis, University of Michigan, 2008.
- [17] D. Wingate and S. Singh. Exponential family predictive representations of state. In *Neural Information Processing Systems (NIPS)*, 2007.
- [18] D. Wingate and S. Singh. On discovery and learning of models with predictive representations of state for agents with continuous actions and observations. In *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 1128–1135, 2007.
- [19] D. Wingate, V. Soni, B. Wolfe, and S. Singh. Relational knowledge with predictive representations of state. In *International Joint Conference on Artificial Intelligence (IJCAI)*, pages 2035–2040, 2007.
- [20] D. Wingate and S. Singh. Kernel predictive linear Gaussian models for nonlinear stochastic dynamical systems. In *International Conference on Machine Learning (ICML)*, pages 1017–1024, 2006.
- [21] D. Wingate and S. Singh. Mixtures of predictive linear Gaussian models for nonlinear stochastic dynamical systems. In *National Conference on Artificial Intelligence (AAAI)*, 2006.
- [22] D. Wingate, N. Powell, Q. Snell, and K. D. Seppi. Prioritized multiplicative Schwarz procedures for solutions to general linear systems. In *International Parallel and Distributed Processing Symposium (IPDPS)*, 2005.
- [23] D. Wingate and K. D. Seppi. Prioritization methods for accelerating MDP solvers. *Journal of Machine Learning Research (JMLR)*, 6:851–881, 2005.
- [24] M. R. Rudary, S. Singh, and D. Wingate. Predictive linear-Gaussian models of stochastic dynamical systems. In *Uncertainty in Artificial Intelligence (UAI)*, pages 501–508, 2005.
- [25] D. Wingate and K. D. Seppi. P3VI: A partitioned, prioritized, parallel value iterator. In *International Conference on Machine Learning (ICML)*, pages 863–870, 2004.
- [26] C. K. Monson, D. Wingate, K. D. Seppi, and T. S. Peterson. Variable resolution discretization in the joint space. In *International Conference on Machine Learning and Applications (ICMLA)*, 2004.
- [27] D. Wingate and K. D. Seppi. Efficient value iteration using partitioned models. In *International Conference on Machine Learning and Applications (ICMLA)*, pages 53–59, 2003. **Best paper award.**

Invited Talks (not including conference presentations)

- 2011 University of New Hampshire CS colloquium
- 2011 Washington University CSE colloquium
- 2011 DeepMind, Inc.
- 2011 Gatsby Neuroscience Unit, UCL
- 2011 University of Massachusetts Amherst Machine Learning Seminar Series
- 2011 MIT LIDS seminar
- 2011 Harvard University Special CS seminar
- 2011 Carnegie Mellon University Special CS seminar
- 2011 University of Michigan AI seminar series

- 2010 Niv Lab, Princeton University
- 2010 MIT Angstrom project student seminar
- 2010 Shell Oil, Inc.
- 2010 Lyric Semiconductor, Inc.
- 2010 Stony Brook University Special CS seminar
- 2010 Johns Hopkins University Special CS seminar
- 2010 MIT Stochastic Systems Group
- 2010 MIT Optimization and Network Game Theory group
- 2010 MIT Shape from shading seminar
- 2009 NIPS Workshop on Partially Observable RL
- 2009 Barbados Workshop on RL
- 2009 Mathworks, Inc.
- 2009 BYU CS Colloquium Series
- 2008 University of Massachusetts Amherst Machine Learning Seminar Series
- 2008 Rutgers Bayesian RL Reading Group
- 2007 University of Alberta
- 2006 University of Michigan AI seminar series
- 2006 Barbados Workshop on Predictive Representations of State

Professional Activities

- Co-organizer, 2012 AAAI Spring Symposium: “Designing Intelligent Robots: Reintegrating AI” (with George Konidaris, Sarah Osentoski, Todd Hester, Stephen Hart and Byron Boots)
- Co-organizer, 2011 ICML Workshop on Planning and Acting with Uncertain Models (with Finale Doshi-Velez)
- General chair, 2009 Reinforcement Learning Competition
- Area Chair, ICML 2009
- Co-organizer, NIPS 2006 Workshop on Grounding Perception, Knowledge and Cognition in Sensori-Motor Experience (with Brian Tanner and Michael James).
- Conference and journal reviewing / program committee member
 JMLR{05,06,07,08,09,10,11}, ML{08,10,10}, AAAI{05,07,08,10}, ICML{07,08,09,11}, NECO, NWO, IJCAI07, ECML09, RSS10, AISTATS{11,12}, UAI11, NIPS{05,07,08,09,10,11}.

Advising Experience

Thesis Supervisor:

Chris Calabrese, MIT. Masters of Engineering. Expected date of graduation: 2013.
 Deborah Hanus, MIT. Masters of Engineering. Expected date of graduation: 2013.

Thesis Committee Member:

Jonathan Eastep, MIT. PhD. Graduated June, 2011. Advisor: Anant Agarwal.
 Sajid Siddiqi, CMU. PhD. Graduated November 2009. Advisor: Geoff Gordon.

Other

Full-time missionary service in Montreal, Canada for The Church of Jesus Christ of Latter-day Saints (Dec. 1996 - Dec. 1998; Spanish speaking). I also speak some French.

My wife and I have six beautiful children, ages 7, 6, 4, 3, 2 and 0.5.

Citizen of the USA.

References

Joshua B. Tenenbaum, MIT

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