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## RESEARCH EXPERIENCE

Postdoctoral Research Associate, Computational Cognitive Science Group, MIT Jan. 2008 - Present

Developing hierarchical Bayesian models capable of finding rich structure in dynamical systems. Developing new Bayesian nonparametric distributions. Developing hierarchical Bayesian manifold representations for unsupervised learning.

Research Fellow, Reinforcement Learning Group, University of Michigan Aug. 2004 - Dec. 2007

Developed novel models for nonlinear stochastic dynamical systems with rich, structured states and observations (using predictively defined representations of state). Leveraged tools from graphical probabilistic modeling and inference, information theory, optimization, and machine learning. Developed similar representations capable of capturing relational knowledge.

Research Assistant, BYU Applied Machine Learning Laboratory Aug. 2001 - Aug. 2004

Designed and implemented efficient prioritized, parallel value iteration architecture. Designed and implemented novel text classification kernel. Designed homogeneous variable resolution discretization architecture for solving continuous action RL problems.

## PUBLICATIONS

David Wingate and Satinder Singh. Efficiently Learning Linear-Linear Exponential Family Predictive Representations of State. In *International Conference on Machine Learning (ICML)*, 2008.

Michael Bowling, Alborz Geramifard and David Wingate. Sigma Point Policy Iteration. In *Autonomous Agents and Multiagent Systems (AAMAS)*, 2008.

David Wingate and Satinder Singh. Exponential Family Predictive Representations of State. In *Neural Information Processing Systems (NIPS)*, 2007.

David Wingate and Satinder 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)*, 2007.

David Wingate, Vishal Soni, Britton Wolfe and Satinder Singh. Relational Knowledge with Predictive State Representations. In *International Joint Conference on Artificial Intelligence (IJCAI)*, 2007.

David Wingate and Satinder Singh. Mixtures of Predictive Linear Gaussian Models for Nonlinear Stochastic Dynamical Systems. In *National Conference on Artificial Intelligence (AAAI)*, 2006.

David Wingate and Satinder Singh. Kernel Predictive Linear Gaussian Models for Nonlinear Stochastic Dynamical Systems. In *International Conference on Machine Learning (ICML)*, 2006.

Matt Rudary, Satinder Singh and David Wingate. Predictive Linear-Gaussian Models of Stochastic Dynamical Systems. In *Uncertainty in Artificial Intelligence (UAI)*, 2005.

David Wingate and Kevin Seppi. Prioritization Methods for Accelerating MDP Solvers. In *Journal of Machine Learning Research (JMLR)* 6 (May):851-881, 2005.

David Wingate, Nathaniel Powell, Quinn Snell and Kevin Seppi. Prioritized Multiplicative Schwarz Procedures for Solutions to General Linear Systems. In *International Parallel and Distributed Processing Symposium (IPDPS)*, 2005.

David Wingate and Kevin Seppi. P3VI: A Partitioned, Prioritized, Parallel Value Iterator. In *International Conference on Machine Learning (ICML)*, pages 863-870, 2004.

Christopher K. Monson, David Wingate, Kevin Seppi and Todd Peterson. Variable Resolution Discretization in the Joint Space. *International Conference on Machine Learning and Applications (ICMLA)*, 2004.

David Wingate and Kevin Seppi. Cache Performance of Priority Metrics for MDP Solvers. In *AAAI Workshop on Learning and Planning in Markov Processes*, pages 103-106, 2004.

David Wingate and Kevin Seppi. Efficient value iteration using partitioned models. In *International Conference on Machine Learning and Applications (ICMLA)*, pages 53-59, 2003. Best paper award.

## HONORS

NSF Graduate Research Fellow, 2004-2007

## WORK EXPERIENCE

Chief Technology Officer, Orangatango, Inc. Nov. 1999 - Jan. 2003  
Designed and implemented a privacy, acceleration, and data centralization Internet service. Executed all aspects, including hardware, software, support and personnel infrastructure.

Chief Technology Officer, Akopia, Inc. June 1999 - Jan. 2001  
Designed and implemented TallyMan<sup>®</sup>, an open-source, enterprise-level ecommerce storefront building and inventory management package. Acquired by RedHat, Inc. Jan. 2001.

Technical Director, ICentral, Inc. Dec. 1995 - Dec. 1996  
Designed and implemented ShopSite<sup>®</sup>, an integrated Internet storefront building and sales management package (with virtual mall). Acquired by OpenMarket, Inc. Apr. 1998.

## 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.

## SKILLS AND RESEARCH INTERESTS

1. Thorough understanding of statistical machine learning algorithms (particularly support-vector methods, kernel methods, and manifold learning), along with their connections to dynamical system modeling, predictive representations of state, information theory, and reinforcement learning.
2. Expertise in hierarchical Bayesian models and probabilistic inference, including message-passing, MCMC and variational methods. Expertise with hierarchical Bayesian nonparametric distributions.
3. Strong interests in perception, control, machine vision, digital image processing, and perceptual feature extraction, particularly in the context of autonomous mobile robots.
4. Significant experience with massively parallel processing and MPP application development; skilled with MPI and clustering technologies. Experience with OpenMP.
5. Proficient with virtually all internet application technologies, both client and server side (including Perl, C/C++, Javascript, HTML/CSS, DHTML, python, etc.). Expert Linux systems administrator. Extensive networking experience, including familiarity with TCP/IP, L2/L4 switch configuration, and load balancing. Comprehensive experience with many protocols, especially HTTP, SSL, FTP and SMTP. Skilled at Oracle and PostgreSQL administration, including query and schema design.

## OTHER

Full-time missionary service in Montreal, Canada for The Church of Jesus-Christ of Latter Day Saints (Dec. 1996 - Dec. 1998; Spanish speaking).