CHRISTIAN R. SHELTON

University of California, Riverside
Department of Computer Science & Engineering
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EDUCATION

Massachusetts Institute of Technology 1998–2001
PhD, Computer Science

Massachusetts Institute of Technology 1996–1998
SM, Computer Science

Stanford University 1993–1996
BS, Computer Science (with honors)

RESEARCH POSITIONS

University of California, Riverside, Associate Professor 2010–present
Department of Computer Science and Engineering

University of California, Riverside, Assistant Professor 2003–2010
Department of Computer Science and Engineering

Intel, Visiting Faculty 2003–2004
Applications of machine learning to microprocessor fabrication

Stanford University, Research Associate 2001–2003
Reinforcement learning, game theory, stochastic processes

PUBLICATIONS

Journals

[1] Alec C. Gerry, G. E. Higginbotham, N. Periera, A. Lam, and C. R. Shelton. Evaluation of surveillance methods for monitoring house fly abundance and activity on large commercial dairy operations. *Journal of Economic Entomology*, 104(3), 1087–1092, 2011.

[2] Robert A. Hanneman and Christian R. Shelton. Applying modality and equivalence concepts to pattern-finding in social process-produced data. *Social Network Analysis and Mining*, 1, 59–72, 2011.

[3] Jing Xu and Christian R. Shelton. Intrusion detection using continuous time Bayesian networks. *Journal of Artificial Intelligence Research*, 39, 745–774, 2010.

[4] Yu Fan, Jing Xu, and Christian R. Shelton. Importance sampling for continuous time Bayesian networks. *Journal of Machine Learning Research*, 11(Aug), 2077–2102, 2010.

[5] Kevin Horan, Christian R. Shelton, and Thomas Girke. Predicting conserved protein motifs with sub-HMMs. *BMC Bioinformatics*, 11(205), 1471–2105, 2010.

[6] Christian R. Shelton, Yu Fan, William Lam, Joon Lee, and Jing Xu. Continuous time Bayesian network reasoning and learning engine. *Journal of Machine Learning Research*, 11(Mar), 1137–1140, 2010.

[7] Xiaoyue Wang, Lexiang Ye, Eamonn Keogh, and Christian Shelton. Annotating historical archives of images. *International Journal of Digital Library Systems*, 1(2), 59–80, 2010.

[8] Adriano Macchietto, Victor Zordan, and Christian R. Shelton. Momentum control for balance. *ACM Transactions on Graphics / SIGGRAPH*, 28(3), 2009.

[9] Kevin Horan, Charles Jang, Julie Bailey-Serres, Ron Mittler, Christian Shelton, Jeff F Harper, Jian-Kang Zhu, John JC Cushman, Martin Gollery, and Thomas Girke. Annotating genes of known and unknown function by large-scale co-expression analysis. *Plant Physiology*, 147(1), 41–57, 2008.

[10] Ben Blum, Christian R. Shelton, and Daphne Koller. A continuation method for Nash equilibria in structured games. *Journal of Artificial Intelligence Research*, 25:457–502, 2006.

[11] Charles L. Isbell, Michael Kearns, Satinder Singh, Christian R. Shelton, Peter Stone, and David Kormann. Cobot in LambdaMOO: An adaptive social statistics agent. *Autonomous Agents and Multi-Agent Systems*, 13(3):327–354, 2006.

[12] Christian R. Shelton. Morphable surface models. *International Journal of Computer Vision*, 38(1):75–91, 2000.

[13] Tomaso Poggio and Christian R. Shelton. Learning in brains and machines. *Spatial Vision*, 13(2,3), 287–296, 2000.

[14] Dan Halperin and Christian R. Shelton. A perturbation scheme for spherical arrangements with application to molecular modeling. *Computational Geometry: Theory and Applications*, 10(4):273–288, 1998.

[15] P. W. Finn, L. E. Kavraki, J.-C. Latombe, R. Motwani, C. Shelton, S. Venkatasubramanian, and A. Yao. RAPID: Randomized pharmacophore identification for drug design. *Computational Geometry: Theory and Applications*, 10(4):263–272, 1998.

Refereed Conferences

[16] Zhen Qin and Christian R. Shelton. Improving Multi-target Tracking via Social Grouping. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2012.

[17] E. Busra Celikkaya, Christian R. Shelton, and William Lam. Factored Filtering of Continuous-Time Systems. In *Proceedings of the Twenty-Seventh International Conference on Uncertainty in Artificial Intelligence (UAI)*, 2011.

[18] Teddy N. Yap, Jr., Mingyang Li, Anastasios I. Mourikis, and Christian R. Shelton. A particle filter for monocular vision-aided odometry. In *Proceedings of the 2011 IEEE International Conference on Robotics and Automation (ICRA)*. 2011.

[19] Antony Lam, Amit K. Roy-Chowdury, and Christian R. Shelton. Interactive event search through transfer learning. In *Proceedings of the Tenth Asian Conference on Computer Vision (ACCV)*, 2010.

[20] Yu Fan and Christian R. Shelton. Learning continuous-time social network dynamics. In *Proceedings of the Twenty-Fifth International Conference on Uncertainty in Artificial Intelligence (UAI)*, 2009.

[21] Teddy N. Yap, Jr. and Christian R. Shelton. SLAM in large indoor environments with low-cost, noisy, and sparse sonars In *Proceedings of the 2008 IEEE International Conference on Robotics and Automation (ICRA)*. pages 1395–1401, 2009.

[22] Guobiao Mei and Christian R. Shelton. Unsupervised image embedding using nonparametric statistics. In *International Conference on Pattern Recognition (ICPR)*, 2008.

[23] Antony Lam and Christian R. Shelton. Face recognition and alignment using support vector machines. In *Automatic Face and Gesture Recognition*, 2008.

[24] Kin Fai Kan and Christian R. Shelton. Catenary support vector machines. In *Knowledge Discovery in Databases (ECML/PKDD)* (LNAI, vol 5211), pages 597–610, 2008.

[25] Jing Xu and Christian R. Shelton. Continuous time Bayesian networks for host level network intrusion detection. In *Knowledge Discovery in Databases (ECML/PKDD)* (LNAI, vol 5212), pages 613–627, 2008.

[26] Xiaoyue Wang, Lexiang Ye, Eamonn Keogh, and Christian Shelton. Annotating historical archives of images. In *Joint Conference on Digital Libraries*, pages 341–350, 2008.

[27] Teddy N. Yap, Jr. and Christian R. Shelton. Simultaneous learning of motion and sensor model parameters for mobile robots. In *Proceedings of the 2008 IEEE International Conference on Robotics and Automation (ICRA)*. pages 2091–2097, 2008.

[28] Kin Fai Kan and Christian R. Shelton. Solving structured continuous-time Markov decision processes. In *Proceedings of the Tenth International Symposium on Artificial Intelligence and Mathematics (ISAIM)*. 2008.

[29] Yu Fan and Christian R. Shelton. Sampling for approximate inference in continuous time Bayesian networks. In *Proceedings of the Tenth International Symposium on Artificial Intelligence and Mathematics (ISAIM)*. 2008.

[30] Christian R. Shelton, Wesley Huie, and Kin Fai Kan. Chained boosting. In *Advances in Neural Information Processing Systems (NIPS)*, pages 1281–1288, 2007.

[31] Titus Winters, Christian R. Shelton, and Tom Payne. Investigating generative factors of score matrices. In *Proceedings of the Thirteenth International Conference on Artificial Intelligence in Education*, pages 479–486, 2007.

[32] Guobiao Mei and Christian R. Shelton. Collaborative visualization. In *Proceedings of the Twenty-Second International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 341–348, 2006.

[33] Xiaopeng Xi, Eamonn Keogh, Christian Shelton, Li Wei, and Chotirat Ann Ratanamahatana. Fast time series classification using numerosity reduction. In *Proceedings of the Twenty-Third International Conference on Machine Learning (ICML)*, pages 1033–1040, 2006.

[34] Uri Nodelman, Christian R. Shelton, and Daphne Koller. Expectation maximization and complex duration distributions for continuous time Bayesian networks. In *Proceedings of the Twenty-First International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 411–430, 2005.

[35] Uri Nodelman, Daphne Koller, and Christian R. Shelton. Expectation propagation for continuous time Bayesian networks. In *Proceedings of the Twenty-First International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 431–440, 2005.

[36] Uri Nodelman, Christian R. Shelton, and Daphne Koller. Learning continuous time Bayesian networks. In *Proceedings of the Nineteenth International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 451–458, 2003. **Best Student Paper Award** (student: Uri Nodelman).

[37] Ben Blum, Christian R. Shelton, and Daphne Koller. A continuation method for Nash equilibria in structured games. In *Proceedings of the Eighteenth International Joint Conference on Artificial Intelligence (IJCAI)*, pages 757–764, 2003.

[38] Uri Nodelman, Christian R. Shelton, and Daphne Koller. Continuous time Bayesian networks. In *Proceedings of the Eighteenth International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 378–387, 2002.

[39] Christian R. Shelton. Reinforcement learning with partially known world dynamics. In *Proceedings of the Eighteenth International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 461–468, 2002.

[40] Leonid Peshkin and Christian R. Shelton. Learning from scarce experience. In *Proceedings of the Nineteenth International Conference on Machine Learning (ICML)*, pages 498–505, 2002.

[41] Charles L. Isbell, Christian R. Shelton, Michael Kearns, Satinder Singh, and Peter Stone. A social reinforcement learning agent. In *Proceedings of the Fifth International Conference on Autonomous Agents (AGENTS)*, 2001. **Best Paper Award**.

[42] Christian R. Shelton. Policy improvement for POMDPs using normalized importance sampling. In *Proceedings of the Seventeenth International Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 496–503, 2001.

[43] Christian R. Shelton. Balancing multiple sources of reward in reinforcement learning. In *Advances in Neural Information Processing Systems (NIPS)*, pages 1082–1088, 2000.

[44] Dan Halperin and Christian R. Shelton. A perturbation scheme for spherical arrangements with application to molecular modeling. In *Proceedings of the Thirteenth Symposium on Computational Geometry*, pages 183–192, 1997.

[45] P. W. Finn, L. E. Kavraki, J.-C. Latombe, R. Motwani, C. Shelton, S. Venkatasubramanian, and A. Yao. RAPID: Randomized pharmocophore indentification for drug design. In *Proceedings of the Thirteenth Symposium on Computational Geometry*, pages 324–333, 1997.

[46] Paul W. Finn, Dan Halperin, Lydia E. Kavraki, Jean-Claude Latombe, Rajeev Motwani, Christian Shelton, and Suresh Venkatasubramanian. Geometric manipulation of flexible ligands. In M. C. Lin and D. Manocha, editors, *Applied Computational Geometry: Towards Geometric Engineering*, pages 67–78. Springer, 1996.

TEACHING

UC Riverside 2003 – present

CS272: Probabilistic Models for Artificial Intelligence
CS229: Machine Learning
CS205: Artificial Intelligence (grad)
CS181: Principles of Programming Languages
CS179M: Senior Project in Artificial Intelligence
CS170: Introduction to Artificial Intelligence (undergrad)

GRADUATE STUDENTS

UC Riverside 2003 – present

Kevin Horan, PhD, 2011, currently at Global Recordings Network
Antony Lam, PhD, 2010, currently a Post-doc at NII, Japan
Jing Xu, PhD, 2010, currently at Mathworks
Teddy Yap, Jr., PhD, 2009
Yu Fan, PhD, 2009, currently at Google
Kin Fai Kan, PhD, 2008, currently at Yahoo! Labs
Guobiao Mei, PhD, 2008, currently at Google
Jeff Price, MS, 2011
Wesley Huie, MS, 2005

Busra Celikkaya, PhD, expected 2013
Juan Casse, PhD, expected 2013
Zhen Qin, PhD, expected 2015

FUNDED GRANTS

Estimating Models of Patient Response to Ventilation 10/2011 – 6/2012
$38,306, sub-award from Children's Hospital Los Angeles

Modular CS1 from the Inside Out: Comp. Thinking for STEM Students 10/2010 – 9/2011
$25,000 (UCR's component), NSF CPATH, Senior Personnel (Harvey Mudd lead institution)

Reasoning in Dynamic Real Time Systems 4/2009 – 4/2010
$100,000, DARPA, Computer Science Study Group (CSSG), **sole PI**

Continuous Time Structured Stochastic Processes 12/2006 – 11/2009
$346,729, US Air Force (AFOSR) Young Investigator Program (YIP), **sole PI**

Continuous Time Models for Malicious Net. Traffic Detection 10/2006 – 12/2007
$86,500 (= $55,000 from Intel Research + $31,500 from UC MICRO), **sole PI**

Adaptive Decision Making for Silicon Manufacturing 10/2004 – 12/2006
$159,646 (= $95,000 from Intel Research + $64,646 from UC MICRO), **sole PI**

INVITED TALKS

Inference and Learning for Continuous Time Stochastic Systems November 2011
Asilomar Conference on Signals, Systems and Computers

Anyway you slice it, time is continuous September 2011
Southern California Machine Learning Workshop

Inferring Time-Varying Hidden Social Links September 2011
ID Analytics, San Diego

Applications of Dynamic-System Modeling August 2011
Virtual Pediatric Intensive Care Unit, Childrens Hospital Los Angeles

Modeling Stochastic Dynamic Systems in Continuous Time May 2010
AI/ML Weekly Seminar, UCI

Uncertainty in Artificial Intelligence: Visual Odometry March 2010
Invited Lunch Speaker at Measurement Science Conference, Pasadena

Structured Models of Continuous-Time Dynamic Processes February 2009
Information Theory and Applications Workshop, UCSD

Reasoning about Social Network Dynamics September 2008
Workshop on Socio-Cultural Modeling, Santa Barbara

Continuous Time Bayesian Networks and Network Traffic Monitoring April 2007
Machine Learning Seminar, UCSD

Continuous Time Bayesian Networks and Network Traffic Monitoring March 2006
Intel Research, Santa Clara, California

Computing Equilibria in Compact Structured Game Representations July 2004
HRL Laboratories, Malibu, California

Structured Game Representations and Nash Calculation January 2004
8th International Symposium on A.I. and Math., Fort Lauderdale, Florida

Continuous Time Bayesian Networks September 2003
Brains and Machines Seminar Series, CBCL, MIT

Compact Structured Game Representations September 2003
Complexity in Economic Theory, Cowles Foundation Workshop, Yale

Compact Structured Game Representations August 2003
14th International Conference on Game Theory, Stony Brook, New York

PROFESSIONAL ACTIVITIES

Editorial Board 2009 – 2012
Journal of Artificial Intelligence Research (JAIR)

Managing Editor 2003 – 2008
Journal of Machine Learning Research (JMLR)

Conference Senior PC Member:

- Uncertainty in Artificial Intelligence (UAI): 2011, 2012

Conference PC Member:

- International Joint Conferences on Artificial Intelligence (IJCAI): 2007, 2009
- International Conference on Machine Learning (ICML): 2006, 2007, 2008, 2010
- Conference on Artificial Intelligence (AAAI): 2008
- Uncertainty in Artificial Intelligence (UAI): 2003, 2005, 2006, 2007
- International Conference on Knowledge Discovery and Data Mining (KDD): 2006, 2007

US Patent Patent #6,525,744

Filed: March 11, 1999

Correspondence between n-dimensional surface: vector fields that are defined by surfaces and that generate surfaces which preserve characteristics of the defining surfaces
Tomaso Poggio and Christian Shelton