

Abram (Abe) Friesen | CV

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206.659.1223

I am looking for a career in which I can continue to develop intelligent systems that are general, flexible, and useful. To date, my research has targeted a core problem in machine learning (ML): how to build powerful models while retaining the ability to reason efficiently. By understanding what makes reasoning hard, I developed expressive but tractable models for deep learning, probabilistic modeling, nonconvex optimization, and computer vision. This work appeared at top ML and artificial intelligence (AI) conferences and won a distinguished paper award.

Education

2018 | **PH.D. IN COMPUTER SCIENCE & ENGINEERING**

University of Washington (UW), Seattle, WA USA

Area: Machine learning and artificial intelligence

Thesis topic: Improving model expressivity while retaining tractable inference.

Advisor: Pedro Domingos

Committee: Carlos Guestrin, Jeff Bilmes, and Henry Kautz

- IJCAI Distinguished Paper Award
- NSERC Ph.D. fellowship (3 years)

2012 | **M.S. IN COMPUTER SCIENCE & ENGINEERING**

University of Washington (UW), Seattle, WA USA

Area: Artificial intelligence and cognitive science

Thesis topic: Goal-based imitation learning with hierarchical actions

Advisor: Rajesh Rao

2006 | **B.ENG. IN COMPUTER ENGINEERING WITH MECHATRONICS OPTION**

University of Victoria (UVic), Victoria, BC Canada

- Gold Medal for Highest Graduating GPA in Computer Engineering
- University of Victoria President's Scholarship, James R. Bullick Memorial Scholarship for an Outstanding Engineer, Tom Toynbee Academic and Community Scholarship

Research Experience

2012 - 2018 | **GRADUATE RESEARCH ASSISTANT WITH PEDRO DOMINGOS**

University of Washington (UW), Seattle, WA USA

Researched and developed models and algorithms for tractable inference, and applied these to problems in machine learning and artificial intelligence, including image classification, scene understanding, structure from motion, and protein folding. This resulted in publications at multiple conferences (ICML, ICLR, IJCAI) and a distinguished paper award (IJCAI).

2011 | **VISITING RESEARCHER WITH DAVID WINGATE, LESLIE KAEHLING, AND JOSH TENENBAUM**

Massachusetts Institute of Technology (MIT), Cambridge, MA USA

Investigated probabilistic programming methods for reinforcement learning and control.

Applied reinforcement learning to develop algorithms for adaptive inference.

2011 | **VISITING RESEARCHER WITH TOM GRIFFITHS**

UC Berkeley, Berkeley, CA USA

Used nonparametric Bayesian methods to develop an ideal-observer model for inferring the reference frames in a visual scene. This resulted in a publication at the NIPS conference.

2010 | **RESEARCH INTERN WITH DIETER FOX**

Intel Research, Seattle, WA USA

Developed software to track and process human movements using a 3-D depth camera. This software was used to control the robotic arm in Intel's public demo of a chess-playing robot.

2008 - 2012 | **GRADUATE RESEARCH ASSISTANT** WITH RAJESH RAO

University of Washington (UW), Seattle, WA USA

Developed models for planning and decision-making, focusing specifically on reinforcement learning, imitation, and goal inference, resulting in publications at ICDL and COGSCI.

Industry Experience

2006 - 2008 | **SOFTWARE ENGINEER** (C++)

Itiva Development, Palo Alto, CA USA and Kelowna, BC Canada

Worked with a small team to develop a fast, reliable content distribution system that used both peer-to-peer technology and existing internet infrastructure to maximize performance and minimize cost. Co-wrote the multithreaded, cross-platform, client; focused on adding intelligence to improve download speed and efficiency.

2002 - 2006 | **SOFTWARE ENGINEERING INTERSHIPS** (C++, VISUAL FOXPRO)

Victoria, BC Canada

Wrote software for controlling experiments in a neuroethology lab and for user interfaces and data processing at a financial data management firm.

Refereed Conference Publications

2018 | **DEEP LEARNING AS A MIXED CONVEX-COMBINATORIAL OPTIMIZATION PROBLEM**

Abram Friesen and Pedro Domingos. In *Proceedings of the International Conference on Learning Representations (ICLR 2018)*. [Acceptance rate 36%; top 10% of papers by review score]

2016 | **THE SUM-PRODUCT THEOREM: A FOUNDATION FOR LEARNING TRACTABLE MODELS**

Abram Friesen and Pedro Domingos. In *Proceedings of the International Conference on Machine Learning (ICML 2016)*. [Acceptance rate 25%]

2015 | **RECURSIVE DECOMPOSITION FOR NONCONVEX OPTIMIZATION**

Abram Friesen and Pedro Domingos. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI 2015)*. [Acceptance rate: 29%]

- Winner of the distinguished paper award.

2012 | **HOW PRIOR PROBABILITY INFLUENCES DECISION MAKING: A UNIFYING MODEL**

Yanping Huang, Abram Friesen, Timothy Hanks, Michael Shadlen, and Rajesh Rao. In *Proceedings of the Annual Conference on Neural Information Processing Systems (NIPS 2012)*. [Acceptance rate: 25%]

2011 | **AN IDEAL-OBSERVER MODEL FOR IDENTIFYING THE REFERENCE FRAME OF OBJECTS**

Joseph Austerweil, Abram Friesen, and Thomas Griffiths. In *Proceedings of the Annual Conference on Neural Information Processing Systems (NIPS 2011)*. [Acceptance rate: 22%]

2011 | **GAZE FOLLOWING AS GOAL INFERENCE: A BAYESIAN MODEL**

Abram Friesen and Rajesh Rao. In *Proceedings of the Annual Conference of the Cognitive Science Society (COGSCI 2011)*.

2010 | **IMITATION LEARNING WITH HIERARCHICAL ACTIONS**

Abram Friesen and Rajesh Rao (2010). In *Proceedings of the International Conference on Learning and Development (ICDL 2010)*.

2010 | **ESTIMATING THE PROGRESS OF MAP-REDUCE PIPELINES**

Kristi Morton, Abram Friesen, Magdalena Balazinska, and Dan Grossman. In *Proceedings of the IEEE International Conference on Data Engineering (ICDE 2010)*.

Refereed Workshop Publications

2017 | **UNIFYING SUM-PRODUCT NETWORKS AND SUBMODULAR FIELDS**

Abram Friesen and Pedro Domingos. In *Proceedings of the Workshop on Principled Approaches to Deep Learning at the International Conference on Machine Learning (PADL at ICML 2017)*.

2014 | **EXPLOITING STRUCTURE FOR TRACTABLE NONCONVEX OPTIMIZATION**

Abram Friesen and Pedro Domingos. In *Proceedings of the Learning Tractable Probabilistic Models Workshop at the International Conference on Machine Learning (LTPM at ICML 2014)*.

2013 | **NONCONVEX OPTIMIZATION IS COMBINATORIAL OPTIMIZATION**

Abram Friesen and Pedro Domingos. In *Proceedings of the Optimization for Machine Learning Workshop at the Annual Conference for Neural Information Processing Systems (OPT at NIPS 2013)*.

Invited Talks

2017 | **DEEP LEARNING AS MIXED CONVEX-COMBINATORIAL OPTIMIZATION**

Invited talk for UW affiliates meeting. *Seattle, WA USA*.

2016 | **THE SUM-PRODUCT THEOREM: A FOUNDATION FOR LEARNING TRACTABLE MODELS**

Oral presentation at ICML. *New York, NY USA*.

2016 | **SUBMODULAR SPNS FOR SCENE UNDERSTANDING**

Invited talk for UW affiliates meeting. *Seattle, WA USA*.

2015 | **RECURSIVE DECOMPOSITION FOR NONCONVEX OPTIMIZATION**

Distinguished paper award talk at IJCAI. *Buenos Aires, Argentina*.

2011 | **GAZE FOLLOWING AS GOAL INFERENCE: A BAYESIAN MODEL**

Saxe Lab invited talk. *MIT, Cambridge, MA USA*.

2011 | **GAZE FOLLOWING AS GOAL INFERENCE: A BAYESIAN MODEL**

Oral presentation at COGSCI 2011. *Cambridge, MA USA*.

Service and Teaching Experience

2011 - PRESENT | **REVIEWER** for conference (ICML, NIPS, IJCAI, AAAI) and journal (JMLR) submissions

2013 | **ORGANIZER, PRESENTER, AND DISCUSSION LEADER** of the Graduate AI Seminar at UW

2010 | **CO-CHAIR** of the New Graduate Student Orientation Committee at UW

2009 | **VOLUNTEER** at the Conference on Robotics: Science and Systems (RSS)

2009 | **TEACHING ASSISTANT** for Applications of AI (masters) and Software Engineering (undergraduate)

2005 - 2012 | **TUTOR** for math and computer science (undergraduate and elementary)

References

Available on request.