

Natalia Hernandez Gardiol

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Oakland, CA

Research Interests

Decision-making under uncertainty, Markov decision processes, reinforcement learning, planning, topic modeling, information retrieval, recommendation systems.

Academic Background

Doctor of Philosophy in Electrical Engineering and Computer Science February 2008
Computer Science and Artificial Intelligence Lab (CSAIL)
Massachusetts Institute of Technology, Cambridge, MA
Thesis: Relational Envelope-based Planning, an any-time algorithm that computes a fast approximate solution to a probabilistic planning problem and then refines it as computational resources allow.

Master of Science in Electrical Engineering and Computer Science February 2003
Massachusetts Institute of Technology, Cambridge, MA
Thesis title: Applying Probabilistic Rules to Relational Worlds

Bachelor of Science in Computer Science and Engineering, *magna cum laude* December 1999
Michigan State University, East Lansing, MI

Professional Experience

Principal Applied Researcher / Information Retrieval Specialist March 2012 - present
Apple, Cupertino, CA
Member of team that redesigned and rebuilt back-end to the iTunes Store and Apple App Store. Responsible for improving search quality, designing ranking factors, and testing their effect on the ranking algorithm.

Research Engineer Nov 2010 - Feb 2012
Chomp Inc, San Francisco, CA
Led and worked on projects related to mobile app search: topic modeling, feature extraction, signal prototyping, and search-quality evaluation.

Independent Consultant July 2010 - Oct 2010
IdeaLoop, San Francisco, CA
Advised several small startups on projects related to video recommendations, AdWords optimization, user reputation metrics, and topic modeling.

Visiting Professor / Postdoctoral Associate March 2010 - July 2010
Universitat Pompeu Fabra, Barcelona, Spain
Artificial Intelligence Group, directed by Hector Geffner
Teaching Responsibilities: Automata Theory, Introduction to Database Systems

Assistant Vice President May 2008 - February 2010
State Street Associates, Cambridge, MA
Research Topics: statistical models of investor behavior, financial indicator development and production

Postdoctoral Associate January 2008 - May 2008
Massachusetts Institute of Technology
LIS Lab, directed by Leslie Pack Kaelbling and Tomas Lozano-Perez
Research Topics: Bayesian models, statistical learning methods

Research Assistant September 2000 - December 2007
Massachusetts Institute of Technology
LIS Lab, directed by Leslie Pack Kaelbling
Research Topics: probabilistic models for sequential decision-making, planning with abstractions, reinforcement learning with partial observability

Research Assistant September 1998 - June 2000
 Michigan State University
 Autonomous Agents Lab, directed by Sridhar Mahadevan
 Research topics: hierarchical reinforcement learning

Engineering Co-operative Education Internship January 1998 - August 1998
 IBM Global Services, Southbury Connecticut.
 Advisor: Linda Yue.
 Projects: Lotus Notes application programming, Perl scripts to assist DNS management

Undergraduate Research Assistant May 1997 - December 1997
 Michigan State University
 Pattern Recognition and Image Processing Lab, directed by Anil Jain
 Research topics: automated finger-print image capture

Undergraduate Research Assistant September 1996 - May 1997
 Michigan State University
 Genetic Algorithms Lab, directed by Bill Punch
 Project: search interface for multiple web search engines

Teaching Experience

Course Instructor Spring 2010
 Universitat Pompeu Fabra
 Undergraduate-level, core requirement: Teoría de Autómatas II (Automata Theory)
 Prepared lectures (in Spanish), held office hours, and evaluated problem sets and exams (in Catalan).

Lab Instructor Spring 2010
 Universitat Pompeu Fabra
 Undergraduate-level, core requirement: Bases de Datos (Database Lab)
 Designed lab curriculum and assignments, presented lectures, and evaluated student coursework.

Teaching Assistant Fall 2007
 Massachusetts Institute of Technology
 Undergraduate-level, core requirement: 6.01, Introduction to EECS.
 Assisted with problem set development, offered office hours and classroom support for students on projects ranging from python coding, to simple circuits and basic robot control.

Teaching Assistant Fall 2002
 Massachusetts Institute of Technology
 Graduate-level, core elective: 6.827, Techniques in Artificial Intelligence.
 Helped prepare problem sets, offered office hours and review sessions.

Papers

Conferences and Symposia

Natalia H. Gardiol and Leslie Pack Kaelbling. “Action-space partitioning for planning”. In *National Conference on Artificial Intelligence (AAAI)*. Vancouver, Canada, 2007. **Note: One of top five international conferences for AI/Machine Learning; the others are NIPS, UAI, ICML, and IJCAI. Acceptance rate in 2007: 27.5% (253/921)** .

Natalia H. Gardiol and Leslie Pack Kaelbling. “Computing action equivalences for planning”. In *International Conference on Automated Planning and Scheduling, Doctoral Consortium*. Cumbria, UK, 2006. **Note: Leading international conference for planning research.**

Natalia H. Gardiol and Leslie P. Kaelbling. “Envelope-based planning in relational MDPs”. In *Advances in Neural Information Processing 16 (NIPS-2003)*. Vancouver, 2004. **Note: Top five international conference for AI/ML. Acceptance rate in 2003: 27.6% (198/717)**.

Sarah J. Finney, Natalia H. Gardiol, Leslie Pack Kaelbling, and Tim Oates. “The thing that we tried didn’t work very well: Deictic representation in reinforcement learning”. In *18th Int’l Conference on Uncertainty in Artificial Intelligence (UAI-02)*. Edmonton, 2002. **Note: Top five international conference for AI/ML. Acceptance rate in 2002: 34% (66/192)**.

Leslie Pack Kaelbling, Tim Oates, Natalia H. Gardiol, and Sarah J. Finney. “Learning in worlds with objects”. In *Working Notes of the AAAI Stanford Spring Symposium on Learning Grounded Representations*. March 2001.

Natalia H. Gardiol and Sridhar Mahadevan. “Hierarchical memory-based reinforcement learning”. In *Advances in Neural Information Processing 13 (NIPS-2000)*. Denver, 2001. **Note: Top five international conference for AI/ML. Acceptance rate in 2001: 30%.**

Technical Reports

Natalia H. Gardiol and Leslie Pack Kaelbling. “Adaptive envelope MDPs for relational equivalence-based planning”. Technical Report MIT-CSAIL-TR-2008-050, MIT CSAIL, Cambridge, MA, 2008.

Natalia H. Gardiol. *Relational Envelope-based Planning*. Ph.D. thesis, MIT, Cambridge, MA, 2007. MIT-CSAIL-TR-2007-061.

Natalia H. Gardiol and Leslie Pack Kaelbling. “Computing action equivalences for planning under time constraints”. Technical Report MIT-CSAIL-TR-2006-022, MIT CSAIL, Cambridge, MA, 2006.

Natalia H. Gardiol. *Applying Probabilistic Rules To Relational Worlds*. Master’s thesis, MIT, Cambridge, MA, 2002.

Sarah J. Finney, Natalia H. Gardiol, Leslie Pack Kaelbling, and Tim Oates. “Learning with deictic representations”. Technical Report AIM-2002-006, MIT AI Lab, Cambridge, MA, 2002.

Awards & Fellowships

GE Fund Faculty for the Future Fellowship Spring 2004

National Science Foundation Graduate Research Fellowship 3-Year Fellowship, Fall 2000

Outstanding Undergraduate Research Award Computing Research Association. Dec. 1999

Professorial Assistantship Michigan State University. 2-Year Grant, Spring 1995

Spartan Scholarship Michigan State University. 4-Year Scholarship, Spring 1995

Professional Activities

Journal Reviewer Journal of Artificial Intelligence Research

Conference Reviewer Neural Information Processing Systems conference (NIPS) 2003, 2004; International Joint Conference on Artificial Intelligence (IJCAI) 2003, 2005, 2009; Robotics Science & Systems (RSS) 2005; New England Student Conference on Artificial Intelligence (NESCAI) 2007; Iberamia-08; International Conference on Machine Learning (ICML) 2007, 2008; European Conference on Artificial Intelligence (ECAI) 2010.

Society Memberships Tau Beta Pi, American Association for Artificial Intelligence (AAAI)

Languages

Spanish (native), English (native), French (fluent)

Other Interests

Cambridge Bicycle/Igleheart Frames Cycling Team Dedicated grassroots team competing in multiple disciplines, 2008-2010. Taught bike racing skills workshops as Women’s team captain.

MIT Cycling Team Competed in Road, Mountain, Track, and Cyclocross disciplines. Member of Collegiate National Cyclocross Championship team, 2006.

MIT Outing Club Led official Winter skiing, snowshoeing trips and Summer rock-climbing trips. Board of directors member and Skiing chair, 2003-2006.

Wilderness First Aid WFA and Advanced WFA certified, 2003 and 2005.