Curriculum Vitæ—Andrew Y. Ng

Associate Professor
Stanford University
Computer Science Department
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Research interests

- Broad competence Artificial Intelligence.
- Foundations of Machine Learning.
- Learning for perception and natural language processing.

Education

Carnegie Mellon University. 1997.
B.Sc. in Mathematics/Computer Science. (Graduated at top of class.)
B.Sc. in Statistics, with an additional major in Economics.
(Both degrees with Honors.)

Massachusetts Institute of Technology, Artificial Intelligence Laboratory.
M.Sc. in Electrical Engineering and Computer Science, 1998.
Thesis title: On feature selection: Learning with exponentially many irrelevant features as training examples.

University of California, Berkeley.
Ph.D. in Computer Science, 2003.
Thesis title: Shaping and policy search in reinforcement learning.

Awards and Honors

IJCAI Computers and Thought award (highest award in AI given to a researcher under 35): 2009; ICML Best Paper Award: Best application paper: 2009; Vance D. & Arlene C. Coffman Faculty Scholar Award: 2009; TR35 (Technology Review, 35 innovators under 35): 2008; ICML Best Paper Award: Best application paper: 2008; Alfred P. Sloan Research Fellow: 2007; 3dRR Best Paper Award: 2007; ACL Best Paper Award: 2006; CEAS Best

Student Paper Award: 2005; Microsoft Research Fellowship: 2001-2002; Berkeley Fellowship: 1998-2000; Phi Kappa Phi Honors Society: 1997; Student Leadership Award: 1997; Microsoft Technical Award: 1996; Andrew Carnegie Society Scholarship: 1996; Pi Mu Epsilon Honors Society: 1996; Microsoft Technical Scholarship Award: 1995; Phi Beta Kappa Honors Society: 1995; Bell Atlantic Network Services Scholarship: 1995; Omicron Delta Upsilon Honors Society: 1995.

Positions held

Stanford University. 2002-present.
Associate Professor (2009-present). Assistant Professor (2002-2009). Computer Science Department and (by courtesy) Department of Electrical Engineering. Major projects include: The STAIR (STanford Artificial Intelligence Robot) project (http://stair.stanford.edu). Aerobatic helicopter flight via apprenticeship learning (http://heli.stanford.edu), and more generally machine learning for robotic control. Building 3d models from a single still image (http://make3d.stanford.edu). The "Stanford WordNet" project (machine learning to automatically enlarge WordNet). Efficient L_1 methods, self-taught learning and unsupervised feature learning.

University of California, Berkeley, 1998-2002.
Graduate student/Research Assistant. Research on machine learning algorithms for control and for text and web data processing.

AT&T Labs – Research, Summer 1996-Spring 1998, Summer 1999, Summer 2000.
Research on reinforcement learning, model selection, and feature selection.

Massachusetts Institute of Technology, Fall 1997-Fall 1998.
Research Assistant. Built the first publically available, automatically-indexed web-search engine for research papers on the web (precursor to CiteSeer/ResearchIndex, but specializing in machine learning).

Students

Current Ph.D. students:

- Adam Coates
  Expected graduation: 2011
- Quoc Le
  Expected graduation: 2012
- Andrew Maas
  Expected graduation: 2013
- Jiquan Ngiam
  Expected graduation: 2013

- Morgan Quigley
  Expected graduation: 2012

Former Ph.D. students:

- Pieter Abbeel (Assistant Professor, UC Berkeley)
  Thesis: Apprenticeship Learning and Reinforcement Learning with Application to Robotic Control
  Graduated: August 2008
- Chuong Do (Tom) (Scientist, 23andme)
  Thesis: Discriminative probabilistic models for biological sequence analysis
  Graduated: June 2009
- Ashutosh Saxena (Assistant Professor, Cornell University)
  Thesis: Robotic Grasping and Depth Perception: Learning 3D Models from a Single Image
  Graduated: August 2009
- Rajat Raina (Research Sciencetist, Facebook)
  Thesis: Self-taught learning: Algorithms and applications
  Graduated: August 2009
- Rion Snow (Member of Technical Staff, Twitter)
  Thesis: Semantic Taxonomy Induction: Theory and Applications
  Graduated: June 2009
- J. Zico Kolter (Post doc, MIT)
  Thesis: Learning and Control with Inaccurate Models
  Graduated: August 2010
- Honglak Lee (Assistant Professor, University of Michigan, Ann Arbor)
  Thesis: Unsupervised Feature Learning via Sparse Hierarchical Representations
  Graduated: August 2010

Current and former M.Sc. students:

- Deepak Rao
- Bipin Suresh
- Tao Wang
- Will Zou
- Siddarth Batra (graduated June 2010)
- Ethan Dreyfus (June 2010)
- Ian Goodfellow (June 2010)
- Anand Madhavan (June 2010)
- Rajesh Ranganath (June 2010)
- Charles DuHadway (June 2009)

- Paul Baumstarck (Mar 2010)
- Hee-Tae Jung (June 2009)
- Tim Hunter (June 2009)
- Brian Sa (June 2009)
- Samuel Schreiber (June 2009)
- Jeffrey Spehar (June 2009)
- Lawson Wong (June 2009)
- Sara Bolouki (June 2008)
- Ekanadham Chaitanya (June 2008)
- Quan Gan (June 2008)
- Roger Grosse (June 2008)
- Jeremy Hoffman (June 2008)
- Helen Kwong (June 2008)
- Siddharth Jonathan (June 2007)
- Paul Reynolds (June 2007)
- Benjamin Sapp (June 2007)
- Sushant Prakash (June 2007)
- Min Sun (June 2007)
- Justin Driemeyer (Mar 2007)
- Mike Brzozowski (Sep 2006)
- Kendra Carattini (June 2006)
- Cheng-Tao Chu (June 2006)
- Sung Chung (June 2006)
- Justin Kearns (June 2006)
- Marius Messner (June 2006)
- Kurt Miller (June 2006)
- Chioma Osondu (June 2006)
- YuanYuan Yu (June 2006)
- Erick Delage (June 2005)
- Aria Haghighi (June 2005)
- Jeff Michels (June 2005)
- Jason Chuang (June 2005)
- Wenmiao Lu (June 2005)
- Nisheeth Ranjan (June 2005)

- Gurjeet Singh (Mar 2005)
- Chih-Han Yu (Mar 2005)
- Eric Berger (June 2004)
- Eric Liang (June 2004)
- Khian Lim (June 2004)
- David Mulford (June 2004)

Invited Talks

Distinguished lecture at UCSD Computer Science Department, 2012.

Distinguished lecture at University of Toronto Computer Science Department, 2012.

Invited talk at US FIRST Robotics competition, San Jose, 2012.

Invited talk at International Joint Conference on Neural Networks (IJCNN), 2011.

Invited talk at RulesFest conference, 2011.

Invited talk at BAVM, 2011.

Invited talk at Frontiers of Vision meeting, Cambridge MA, 2011.

Invited talk at RSS workshop on mobile manipulation, 2011.

STAN plenary talk, 2011.

Keynote at the Conference on Empirical Methods on Natural Language Processing (EMNLP), Oct 2010 (to be held).

Invited talk at Google Computer Vision Conference, 2010.

Distinguished lecturer at "triangle" lecturer series (Duke, UNC, and NC), 2009

IJCAI 2009 Computers & Thought talk, 2009.

Invited speaker at the Multidisciplinary Symposium on Reinforcement Learning (MSRL), 2009.

Invited speaker at ICML workshop on Learning feature hierarchies, 2009.

Invited speaker at University of Montreal, Machine Learning seminar, 2009.

Invited speaker at CIFAR meeting on Neural Computation and Adaptive Perception, Toronto, 2009.

Invited speaker at AAAI Presidential Panel meeting on Long-Term AI Futures, Asilomar, 2009.

Invited speaker at Princeton University, CS Colloquium, 2009.

Invited speaker at the Symposium on Autonomous Systems, Max Planck Society, Germany, 2009.

Invited speaker at University of British Columbia, CS Department, 2009.

Invited speaker at Lockheed Martin/ATC Colloquium, 2009.

Invited speaker at University of Pennsylvania, GRASP Seminar, Nov 2008.

Invited speaker at MIT, Robotics Seminar, Nov 2008.

Invited speaker at the International Conference on Machine Learning (ICML), 2008.

Keynote speaker at the International Conference on Development and Learning (ICDL), 2008.

Invited speaker at Cornell University, CS Colloquium, 2008.

Invited speaker at University of Washington, CS Department, 2008.

Invited speaker at University of Southern California, CS Department, 2008.

Invited speaker at Microsoft Research, Seattle, 2008.

Invited speaker at AAAI workshop on Mobility and Manipulation, 2008.

Invited speaker at DSCR Terachip workshop, Santa Cruz, CA, 2008.

Invited speaker at UC Berkeley Center for Intelligent Systems (CIS) Seminar, 2008.

Invited speaker at CIFAR meeting on Statistics of Natural Scenes, UC Berkeley, 2008.

Invited seminar at Boeing, Phantom Works, 2008.

Invited speaker at Information Theory and Applications Workshop, UC San Diego, 2008.

Invited speaker at Personal Robotics and Mobile Manipulation Workshop, Intel, 2008.

Invited speaker at CRA Computing Community Consortium meeting, 2008.

Invited speaker at NIPS workshop on "Robotics Challenges for Machine Learning," 2007.

Invited speaker at NIPS workshop on "Beyond Simple Cells: Probabilistic Models for Visual Cortical Processing," 2007.

Invited speaker at Future of AI in Robotics workshop, Japan, 2007.

Invited speaker at International Symposium on Robotics Research (ISRR), 2007.

Invited speaker at International Conference on Neural Information Processing (ICONIP), Japan, 2007.

Keynote speaker at Robotics: Science and Systems Workshop on Robot Manipulation: Sensing and Adapting to the Real World, 2007

Invited seminar at University of Michigan, Ann Arbor, Artificial Intelligence Seminar, 2007.

Invited seminar at Carnegie Mellon University, Robotics Institute seminar, 2007.

Invited seminar at UC Berkeley, Redwood Center for Neuroscience, 2007.

Invited seminar at Georgia Tech, Robotics and Intelligence Machines (RIM) seminar, 2007.

Invited speaker at NSF workshop on Future challenges for the science and engineering of learning, 2007

Invited seminar at NASA Ames, 2007.

Invited speaker at COSYNE (Computational and Systems Neuroscience) workshop on Motor control, 2007.

Invited speaker at COSYNE (Computational and Systems Neuroscience) workshop on Functional requirements of a visual theory, 2007.

Invited seminar at the Chinese University of Hong Kong (CUHK), 2007.

Invited speaker at Neuroscience Enabled Computer Vision Workshop, Washington DC, 2007.

Invited speaker at the Algorithmic Learning Theory (ALT) conference and the Conference on Discovery Science (DS), Barcelona, 2006.

Invited speaker at CIAR meeting on Neural Computation and Adaptive Perception, Canada, 2006.

Invited speaker at Manifolds and Visual Perception workshop, UC Berkeley, 2006.

Invited seminar at KIST (Korea Institute of Science and Technology), 2006.

Invited seminar at KITECH (Korea Institute of Industrial Technology), 2006.

Invited speaker at Workshop on Biologically Inspired Scene Understanding, 2006.

Invited talk at Google, 2006.

Invited speaker at International Symposium on Robotics Research (ISRR) Conference, 2005.

Invited speaker at Robotics: Science and Systems workshop on robot locomotion, 2005.

Invited speaker at MSR/UW Summer Institute on Intelligent Systems (ISYS), 2005.

Invited speaker at UC Berkeley Center for Intelligent Systems (CIS) seminar, 2005.

Invited lecture at Seoul National University, Department of Mechanical and Aerospace Engineering, 2005.

Invited speaker at NIPS workshop on "Verification, Validation and Testing of Learning Systems." 2004

GRASP seminar at University of Pennsylvania. 2004.

Seminar at NASA Ames. 2003.

Invited speaker at NIPS workshop on "Planning for the real-world." 2003.

Invited speaker at "Navigation, Locomotion and Articulation" workshop. 2003.

Seminar at NASA Ames. 2002.

Seminar at Stanford University, Department of Computer Science. 2001.

Invited speaker at the Foundations of Statistical Inference conference, Jerusalem. 2000.

Learning seminar at The Hebrew University, School of Computer Science and Engineering. 2000.

Seminar at Stanford University, Department of Computer Science. 1999.

Publications

Theses

[1] **Shaping and policy search in reinforcement learning**. Andrew Y. Ng. Ph.D. Thesis. University of California, Berkeley, 2003.

[2] **On Feature Selection: Learning with exponentially many irrelevant features as training examples**. Andrew Y. Ng. Masters Thesis. Massachusetts Institute of Technology, Artificial Intelligence Laboratory, 1998.

Book Chapters

[3] **An Information-Theoretic Analysis of Hard and Soft Assignment Methods for Clustering**. Michael Kearns, Yishay Mansour and Andrew Y. Ng. In M. I. Jordan, (Ed.), *Learning in Graphical Models*. MIT Press, 1997.

Refereed Journal Articles

[4] **Autonomous Helicopter Aerobatics through Apprenticeship Learning**, Pieter Abbeel, Adam Coates and Andrew Y. Ng. In *International Journal of Robotics Research (IJRR)*, 2010.

[5] **Make3D: Learning 3-D Scene Structure from a Single Still Image**, Ashutosh Saxena, Min Sun, and Andrew Y. Ng. In *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 2008.

[6] **Robotic Grasping of Novel Objects using Vision**, Ashutosh Saxena, Justin Driemeyer, and Andrew Y. Ng. In *International Journal of Robotics Research (IJRR)*, 2007.

[7] **3-D depth reconstruction from a single still image**, Ashutosh Saxena, Sung H. Chung, and Andrew Y. Ng. In the *International Journal of Computer Vision (IJCV)*, 2007.

[8] **Learning factor graphs in polynomial time & sample complexity**, Pieter Abbeel, Daphne Koller and Andrew Y. Ng. In *Journal of Machine Learning Research*, 7:1743-1788, 2006.

[9] **Autonomous helicopter tracking and localization using a self-calibrating camera array**, Masa Matsuoka, Surya Singh, Alan Chen, Adam Coates, Andrew Y. Ng and Sebastian Thrun. In *International Journal of Robotics Research (IJRR)*, 2006.

[10] **Latent Dirichlet Allocation**. David Blei, Andrew Y. Ng and Michael I. Jordan. *Journal of Machine Learning Research*, 3:993-1022, 2003.

[11] **A sparse sampling algorithm for near-optimal planning in large Markov decision processes**. Michael Kearns, Yishay Mansour and Andrew Y. Ng. Accepted to *Machine Learning*.

[12] **An experimental and theoretical comparison of model selection methods**. Michael Kearns, Yishay Mansour, Andrew Y. Ng and Dana Ron. In *Machine Learning 27(1)*, pp. 7–50, 1997.

Refereed Conference Papers

[13] **Autonomous Operation of Novel Elevators for Robot Navigation**. Ellen Klingbeil, Blake Carpenter, Olga Russakovsky and Andrew Y. Ng. In *International Conference on Robotics and Automation (ICRA)*, 2010.

[14] **Learning to grasp objects with multiple contact points**. Quoc Le, David Kamm and Andrew Y. Ng. In *International Conference on Robotics and Automation (ICRA)*, 2010.

[15] **Multi-Camera Object Detection for Robotics**. Adam Coates and Andrew Y. Ng. In *International Conference on Robotics and Automation (ICRA)*, 2010.

[16] **A Probabilistic Approach to Mixed Open-loop and Closed-loop Control, with Application to Extreme Autonomous Driving**. J. Zico Kolter, Christian Plagemann, David T. Jackson, Andrew Y. Ng and Sebastian Thrun. In *International Conference on Robotics and Automation (ICRA)*, 2010.

[17] **Grasping Novel Objects with Depth Segmentation**. Deepak Rao, Quoc V. Le, Thanathorn Phoka, Morgan Quigley, Attawith Sudsand and Andrew Y. Ng. In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*, 2010.

[18] **Low-cost Accelerometers for Robotic Manipulator Perception**. Morgan Quigley, Reuben Brewer, Sai P. Soundararaj, Vijay Pradeep, Quoc V. Le and Andrew Y. Ng. In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*, 2010.

[19] **A Steiner tree approach to object detection**. Olga Russakovsky and Andrew Y. Ng. In *Computer Vision and Pattern Recognition (CVPR)*, 2010.

[20] **Measuring invariances in deep networks**. Ian J. Goodfellow, Quoc V. Le, Andrew M. Saxe, Honglak Lee and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 22 (NIPS)*, 2009.

[21] **Unsupervised feature learning for audio classification using convolutional deep belief networks**. Honglak Lee, Yan Largman, Peter Pham and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 22 (NIPS)*, 2009.

[22] **Convolutional Deep Belief Networks for Scalable Unsupervised Learning of Hierarchical Representations**, Honglak Lee, Roger Grosse, Rajesh Ranganath and Andrew Y. Ng. In *Proceedings of the Twenth-Sixth International Conference on Machine Learning*, 2009. **(Best paper award: Best application paper.)**

[23] **Large-scale Deep Unsupervised Learning using Graphics Processors**, Rajat Raina, Anand Madhavan and Andrew Y. Ng. In *Proceedings of the Twenth-Sixth International Conference on Machine Learning*, 2009.

[24] **A Majorization-Minimization Algorithm for (Multiple) Hyperparameter Learning**, Chuan Sheng Foo, Chuong Do and Andrew Y. Ng. In *Proceedings of the Twenth-Sixth International Conference on Machine Learning*, 2009.

[25] **Regularization and Feature Selection in Least-Squares Temporal Difference Learning**, J. Zico Kolter and Andrew Y. Ng. In *Proceedings of the Twenth-Sixth International Conference on Machine Learning*, 2009.

[26] **Near-Bayesian Exploration in Polynomial Time**, J. Zico Kolter and Andrew Y. Ng. In *Proceedings of the Twenth-Sixth International Conference on Machine Learning*, 2009.

[27] **Scalable Learning for Object Detection with GPU hardware**, Adam Coates, Paul Baumstarck, Quoc Le, and Andrew Y. Ng. In *Proceedings of the International Conference on Intellegent Robots and Systems (IROS)*, 2009.

[28] **Joint calibration of multiple sensors**, Quoc Le and Andrew Y. Ng. In *Proceedings of the International Conference on Intellegent Robots and Systems (IROS)*, 2009.

[29] **Policy Search via the Signed Derivative**, J. Zico Kolter and Andrew Y. Ng. In *Proceedings of Robotics: Science and Systems (RSS)*, 2009

[30] **Exponential Family Sparse Coding with Application to Self-taught Learning**, Honglak Lee, Rajat Raina, Alex Teichman and Andrew Y. Ng. In *Proceedings of the Twenth-First International Joint Conference on Artificial Intelligence (IJCAI-09)*, 2009.

[31] **High-Accuracy 3D Sensing for Mobile Manipulation: Improving Object Detection and Door Opening**, Morgan Quigley, Siddharth Batra, Stephen Gould, Ellen Klingbeil, Quoc Le, Ashley Wellman and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.

[32] **Stereo Vision and Terrain Modeling for Quadruped Robots**, J. Zico Kolter, Youngjun Kim and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.

[33] **Task-Space Trajectories via Cubic Spline Optimization**, J. Zico Kolter and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.

[34] **Learning Sound Location from a Single Microphone**, Ashutosh Saxena and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.

[35] **Learning 3-D Object Orientation from Images**, Ashutosh Saxena, Justin Driemeyer and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.

[36] **Reactive Grasping using Optical Proximity Sensors**, Kaijen Hsiao, Paul Nangeroni, Manfred Huber, Ashutosh Saxena and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.

[37] **Autonomous Autorotation of an RC Helicopter**, Pieter Abbeel, Adam Coates, Timothy Hunter and Andrew Y. Ng. In the *11th International Symposium on Experimental Robotics (ISER)*, 2008.

[38] **Space-indexed Dynamic Programming: Learning to Follow Trajectories**, J. Zico Kolter, Adam Coates, Andrew Y. Ng, Yi Gu, and Charles DuHadway. In *Proceedings of the Twenty-fifth International Conference on Machine Learning*, 2008.

[39] **Learning for Control from Multiple Demonstrations**, Adam Coates, Pieter Abbeel and Andrew Y. Ng. In *Proceedings of the Twenty-fifth International Conference on Machine Learning*, 2008. **(Best paper award: Best application paper.)**

[40] **Apprenticeship Learning for Motion Planning with Application to Parking Lot Navigation**, Pieter Abbeel, Dmitri Dolgov, Andrew Y. Ng and Sebastian Thrun. In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*, 2008.

[41] **A Complete Control Architecture for Quadruped Locomotion Over Rough Terrain**, J. Zico Kolter, Mike Rodgers and Andrew Y. Ng. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2008.

[42] **Make3D: Depth Perception from a Single Still Image**, Ashutosh Saxena, Min Sun, and Andrew Y. Ng. In *Proceedings of the Twenty-Third National Conference on Artificial Intelligence (AAAI, Nectar track)*, 2008.

[43] **A Fast Data Collection and Augmentation Procedure for Object Recognition**, Benjamin Sapp, Ashutosh Saxena, and Andrew Y. Ng. In AAAI, 2008. In *Proceedings of the Twenty-Third National Conference on Artificial Intelligence (AAAI)*, 2008.

[44] **Learning grasp strategies with partial shape information**, Ashutosh Saxena, Lawson Wong, and Andrew Y. Ng. In *Proceedings of the Twenty-Third National Conference on Artificial Intelligence (AAAI)*, 2008.

[45] **Cheap and Fast — But is it Good? Evaluating Non-Expert Annotations for Natural Language Tasks**, Rion Snow Brendan O'Connor, Dan Jurafsky and Andrew Y. Ng. In *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2008.

[46] **Hierarchical Apprenticeship Learning with Applications to Quadruped Locomotion**, J. Zico Kolter, Pieter Abbeel, and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 20 (NIPS2007)*, 2008.

[47] **Sparse deep belief net model for visual area V2**, Honglak Lee, Ekanadham Chaitanya, and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 20 (NIPS2007)*, 2008.

[48] **Efficient multiple hyperparameter learning for log-linear models**, Chuong Do, Chuan-Sheng Foo, Andrew Y. Ng. In *Advances in Neural Information Processing Systems 20 (NIPS2007)*, 2008.

[49] **A Vision-based System for Grasping Novel Objects in Cluttered Environments**, Ashutosh Saxena, Lawson Wong, Morgan Quigley and Andrew Y. Ng. In *Proceedings of the International Symposium on Robotics Research (ISRR)*, 2007.

[50] **Learning omnidirectional path following using dimensionality reduction**, J. Zico Kolter and Andrew Y. Ng. In Proceedings of Robotics: Science and Systems, 2007.

[51] **Shift-Invariant Sparse Coding for Audio Classification**, Roger Grosse, Rajat Raina, Helen Kwong and Andrew Y. Ng. In *Proceedings of the Twenty-third Conference on Uncertainty in Artificial Intelligence*, 2007.

[52] **Learning to merge word senses**, Rion Snow, Sushant Prakash, Dan Jurafsky and Andrew Y. Ng. In *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2007.

[53] **Self-taught learning: Transfer learning from unlabeled data**, Rajat Raina, Alexis Battle, Honglak Lee, Benjamin Packer and Andrew Y. Ng. In *Proceedings of the Twenty-fourth International Conference on Machine Learning*, 2007.

[54] **Portable GNSS Baseband Logging**, Morgan Quigley, Pieter Abbeel, Dave S. De Lorenzo, Yi Gu, Sara Bolouki, Dennis Akos, and Andrew Y. Ng. In *Institute of Navigation (ION) GNSS Conference*, 2007.

[55] **Peripheral-Foveal Vision for Real-time Object Recognition and Tracking in Video**. Stephen Gould, Joakim Arfvidsson, Adrian Kaehler, Benjamin Sapp, Marius Meissner, Gary Bradski, Paul Baumstarck, Sukwon Chung and Andrew Y. Ng. In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.

[56] **Probabilistic Mobile Manipulation in Dynamic Environments, with Application to Opening Doors**. Anya Petrovskaya and Andrew Y. Ng. In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.

[57] **A Factor Graph Model for Software Bug Finding**. Ted Kremenek, Andrew Y. Ng and Dawson Engler. In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.

[58] **Depth Estimation using Monocular and Stereo Cues**. Ashutosh Saxena, Jamie Schulte and Andrew Y. Ng. In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.

[59] **Robotic Grasping of Novel Objects**. Ashutosh Saxena, Justin Driemeyer, Justin Kearns, Andrew Y. Ng. In *Advances in Neural Information Processing Systems 19 (NIPS2006)*, 2007.

[60] **An Application of Reinforcement Learning to Aerobatic Helicopter Flight**. Pieter Abbeel, Adam Coates, Morgan Quigley and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 19 (NIPS2006)*, 2007.

[61] **Efficient sparse coding algorithms, end-stopping and nCRF surround suppression**, Honglak Lee, Alexis Battle, Raina Rajat and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 19 (NIPS2006)*, 2007.

[62] **Map-Reduce for Machine Learning on Multicore**. Cheng-Tao Chu, Sang Kyun Kim, Yi-An Lin, YuanYuan Yu, Gary Bradski, Andrew Y. Ng and Kunle Olukotum. In *Advances in Neural Information Processing Systems 19 (NIPS2006)*, 2007.

[63] **Semantic taxonomy induction from heterogeneous evidence**. Rion Snow, Dan Jurafsky and Andrew Y. Ng. In *Proceedings of the 44th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2006. **(Best paper award.)**

[64] **Learning to grasp novel objects using vision**. Ashutosh Saxena, Justin Driemeyer, Justin Kearns, Chioma Osondu, and Andrew Y. Ng. In *International Symposium on Experimental Robotics (ISER)*, 2006.

[65] **Have we met? MDP based speaker ID for robot dialogue**. Filip Krsmanovic, Curtis Spencer, Daniel Jurafsky and Andrew Y. Ng. In *Proceedings of the Ninth International Conference on Spoken Language Processing (InterSpeech–ICSLP)*, 2006.

[66] **Using inaccurate models in reinforcement learning**. Pieter Abbeel, Morgan Quigley and Andrew Y. Ng. In *Proceedings of the Twenty-second International Conference on Machine Learning*, 2006.

[67] **Transfer learning by constructing informative priors**. Rajat Raina, Andrew Y. Ng and Daphne Koller. In *Proceedings of the Twenty-second International Conference on Machine Learning*, 2006.

[68] **From uncertainty to belief: Inferring the specification within**. Ted Kremenek, Paul Twohey, Godmar Back, Andrew Y. Ng and Dawson Engler. In *Proceedings of the 7th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, 2006.

[69] **Solving the problem of cascading errors: Approximate Bayesian inference for linguistic annotation pipelines**. Jenny Finkel, Chris Manning and Andrew Y. Ng. In *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2006.

[70] **Quadruped robot obstacle negotiation via reinforcement learning**. Honglak Lee, Yirong Shen, Chih-Han Yu, Gurjeet Singh, and Andrew Y. Ng. In *International Conference on Robotics and Automation (ICRA)*, 2006.

[71] **Bayesian estimation for autonomous object manipulation based on tactile sensors**. Anya Petrovskaya, Oussama Khatib, Sebastian Thrun, and Andrew Y. Ng. In *International Conference on Robotics and Automation (ICRA)*, 2006.

[72] **Efficient L1 Regularized Logistic Regression**. Su-In Lee, Honglak Lee, Pieter Abbeel, and Andrew Y. Ng. In *Proceedings of the Twenty-First National Conference on Artificial Intelligence (AAAI)*, 2006.

[73] **A dynamic Bayesian network model for autonomous 3d reconstruction from a single indoor image**. Erick Delage, Honglak Lee and Andrew Y. Ng. In IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2006.

[74] **groupTime: Preference-Based Group Scheduling**. Mike Brzozowski, Kendra Carattini, Scott R. Klemmer, Patrick Mihelich, Jiang Hu, Andrew Y. Ng. In *CHI 2006: ACM Conference on Human Factors in Computing Systems*, 2006.

[75] **Contextual search and name disambiguation in email using graphs**. Einat Minkov, William Cohen and Andrew Y. Ng. In *Proceedings of the Twenty-ninth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, 2006.

[76] **Learning Depth from Single Monocular Images**. Ashutosh Saxena, Sung Chung, and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 18 (NIPS2005)*, 2006.

[77] **Learning vehicular dynamics, with application to modeling helicopters**. Pieter Abbeel, Varun Ganapathi and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 18 (NIPS2005)*, 2006.

[78] **On Local Rewards and the Scalability of Distributed Reinforcement Learning**. J. Andrew Bagnell and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 18 (NIPS2005)*, 2006.

[79] **Meta-learning for text classification**. Chuong Do and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 18 (NIPS2005)*, 2006.

[80] **Fast Gaussian Process Regression using KD-trees**. Yirong Shen, Andrew Y. Ng and Matthias Seeger. In *Advances in Neural Information Processing Systems 18 (NIPS2005)*, 2006.

[81] **Spam deobfuscation using a hidden Markov model**. Honglak Lee and Andrew Y. Ng. In *Proceedings of the second Conference on Email and Anti-Spam (CEAS)*, 2005. **(Best student paper award.)**

[82] **Automatic single-image 3d reconstructions of indoor Manhattan world scenes**, Erick Delage, Honglak Lee and Andrew Y. Ng. In *Proceedings of the International Symposium on Robotics Research (ISRR)*, 2005.

[83] **Robust Textual Inference via Graph Matching**. Aria Haghighi, Andrew Y. Ng and Christopher Manning. In *Proceedings of the Human Language Technology Conference/Empirical Methods in Natural Language Processing (HLT-EMNLP)*, 2005.

[84] **Robust textual inference via learning and abductive reasoning**. Rajat Raina, Andrew Y. Ng and Christopher Manning. In *Proceedings of the Twentieth National Conference on Artificial Intelligence (AAAI-05)*, 2005.

[85] **High-speed obstacle avoidance using monocular vision and reinforcement learning**. Jeff Michels, Ashutosh Saxena and Andrew Y. Ng. In *Proceedings of the Twenty-first International Conference on Machine Learning*, 2005.

[86] **Exploration and apprenticeship learning in reinforcement learning**. Pieter Abbeel and Andrew Y. Ng. In *Proceedings of the Twenty-first International Conference on Machine Learning*, 2005.

[87] **Learning factor graphs in polynomial time & sample complexity**. Pieter Abbeel, Daphne Koller and Andrew Y. Ng. In *Proceedings of the Twenty-first Conference on Uncertainty in Artificial Intelligence (UAI)*, 2005.

[88] **Discriminative training of Kalman filters**. Pieter Abbeel, Adam Coates, Michael Montemerlo, Andrew Y. Ng and Sebastian Thrun. In *Proceedings of Robotics: Science and Systems*, 2005.

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[92] **Learning first-order Markov models for control**. Pieter Abbeel and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 17 (NIPS2004)*, 2005.

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[94] **Online bounds for Bayesian algorithms**. Sham Kakade and Andrew Y. Ng. In *Advances in Neural Information Processing Systems 17 (NIPS2004)*, 2005.

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[96] **Apprenticeship learning via inverse reinforcement learning**. Pieter Abbeel and Andrew Y. Ng. In *Proceedings of the Twenty-first International Conference on Machine Learning*, 2004.

[97] **Feature selection, L_1 vs. L_2 regularization, and rotational invariance**. Andrew Y. Ng. In *Proceedings of the Twenty-first International Conference on Machine Learning*, 2004.

[98] **Learning random walk models for inducing word dependency probabilities**. Kristina Toutanova, Christopher Manning and Andrew Y. Ng. In *Proceedings of the Twenty-first International Conference on Machine Learning*, 2004.

[99] **Online learning of pseudo-metrics**. Shai Shalev-Shwartz, Yoram Singer and Andrew Y. Ng. In *Proceedings of the Twenty-first International Conference on Machine Learning*, 2004.

[100] **Autonomous helicopter flight via reinforcement learning**. Andrew Y. Ng, H. Jin Kim, Michael Jordan and Shankar Sastry. In *Advances in Neural Information Processing Systems 16 (NIPS2003)*, 2004.

[101] **Policy search by dynamic programming**. J. Andrew Bagnell, Sham Kakade, Andrew Y. Ng and Jeff Schneider. In *Advances in Neural Information Processing Systems 16 (NIPS2003)*, 2004.

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[104] **On discriminative vs. generative classifiers: A comparison of logistic regression and naive Bayes**. Andrew Y. Ng and Michael Jordan. In *Advances in Neural Information Processing Systems 14 (NIPS2001)*, 2002.

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[109] **Convergence rates of the Voting Gibbs classifier, with application to Bayesian feature selection**. Andrew Y. Ng, & Michael Jordan. In *Proceedings of the Eighteenth International Conference on Machine Learning*, 2001.

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[111] **Algorithms for Inverse Reinforcement learning**. Andrew Y. Ng, and Stuart Russell. In *Proceedings of the Seventeenth International Conference on Machine Learning*. Morgan Kauffman, 2000.

[112] **Approximate inference algorithms for two-layer Bayesian networks**. Andrew Y. Ng, and Michael Jordan. In *Advances in Neural Information Processing Systems 12 (NIPS1999)*, 2000.

[113] **Policy search via density estimation**. Andrew Y. Ng, Ronald Parr and Daphne Koller. In *Advances in Neural Information Processing Systems 12 (NIPS1999)*, 2000.

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[115] **Policy invariance under reward transformations: Theory and application to reward shaping**. Andrew Y. Ng, Daishi Harada and Stuart Russell. In *Proceedings of the Sixteenth International Conference on Machine Learning*. Morgan Kauffman, 1999.

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[119] **Improving text classification by shrinkage in a hierarchy of classes**. Andrew McCallum, Ronald Rosenfeld, Tom Mitchell and Andrew Y. Ng,. In *Proceedings of the Fifteenth International Conference on Machine Learning*. Morgan Kauffman, 1998.

[120] **Preventing "overfitting" of cross-validation data**. Andrew Y. Ng. In *Proceedings of the Fourteenth International Conference on Machine Learning.* Morgan Kauffman, 1997.

[121] **An Information-Theoretic Analysis of Hard and Soft Assignment Methods for Clustering**. Michael Kearns, Yishay Mansour and Andrew Y. Ng. In *Proceedings of the Thirteenth Annual Conference on Uncertainty in Artificial Intelligence*, 1997.

[122] **An experimental and theoretical comparison of model selection methods**. Michael Kearns, Yishay Mansour, Andrew Y. Ng and Dana Ron. In *Proceedings of the Eighth Annual ACM Conference on Computational Learning Theory*, 1995.

Workshop and other papers

[123] **Apprenticeship learning for helicopter control**. Adam Coates, Pieter Abbeel and Andrew Y. Ng. In *Communications of the ACM*, Volume 52, 2009.

[124] **ROS: an open-source Robot Operating System**, Morgan Quigley, Brian Gerkey, Ken Conley, Josh Faust, Tully Foote, Jeremy Leibs, Eric Berger, Rob Wheeler, and Andrew Y. Ng. In *Proceedings of the ICRA Open-Source Software workshop*, 2009.

[125] **Learning to Open New Doors**, Ellen Klingbeil, Ashutosh Saxena, Andrew Y. Ng. In *Robotics Science and Systems (RSS) workshop on Robot Manipulation*, 2008.

[126] **STAIR: The STanford Artificial Intelligence Robot project**. Andrew Y. Ng, Stephen Gould, Morgan Quigley, Ashutosh Saxena and Eric Berger. In *Snowbird Learning Workshop* (extended abstract), 2008.

[127] **Integrating visual and range data for robotic object detection**, Stephen Gould, Paul Baumstarck, Morgan Quigley, Andrew Y. Ng and Daphne Koller. In *ECCV workshop on Multi-camera and Multi-modal Sensor Fusion Algorithms and Applications (M2SFA2)*, 2008.

[128] **Exponential family sparse coding with application to self-taught learning with text documents** Honglak Lee, Rajat Raina, Alex Teichman and Andrew Y. Ng. In *Proceedings of the ICML 2008 workshop on Prior Knowledge for Text and Language (PKTL)*, 2008.

[129] **Unsupervised discovery of structure for classification** Rajat Raina, Alexis Battle, Honglak Lee, Benjamin Packer and Andrew Y. Ng. In *Proceedings of NIPS2006 workshop on Learning when test and training inputs have different distributions*, 2006.

[130] **Learning 3-D Scene Structure from a Single Still Image**, Ashutosh Saxena, Min Sun, and Andrew Y. Ng. In *ICCV workshop on 3D Representation for Recognition (3dRR)*, 2007. **(Best paper award.)**

[131] **3-D Reconstruction from Sparse Views using Monocular Vision**. Ashutosh Saxena, Min Sun, and Andrew Y. Ng. In *ICCV workshop on Virtual Representations and Modeling of Large-scale environments (VRML)*, 2007.

[132] **Learning to grasp novel objects using vision**. Ashutosh Saxena, Justin Driemeyer, Justin Kearns, Chioma Osondu, and Andrew Y. Ng. In *Robotics: Science and Systems Workshop on Manipulation for Human Environments*, 2006.

[133] **Transfer learning by constructing informative priors**. Rajat Raina, Andrew Y. Ng and Daphne Koller. In *NIPS 2005 Workshop on Inductive Transfer*, 2005.

Non-refereed Papers

[134] **Reinforcement learning and apprenticeship learning for robotic control** (invited paper). Andrew Y. Ng. In *Proceedings of Algorithmic Learning Theory (ALT)*, 2006.

[135] **Data-intensive question answering**. Eric Brill, Jimmy Lin, Michelle Banko, Sue Dumais and Andrew Y. Ng. In *Proceedings of TREC-10*, 2001.

Courses taught

(Enrollment given in parentheses at end of each line.)

- Aut 09-10. CS229: Machine Learning (Enrollment: 277 students)
- Aut 09-10. CS221: AI: Principles & Techniques (159)
- Win 09-10. CS294A/CS294W: Deep Learning (Research project in AI) (26)
- Aut 08-09. CS229: Machine Learning (221)
- Win 08-09. CS221: AI: Princples & Techniques (138)
- Win 08-09. CS294A/CS294W: The STAIR Project (Research project in AI) (18)
- Win 07-08. CS294A/CS294W: The STAIR Project (Research project in AI) (11)
- Aut 07-08. CS221: AI: Principles & Techniques (92)
- Aut 07-08. CS229: Machine Learning (148)
- Spr 06-07. CS294A/CS294W: The STAIR Project (Research project in AI) (18)
- Aut 06-07. CS221: AI: Principles & Techniques (88)
- Aut 06-07. CS229: Machine Learning (137)
- Win 05-06. CS294B/CS294W: The STAIR Project (Research project in AI) (18)
- Aut 05-06. CS221: AI: Principles & Techniques (with Daphne Koller) (116)
- Aut 05-06. CS229: Machine Learning (156)
- Aut 04-05. CS221: AI: Principles & Techniques (119)

- Aut 04-05. CS229: Machine Learning (89)
- Spr 03-04. CS23N: Robotics and Machine Learning (with Geoffrey Gordon) (16)
- Win 03-04. CS229: Machine Learning (70)
- Win 02-03. CS229: Machine Learning (68)
- Aut 02-03. CS221: AI: Principles & Techniques (103)

Also started Stanford Engineering Everywhere (http://see.stanford.edu) project, which made about a dozen complete Stanford classes freely accessible on the web (including the machine learning class CS229).

Service

- Co-organizer, NIPS 2011 workshop on Deep Learning and Unsupervised Feature Learning.
- Co-organizer, NIPS 2011 workshop on Challenges in Learning Hierarchical Models: Transfer Learning and Optimization
- Co-organizer, NIPS 2010 workshop on Deep Learning and Unsupervised Feature Learning.
- NSF CISE (Computer and Information Science and Engineering) Advisory Committee, 2009-2011.
- Program Co-Chair, Uncertainty in Artificial Intelligence (UAI) conference, 2009.
- Guest editor, Autonomous Robots: Special Issue on Robot Learning, 2009.
- Associate Editor, Journal of Artificial Intelligence Research (JAIR), 2007-present.
- Senior Program Committee, Uncertainty in Artificial Intelligence (UAI) 2007, 2008.
- Editorial Board, Journal of Artificial Intelligence Research (JAIR), 2006-2007.
- Senior Program Committee/Area Chair, International Conference on Machine learning, 2004, 2007.
- Associate Editor, IEEE Robotics and Automation Society Conference Editorial Board (ICRA), 2006.
- Program Co-Chair, Conference on Email and Anti-Spam (CEAS), 2004.
- CEAS (Conference on Email and Anti-Spam) Steering Board, 2004-present.
- Program committee member (Area Chair), Neural Information Processing Systems, 2002, 2005.
- Co-chair, NIPS 2005 workshop on "Towards Human-level AI?"
- Area Chair, Robotics: Science and Systems, 2005.
- Also reviewer for: Journal of Machine Learning Research (2002-2006, 2008); Uncertainty in Artificial Intelligence (2000, 2001, 2004, 2008); Neural Information Processing Systems (2000-2008); International Joint Conference on Artificial Intelligence

(2001, 2003, 2005, 2007); IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (2007); International Conference on Computer Vision (ICCV) (2007) Robotics: Science & Systems (2007); Journal of Artificial Intelligence Research (1999-2002, 2006); International Conference on Robotics and Automation (2006); Journal of the ACM (2006); Neural Computation (2000, 2003, 2005, 2006); International Journal of Computer Vision (2006). International Journal of Robotics Research (2006). International Conference on Machine Learning (1999, 2003-2006); Journal of Field Robotics (2005). ACM SIGIR (information retrieval) conference, 2004; ACM Transactions on Internet Technology, (2003); Human Language Technology, (2003); Artificial Intelligence Communications (2001), International Joint Conference on Neural Networks, 2000; Machine Learning Journal, (1998, 1999, 2000).