

# Rajat Raina

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- RESEARCH INTERESTS      Statistical machine learning, especially unsupervised, semi-supervised and transfer learning. Large-scale AI systems. Applications to text processing, web data, computer vision, video, natural language processing, information retrieval. Optimization theory and algorithms.
- EDUCATION      ♦ **Stanford University.**  
Ph.D. in Computer Science, 2004 – June 2009 (expected).  
Dissertation: Self-taught Learning: Learning from Unlabeled Data.  
Research Advisor: Prof. Andrew Y. Ng.
- ♦ **Stanford University.**  
M.S. in Computer Science. Specialization: Artificial Intelligence, 2002–2004. GPA: 3.98/4.0.
- ♦ **Indian Institute of Technology, Kanpur, India.**  
B.Tech. in Computer Science and Engineering, 1998–2002. GPA: 9.7/10.0.
- RESEARCH EXPERIENCE      ♦ **Stanford University:** M.S./Ph.D. student, 2003–2009 (current).  
Conducted research with Prof. Andrew Ng, Prof. Daphne Koller, Prof. Christopher Manning and students across several research areas, including large-scale unsupervised learning, transfer learning, classification, natural language and text processing, computer vision and audio processing.
- ♦ **Microsoft Research:** Research Intern in the Machine Learning and Applied Statistics group, Jul–Sep 2006. Mentor: Joshua Goodman.  
Devised and implemented machine learning methods for detecting web spam using properties of linked webpages.
- ♦ **Google:** Intern, Jun–Sep 2004. Mentor: Vibhu Mittal.  
Worked with Google’s map-reduce infrastructure to design a method for automatic extraction of question-answer pairs from unstructured FAQ webpages.
- ♦ **EPFL** (Swiss Federal Institute of Technology), Switzerland: AI Lab Intern, May-Jul 2001.  
Implemented a software agent architecture using agent ontologies.
- RESEARCH PAPERS      ♦ Large-scale Deep Unsupervised Learning using Graphics Processors. Rajat Raina, Anand Madhavan, Andrew Y. Ng. *ICML 2009*.
- ♦ Exponential Family Sparse Coding with Application to Self-taught Learning. Honglak Lee, Rajat Raina, Alex Teichman, and Andrew Y. Ng. *IJCAI 2009*.  
Shorter version presented at *ICML 2008 Workshop on Prior Knowledge for Text and Language Processing*.
- ♦ Learning Large Deep Belief Networks using Graphics Processors. Rajat Raina, Andrew Y. Ng. *NIPS 2008 Workshop on Parallel Implementations of Learning Algorithms*
- ♦ Shift-invariant sparse coding for audio classification. Roger Grosse, Rajat Raina, Helen Kwong, and Andrew Y. Ng. *UAI 2007*.
- ♦ Self-taught learning: Transfer learning from unlabeled data. Rajat Raina, Alexis Battle, Honglak Lee, Benjamin Packer and Andrew Y. Ng. *ICML 2007*.  
Shorter version presented at *NIPS 2006 Workshop on Learning when Test and Training Inputs Have Different Distributions*.

- ◇ Efficient sparse coding algorithms. Honglak Lee, Alexis Battle, Rajat Raina, and Andrew Y. Ng. *NIPS 2006*.
- ◇ Constructing informative priors using transfer learning. Rajat Raina, Andrew Y. Ng, Daphne Koller. *ICML 2006*.  
Shorter version presented at *NIPS 2005 Workshop on Inductive Transfer*.
- ◇ Robust textual inference via learning and abductive reasoning. Rajat Raina, Andrew Y. Ng, Christopher D. Manning. *AAAI 2005*.
- ◇ Robust textual inference using diverse knowledge sources. Rajat Raina, Aria Haghighi, Christopher Cox, Jenny Finkel, Jeff Michels, Kristina Toutanova, Bill MacCartney, Marie-Catherine de Marneffe, Christopher D. Manning and Andrew Y. Ng. *PASCAL Recognizing Textual Entailment Challenge 2005*. (Top ranking system in the challenge on 1 of 2 official metrics.)
- ◇ Classification with hybrid generative/discriminative models. Rajat Raina, Yirong Shen, Andrew Y. Ng, Andrew McCallum. *NIPS 2003*.
- ◇ IITKanpurTigers Simulation Robot Soccer Team Description Paper. Akhil Gupta, Rajat Raina, Amitabha Mukerjee. *RoboCup 2002: Robot Soccer World Championships*.
- ◇ Towards a “Perfect” Dribbling Strategy for Robot Soccer. Akhil Gupta, Rajat Raina, Amitabha Mukerjee. *Computational Intelligence, Robotics and Autonomous Systems 2001*.

#### OTHER TALKS AND POSTERS

- ◇ **Poster** on “Exponential family sparse coding with application to self-taught learning with text documents” at *ICML 2008 Workshop on Prior Knowledge for Text and Language*.
- ◇ **Invited talk** at *NIPS 2007 Workshop on Principles of Learning Problem Design*.
- ◇ **Invited talk** at *NIPS 2007 Deep Learning Satellite Meeting*.
- ◇ **Poster** on “Self-taught learning” at *NIPS 2006 Workshop on Learning when Test and Training Inputs Have Different Distributions*.
- ◇ **Talk and poster** on “Transfer learning by constructing informative priors” at *NIPS 2005 Workshop on Inductive Transfer*.

#### STANFORD TEACHING EXPERIENCE

- ◇ **Head Teaching Assistant** for course on artificial intelligence (CS221) in Fall 2006 and Fall 2007. Responsibilities included coordinating 4 other teaching assistants, helping design class projects, supervising design of homeworks and exams, and leading televised discussion sections.
- ◇ **Teaching Assistant** for graduate-level course on machine learning (CS229) in Winter 2004. Responsibilities included assisting students with intensive research projects, and helping with grading and teaching.
- ◇ **Teaching Assistant** for graduate-level course on natural language processing (CS224N) in Spring 2004.
- ◇ **Teaching Assistant** for graduate-level course on Programming Languages (CS242), Fall 2003.

#### ACADEMIC SERVICE

- ◇ **NIPS Conference 2007**: Helped conference administration as the workflow master. Assisted the Program Chairs and Program Committee members during the paper submission and review process, and handled several other responsibilities, including implementing methods for assigning reviewers to papers. NIPS is one of the largest machine learning conferences, with over 1000 paper submissions.
- ◇ **Program Committee Member**: UAI 2007, CEAS 2004.
- ◇ **Reviewer**: Neural Computation, Transactions on Pattern Analysis and Machine Intelligence, NAACL-HLT, ICRA.
- ◇ **Mentoring**: Advised and mentored undergraduate students on research projects in the Undergraduate Research Internships program (CURIS) at Stanford in summer 2006 and 2007.

RELEVANT COURSEWORK	<p>Artificial Intelligence, Machine Learning (teaching assistant), Probabilistic Models in AI, Reasoning Methods in AI, Natural Language Processing (teaching assistant), Introduction to Robotics, Statistical Techniques in Robotics, Computer Vision, Machine Translation, Reputation Systems, Approximate Dynamic Programming.</p> <p>Data Structures, Advanced Algorithms, Randomized Algorithms.</p> <p>Mathematical Methods, Convex Optimization.</p> <p>Operating Systems, Computer Networks, Compilers, Database Systems.</p>
PROGRAMMING	<p>Proficient in C/C++, Java, Perl, Matlab, MPI, GPU programming with NVIDIA CUDA.</p>
HONORS AND AWARDS	<p>Represented IIT Kanpur at the ACM Inter-Collegiate Programming Contest (Asia Region).</p> <p>Certificate for Academic Excellence at IIT Kanpur, awarded to the top 5% students.</p> <p>Ranked 4th out of about 200,000 students in the all-India entrance exam for IIT undergraduate admissions.</p> <p>National Talent Search scholarship, awarded annually to about 500 students in India.</p>
MISC	<p>Member of Stanford Table Tennis team (current), IIT Kanpur Basketball team (1998-2001).</p>
REFERENCES	<p>Available upon request.</p>