

Ankit Anand

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PhD Student,

Indian Institute of Technology, Delhi

Research Interests

Abstractions in Artificial Intelligence (AI) and Machine learning (ML): I am keen towards finding efficient algorithms for problems in AI and ML by exploiting symmetries in problem domain, a technique popularly called as Lifting in context of graphical models. I am presently working on following projects :

- **Exploiting Abstractions in RL especially in Monte Carlo Tree Search Algorithms (MCTS):** We are working on reducing computation in online MDP solving algorithms like UCT by aggregating symmetric states and state-action pairs together. A paper on this work is ASAP-UCT .
- **Lifting Techniques for efficient inference in Markov Chain Monte Carlo (MCMC) methods :** We aim to utilize the underlying symmetry of states for efficient inference in popular Markov Chain Monte Carlo (MCMC) methods like Gibbs Sampling and Metropolis Hasting algorithms.

Academic Profile

2013-Present	PhD, Computer Science and Engineering Area: Artificial Intelligence and Machine Learning Advisors: Parag Singla and Mausam Indian Institute of Technology, Delhi CGPA 8.85/10.0
2011-2013	Master of Technology, Computational Science Advisors: Prof. S.K.Nandy and Dr. J.Lakshmi Indian Institute of Science, Bangalore CGPA 6.90/8.00 with S grade in Project
2006 - 2010	Bachelor of Engineering (Honors), Computer Science PEC University of Technology, Chandigarh CGPA 9.55/10.00

Publications

Under Submission at AISTATS-2016	Non-Count Symmetries in Boolean and Multi-Valued Prob. Graphical Models(With Parag Singla, Ritesh Noothigattu and Mausam)
IJCAI-2016 at New York, USA	Contextual Symmetries in Graphical Models(With Aditya Grover, Mausam and Parag Singla) <i>Awarded Best Paper at Statistical Relational AI (StaRAI) Workshop 2016</i>
ICAPS-2016 at London, UK	OGA-UCT: On the Go Abstractions in UCT (With Ritesh Noothigattu, Mausam and Parag Singla)
IJCAI-2015 at Buenos Aires, Argentina	ASAP-UCT: Abstraction of State-Action Pairs in UCT (With Aditya Grover, Mausam and Parag Singla)
AAMAS-2015 at Istanbul, Turkey	A Novel Abstraction Framework for Online Planning (Extended Abstract) (With Aditya Grover, Mausam and Parag Singla)
Master's thesis, 2013 at IISc Bangalore, India.	Adaptive Virtual Machine Placement supporting performance SLAs
5th IEEE-Cloudcom, 2013 at Bristol, United Kingdom.	Virtual Machine placement optimization supporting performance SLAs (With Dr. J. Lakshmi and Prof S.K. Nandy)
18th IEEE-ADCOM, 2012 at Bangalore, India.	Resource Usage monitoring for KVM based Virtual Machines (With Mohit Dhingra, Dr. J. Lakshmi and Prof S.K. Nandy)

Research and Work Experience

Visiting Scholar at Oregon State University, June 2016-Sep 2016	Visited Prof Alan Fern's Planning and Reinforcement Learning Group where we worked on Abstractions in Monte Carlo Tree Search. We proposed an integrated framework to incorporate State, Action and Temporal Abstractions in MCTS algorithms. We also aim to develop an iterative refinement procedure to refine our initial abstractions so that given more time, better solutions are obtained
Teaching Assistant, IIT Delhi, New Delhi Aug,2013- Present	Probabilistic Graphical Models, Natural Language Processing, Artificial Intelligence, Discrete Structures, Introduction to Computer Science
Software Engineer, Samsung Electronics Pvt Ltd, Noida June-2010 -April 2011	Worked on C++ based Samsung Handset Platform (SHP) for mobile software for Samsung Wave. Also, led application development for BADA platform(C++ based) where by developed Connect-4 game for Samsung Bada App store.
Research Intern, Computer Graphics Lab-IIT Delhi June-July, 2009	Completed a project titled "Recognition of Model and Color of Cars" where by implemented and compared behaviour of SIFT and various Affine invariant object recognition algorithms and finally optimized parameters for given conditions.
Research Intern, Central Scientific Instruments Organization, Chandigarh June-July, 2008	Studied and implemented JPEG encoding and decoding and there by use it to do steganography in JPEG images, proposed a novel technique for steganography in JPEG images, the work was published in proceedings of Eclectica (a Technical Magazine), PEC Chapter.

Academic Achievements

- Awarded **Tata Consultancy Services PhD Fellowship** for duration of 4 years from 2014-Present.
- Awarded a **Commendation Letter by Chairman, SERC** in appreciation of performance in M.Tech Programme at Supercomputer Education and Research Centre, IISc, Bangalore.
- Secured **All-India 99.89 percentile in Graduate Aptitude Test in Engineering (GATE 2010)**, Computer Science stream among more than 100,000 students.
- Awarded **Merit Scholarship by Punjab Engineering College** for being among top 5 percent students from 1st to 6th semester during BE (2006-2010).
- Awarded **National Talent Search Examination (N.T.S.E)** Scholarship by N.C.E.R.T, Delhi in 2004.
- Selected among top-50 in state for participation in **Central Programme on Youth for Leadership in Science,(C.P.Y.L.S)** sponsored by ministry of H.R.D, Govt. of India.

Course Projects

Active Learning in Recommender System	A course project in ML course where we implemented and analyzed various techniques such as minimum variance, collaborative filtering and matrix factorization for the MovieLens dataset and suggested some novel ideas which led to improvements in prediction ratings.
Space Filling Curves for Load Balancing in a Grid Environment	A course project in Parallel Programming which involved implementation of different space filling curves like Hilbert ordering and Morton ordering in a Grid structure and divided the non-uniformly distributed load based on these curves among multiple processors and calculated the cross-processor interaction in different distribution cases.
Portfolio Management in Stocks using PCA	A course project in Numerical Linear Algebra which involved finding co-relations between Bombay Stock Exchange (BSE) SENSEX stocks and finding a better portfolio based on Principal Component Analysis on last 1 year data. The project also involved finding eigen values and comparison of different eigen value computation algorithms which was a bottleneck in this work.

References

Mausam, Associate Professor, Indian Institute of Technology, Delhi, mausam@cse.iitd.ac.in
Parag Singla, Assistant Professor, Indian Institute of Technology, Delhi, parags@cse.iitd.ac.in