Anuj Mahajan

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Research Interests

1 Deep Learning
2 Reinforcement Learning
3 Optimization

Publications

Matthew Fellows*, Anuj Mahajan*, Tim GJ Rudner, and Shimon Whiteson. VIREL: A variational inference framework for reinforcement learning. In *infer2control workshop*. 2018 **[NeurIPS]**.

Anuj Mahajan and Theja Tulabandhula. Symmetry detection and exploitation for function approximation in deep RL. In *Sixteenth International Conference on Autonomous Agents and Multiagent Sytems*. 2017 **[AAMAS]** *extended abstract*, also selected for 2017 **[RLDM]**.

Happy Mittal, Anuj Mahajan, Vibhav G Gogate, and Parag Singla. Lifted inference rules with constraints. In *Advances in Neural Information Processing Systems 28*, pages 3501–3509. Curran Associates, Inc., 2015 **[NeurIPS]**.

Anuj Mahajan, Sharmistha Jat, and Shourya Roy. Feature selection for short text classification using wavelet packet transform. In *Proceedings of the Nineteenth Conference on Computational Natural Language Learning*, pages 321–326. Association for Computational Linguistics, 2015 **[CoNLL]**.

Education

2017– **Doctor of Philosophy in Computer Science**, *University of Oxford*, U.K., Supervisor: Prof. Shimon Whiteson.

2015–2016 **Master of Technology in Computer Science & Engg**, *Indian Institute of Technology*, Delhi, .

2011–2015 **Bachelor of Technology in Computer Science & Engg**, *Indian Institute of Technology*, Delhi, .

* Equal contribution

Master thesis

Title ***Exploring new techniques for MAP Inference in MRFs***

Supervisors Dr.Parag Singla, Dr.Chetan Arora

Description Finding efficient algorithms for solving multi-label, higher order Energy Minimization problems for exact & approximate Maximum a Posteriori inference. These problems find application in fields like Computer Vision and Bioinformatics.The work focused on Graph Cut methods and involved the following:

- Proposal of novel algorithm Lazy Multi Label Generic Cuts
- Proposal of an algorithm for approximate MAP inference in binary pairwise MRFs via electic cut approximation

Technical skills

Python, Java, C/C++, Prolog, SQL, Ocaml, Assembly

Tensor Flow, Pytorch, Docker, Matlab, Mathematica, Knime, Android, web2py, Eigen, OpenAI Gym

Relevant Courses

Advanced Machine Learning, Computational Learning theory, Machine Learning, Probabilistic Graphical Models, Adv. Algorithms, Data Mining, Computer Vision, Theory of Computation, Computational Biology, Numeric & Scientific Computing

Experience

Teaching

2019 **Teaching Assistant**.

TA for Reinforcement Learning course floated in Hilary term for Doctoral students in Autonomous Intelligent Machines and Systems(AIMS), University of Oxford.

2015-16 **Teaching Assistant**.

TA for undergrad and graduate bridge courses. The work included taking demos for assignments, conducting help sessions and grading answer sheets. TA-ship courses:

- Machine Learning (COL774) Spring semester 2015-16.
- Computer Networks (COL334) Fall semester 2015-16.

Industrial

2016-17 **Research Scientist**, *Xerox Research Centre* .

Worked in the Machine Learning and Statistics Group in the following areas:

- Deep Learning with Dr.Theja Tulabandhula
  - Learning symmetries for sample efficient Reinforcement learnring.
- Probabilistic Graphical Models with Dr.Narayanan Unny
  - Finding a boosting framework for training Restricted Boltzmann Machines.
  - Analyzing dynamic pricing policy for public transport systems.
- Ranking for Dueling Bandits with Dr.Arun Rajkumar
  - Using structural properties of the tournament graph of preference matrices having low rank under link transformations for efficient ranking.
- Personalizing applications based on usage with Saurabh Shrivastava
  - Using deep learning for modeling disease dynamics and care from user behavior collected from mobile application.
  - filed for a patent in USA, ID No 1169.0161

2014 **Research Intern**, *Xerox Research Centre*.

Worked on developing feature selection methods and improving the accuracies of machine learning algorithms for short text data like tweets. Developed new method "IADWPT" for feature selection.

- filed for a patent in USA, ID No 14.864.977

Scholarships

1 Awarded Google Deepmind Scholarship 2017-20 for doctoral studies at University of Oxford.

2 Awarded Drapers Hertford graduate Scholarship 2017-20 for doctoral studies at University of Oxford.

3 Awarded Microsoft Student Travel Grant for presenting research paper at CoNLL 2015, Beijing, China.

4 Awarded Microsoft Student Travel Grant for presenting research paper at NIPS 2015, Montreal, Canada.

5 Kishore Vaigyanic Protsahan Yojana(KVPY) fellowship awarded by the Department of Science and Technology, Government of India.(Given to 400 fellows chosen from around one million applicants)

6 Awarded Indian National Association of Engineers (INAE) grant 2015.

7 National Talent Search Examination(NTSE) fellowship awarded by NCERT, Department of Education, Government of India.(500 scholars chosen from around one million applicants)

Awards & Achievements

1 IITD Semester Merit Award : Received the prestigious IITD merit award for fall and spring semester 2011-12 given to top 5% students in the institute.

2 Winner, Microsoft 'code.fun.do' : Programming event organized by Microsoft on 16-17/02/2013

3 Won the Award of Excellence in Australian National Chemistry Quiz(ANCQ) for securing All India Rank - 1 for three consecutive years (2006-08)

4 Represented the state at Indian National Mathematics Olympiad and Astronomy Olympiad.

5 Secured 8th position in the Regional Mathematical Olympiad, 2008 organized by NBHM, Government of India.

6 Best Research Poster award at the Xerox open house 2014 poster presentation event.