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Aditya Modi

Overview

My core area of research is reinforcement learning with focus on efficient exploration and sample-efficient interactive learning. Broadly, I'm interested in developing methods with provable guarantees for interactive learning frameworks like **reinforcement learning, (contextual) bandits, active learning and general online learning**. Further, I'm passionate about the real-world applications of RL and have working experience in popular deep learning frameworks as well.

Education

Sept '16-Present **PhD, Computer Science**, *University of Michigan*, Ann Arbor.
Advisors: Satinder Singh and Ambuj Tewari

Aug '12- May '16 **Bachelor of Technology**, *Indian Institute of Technology*, Kanpur, *GPA – 9.4/10.0*.
Major: Computer Science

Publications/Preprints

Under review **Model-Free Representation Learning and Exploration in Low-rank MDPs**.
Aditya Modi*, Jinglin Chen*, Akshay Krishnamurthy, Nan Jiang, Alekh Agarwal [arxiv]
**Equal contribution*.

ICML 2020 **Clinician-in-the-Loop Decision Making: Reinforcement Learning with Near-Optimal Set-Valued Policies**.
Shengpu Tang, **Aditya Modi**, Michael Sjoding, Jenna Wiens [link]
International Conference on Machine Learning (ICML), 2020.

UAI 2020 **No-regret Exploration in Contextual Reinforcement Learning**.
Aditya Modi and Ambuj Tewari [link]
Conference on Uncertainty in Artificial Intelligence (UAI), 2020
Abridged version accepted to ICML 2019 wkshp on RL for Real Life and RLDM 2019.

AISTATS 2020 **Sample Complexity of Reinforcement Learning with Linearly Combined Model Ensembles**.
Aditya Modi, Nan Jiang, Ambuj Tewari, Satinder Singh [link]
International Conference on Artificial Intelligence and Statistics (AISTATS), 2020.

AAAI 2020 **Meta-Reasoning in Modular Software Systems via Reinforcement Learning**.
A. Modi, D. Dey, A. Agarwal, A. Swaminathan, B. Nushi, S. Andrist, E. Horvitz [link]
AAAI Conference on Artificial Intelligence (AAAI), 2020
Invited poster at *ICML 2019 Workshop on Reinforcement Learning for Real Life*

ALT 2018 **Markov Decision Processes with Continuous Side Information**.
Aditya Modi, Nan Jiang, Satinder Singh, Ambuj Tewari [link]
International Conference on Algorithmic Learning Theory (ALT) 2018

Research Experience

July-Oct 2018 **Research Intern**, *Microsoft Research*, Redmond.
Optimizing modular software pipelines via Reinforcement Learning
Mentors: Debadeepta Dey, Eric Horvitz

Worked on the application of contextual bandit, learning to search and policy search methods to input-adaptive parameter/algorithm selection across components in any modular software pipeline. Work published in AAAI 2020.

Sept-Dec 2016 **Research Assistant**, *University of Michigan*, Ann Arbor.
Data-dependent Importance weighted Active Learning
Advisors: Ambuj Tewari and Barzan Mozafari

Studied the sample complexity of importance-weighted active learning (IWAL) algorithms based on data-dependent complexity measures for bounded loss functions.

May-July 2015 **Research Intern**, *Microsoft Research*, Bangalore, India.
Active Semi-supervised Performance Evaluation
Advisor: Sundararajan Sellamanickam, Principal Applied Scientist. [Report]

Proposed an estimation method for performance measures of black-box classifiers using scarcely labelled datasets for various non-decomposable performance measures (ROC curve, PR curve, F-measure).

Scholastic Achievements

2013, 2015 Academic Excellence Award, IIT Kanpur.

2014 Ram Parkash Chopra Memorial Scholarship, given for academic excellence, IIT Kanpur.

2013-15 Honourable mention in **ACM ICPC Asia Amritapuri** (2014-15, 2013-14) and **Kanpur regionals** (2013-14).

2013 O.P. Jindal Engineering and Management scholarship (awarded to select few candidates from top eng. and management institutes in India)

2012 Secured All India Rank 132 in IIT-JEE 2012 out of 0.5 million candidates.

2012 Secured All India Rank 150 in AIEEE 2012 out of 1.2 million candidates.

Talks/Presentations

March 2021 **Model-free Representation Learning and Exploration in Low-rank MDPs**.
RL Theory virtual seminar series. [Link]

Contextual Reinforcement Learning: Learning optimal intervention policies for a heterogeneous population.
Canadian Operations Research Society (CORS) annual conference, 2021
Speed Oral and poster, Mich. Student Symp. on Interdisciplinary Statistical Sciences (MSSISS) 2019
Oral presentation, MSSISS 2018

Teaching experience

Winter 2017 **Graduate Student Instructor**, EECS 445 - Machine Learning, Univ. of Michigan.

Winter 2016 **Student Mentor**, CS 771 - Machine Learning Techniques, IIT Kanpur.

Fall 2015 **Teaching Assistant**, ESO 207 - Data Structures and Algorithms, IIT Kanpur.

Professional Services and Participation

Program Committee/reviewer AAAI 2019, AISTATS 2019-21, ALT 2020, ICML 2019-21 (2020*), NeurIPS 2019-20 (2019,20*)

* **Top reviewer award**

Fall '20 Long term participant in Simons Institute' (UC Berkeley) program on Theory of Reinforcement Learning

2017, 2018 Co-organizer, Statistical Machine Learning Reading group, Univ. of Michigan.

Relevant Coursework

Theory Advanced Algorithms, Computational Complexity, Algorithmic Game Theory, Approximation Algorithms

Statistics Statistical Inference, Probability Theory, Large Sample Theory, Applied Probability and Stochastic Modeling.

Machine Learning/AI Machine Learning Techniques, Learning with Kernels, Online Learning and Optimization, Probabilistic Machine Learning, Optimization Methods in Statistics, Advanced Artificial Intelligence, Applied Game Theory.