

### Overview

My research interests broadly lie in machine learning and statistics. Specifically, I'm interested in theoretical underpinnings of interactive learning and sequential decision making frameworks like reinforcement learning, bandits and active learning.

### Education

- 2016-Present **PhD, Computer Science**, *University of Michigan*, Ann Arbor, GPA – 3.95/4.00.  
Advisors: Satinder Singh and Ambuj Tewari
- 2012-2016 **Bachelor of Technology**, *Indian Institute of Technology*, Kanpur, GPA – 9.4/10.0.  
Major: Computer Science

### Publications/Preprints

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

### Research Experience

- Sept-Dec 2016 **Research Assistant**, *University of Michigan*, Ann Arbor.  
**Data-dependent Importance weighted Active Learning**  
Advisors: Ambuj Tewari and Barzan Mozafari
- We explored the direction of importance-weighted active learning (IWAL) algorithms based on data-dependent complexity measures for bounded loss functions. We identified key issues in symmetrization and other approaches for the analysis of IWAL for hypothesis classes with bounded VC dimension. Our preliminary results for the analysis were based upon a sample based cover argument motivated by the VE algorithm in contextual bandits literature.
- May-July 2015 **Research Intern**, *Microsoft Research*, Bangalore, India.  
**Active Semi-supervised Performance Evaluation**  
Advisor: Sundararajan Sellamanickam, Principal Applied Scientist. [Report]
- Our work develops an estimation method for performance measures of black-box classifiers in a scarcely labelled data setting. We proposed a semi-supervised density estimation method for class-score estimation based on entropy regularization. Experiments were undertaken on various non-decomposable performance measures (ROC curve, PR curve, F-measure) with varying proportion of labelled examples. Finally, a comparison is also pulled out between existing approaches and our work.

### Selected Projects

- Sept-Dec 2015 **Local Latent Perceptrons for Large Scale Multiclass Learning.**  
Research Project under Vinay Namboodiri, IIT Kanpur  
We formulated a latent perceptron model inspired from Locally Linear SVM (LLSVM) and a mixture of experts model. [Mid-term Report]

- Winter 2016 **Active optimization of ranking surrogates.**  
 Course Project under Purushottam Kar, IIT Kanpur  
 Combined a selective sampling scheme with online algorithms for optimizing precision@k measure for bipartite ranking. [Report]
- Winter 2016 **Stochastic methods for MCMC.**  
 Course Project under Piyush Rai, IIT Kanpur  
 Explored variance reduction techniques in stochastic optimization for stochastic gradient Langevin dynamics (SGLD) method. [Report]
- Fall 2016 **Asynchronicity and delay in distributed stochastic optimization.**  
 Course Project under Long Nguyen, University of Michigan  
 Investigated the delay tolerance of stochastic optimization methods based on recent advances in the literature. [Report]
- Winter 2017 **Data-efficient off-policy policy evaluation for reinforcement learning.**  
 Course Project under Satinder Baveja, University of Michigan  
 Replication of ICML 2016 paper by Thomas *et al.* undertaken for Advanced AI course project. [Report]
- Fall 2017 **Crowdsourcing: A triad of learning, information elicitation and aggregation.**  
 Course Project under Grant Schoenebeck, University of Michigan  
 Surveyed and explored the generic crowd-sourcing problem in sequential decision making framework with game-theoretic view of information elicitation. [Report]

## Awards and Achievements

- May 2016 Travel Scholarship for MLSS Cadiz, 2016.
- 2014-15 Academic Excellence Award, IIT Kanpur.
- 2014 Ram Parkash Chopra Memorial Scholarship, given for academic excellence.
- 2013 OP Jindal Engineering and Management Scholarship, given to around 100 students from top engineering and management institutes from India.
- 2012-13 Academic Excellence Award, IIT Kanpur.
- 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.

## 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.

## Activities

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

## Relevant Coursework

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|---------------------|---|
| Theory              | Algorithms - II, Computational Complexity, Algorithmic Game Theory  |
| Statistics          | Statistical Inference, Probability Theory, Large Sample Theory, Applied Probability and Stochastic Modeling.  |
| Machine Learning/AI | Machine Learning, Learning with Kernels, Online Learning and Optimization, Probabilistic Machine Learning, Optimization Methods in Statistics, Advanced Artificial Intelligence, Applied Game Theory. |