

Rajat Sen

CONTACT INFORMATION

On Request,

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INTERESTS

Online Learning, Causal Inference, Interpretability, Scheduling Systems

EDUCATION

The University of Texas at Austin

Ph.D. in Electrical Engineering(Com-Net-Sys)

August. 2013 - Present

- Advisor : [Prof. Sanjay Shakkottai](#)
- GPA : Major - **4.00**, Overall - **3.96**

Indian Institute of Technology, Kharagpur

B.Tech in Electrical Engineering

2009 - 2013

- Cumulative GPA : **9.24/10**
- Graduated ranked 5th out of 90 students.

HONOURS AND AWARDS

- Jagadish Bose National Science Talent Search (JBNSTS) senior scholar.
- INLAKS IIT Kharagpur Scholar, 2011: Only **3** students were selected from all 6 IITs.
- Secured All India Rank **251** in IIT joint entrance examination 2009(out of about 3,50,000 candidates).
- Received certificate of distinction in Indian National Mathematics Olympiad (INMO 2009).
- DAAD WISE Scholar, 2012.
- Awarded Certificate of merit in National Standard Examination in Physics (NSEP) 2008-2009 for being in the Top **1** % out of 34707 candidates appearing.

PUBLICATIONS

- Sen R, Shanmugam K, Dimakis AG, Shakkottai S. Identifying Best Interventions through Online Importance Sampling. To appear in ICML 2017.
- Sen R, Shanmugam K, Kocaoglu M, Dimakis AG, Shakkottai S. Contextual Bandits with Latent Confounders: An NMF Approach. AISTATS 2017.
- Krishnasamy S, Sen R, Johari R, Shakkottai S. Regret of Queueing Bandits. InAdvances in Neural Information Processing Systems 2016 (pp. 1669-1677).
- Krishnasamy S, Sen R, Shakkottai S, Oh S. Detecting Sponsored Recommendations. ACM Transactions on Modeling and Performance Evaluation of Computing Systems (TOMPECS). 2016 Nov 18;2(1):6.
- Khalid, A.; Sen, R.; Chattopadhyay, A., SI-DFA: Sub-expression integrated Deterministic Finite Automata for Deep Packet Inspection, High Performance Switching and Routing (HPSR), 2013 IEEE 14th International Conference on , vol., no., pp.164,170, 8-11 July 2013

PROJECTS AND INTERNSHIPS

Data Science Intern

(May 2016 - August 2016)

[Amplero](#), Seattle, Washington.

- Worked on bandit optimization in a marketing platform that delivers targeted messages and offers to millions of client customers with advanced segmentation.
- Proposed algorithmic improvements to the machine learning platform that combines specialized decision trees and Thompson sampling. The decision trees are reconditioned from optimization data using techniques from causality.
- Proposed novel variance prediction techniques for samples generated from bagged trees.
- Created a statistical test suite for verifying the correctness and predicting future performance.

Identifying Best Interventions through Online Importance Sampling (Dec 2016 - Present)

WNCG, UT Austin.

- Designed a successive reject strategy for best soft intervention identification (using importance sampling to capture information leakage among the interventions), with applications in online ad placement and biological gene regulatory networks.
- Performed empirical validation on the Flow-cytometry dataset and also used it for interpretability of Inception v3 deep network (Python code-base available on request).

Contextual Bandits with Latent Confounders

(May 2016 - Oct 2016)

WNCG, UT Austin.

- Proposed a contextual bandit model with latent confounding contexts lying in lower dimension.
- Designed a non-negative matrix factorization based bandit algorithm with close to optimal regret guarantees. These are the first regret guarantees for matrix factorization with bandit feedback with rank greater than one.
- Implemented the algorithm in python and showed superior performance on MovieLens and Book Crossing data-sets when compared to baseline algorithms.

Bandit Algorithms for Queueing Systems

(May 2015 - May 2016)

WNCG, UT Austin.

- Developed scheduling algorithms for a stochastic switch network with semi-bandit feedback which gives first of its kind finite time queue length guarantees, with applications in wireless scheduling and crowd sourcing.
- We provide matching lower bounds and simulate results on large scale $K \times K$ switch networks.
- Currently working on extending it to a scenario where convex mixtures of matchings can be scheduled.
- Github Link : https://github.com/rajatsen91/queueing_bandit

Detecting Sponsored Recommendations

(November 2014 - August 2015)

WNCG, UT Austin.

- Designed an algorithm to detect bias of a recommendation engine towards certain sponsored items disguised as recommendations.
- Developed a model to describe a wide range of recommendation systems.
- Provided theoretical guarantees on the performance of the algorithm against various parameters like the number of users, the fraction of biased recommendations and the number of items.
- Simulated the performance of the algorithm on movielens, netflix and amazon datasets, with encouraging results. Accepted as a poster in Sigmetrics 2015.
- Github Link : https://github.com/rajatsen91/recoSYS_matlab

Kaggle Santander Customer Satisfaction Prediction

(Mar 2016 - May 2016)

WNCG, UT Austin

- Participated in kaggle competition to predict customer satisfaction using banking data. <https://www.kaggle.com/c/santander-customer-satisfaction>
- Performed extensive feature engineering and exploratory data analysis.
- Trained a combination of classifiers like Logistic regression, Gradient boosted trees, Random forests with appropriate cross-validation.
- Achieved a private score of 0.827286 in one of our submissions which could have landed us at rank 140 in the private leader board.
- Github Link : <https://github.com/rajatsen91/santander.git>

TEACHING
EXPERIENCE

Teaching Assistant, EE 351K - Probability and Stochastic Processes
University of Texas at Austin

Fall 2013

RELEVANT
COURSEWORK

- **Graduate Courses:** Probability and Stochastic processes, Randomized algorithms, Combinatorics and Graph Theory, Data Mining and Predictive Learning, Markov Chains and Mixing times, Large-scale Optimization, Theory of Probability, Advanced Algorithms, Information Theory
- **MOOC:** Big Data using Spark(edX), Scalable Machine Learning using Spark(edX)

TECHNICAL
SKILLS

- **Programming Languages:** C, C++, Python (Sklearn, Pandas, Numpy, PySpark), Tensorflow, R, MATLAB
- **Documentation:** LaTeX, MS Word