

Rajat Sen

CONTACT INFORMATION	2501 Speedway, C0803, EER - 6.836 Austin, Texas, 78712	Phone: (512)-998-9551 Email: rajat.sen@utexas.edu Homepage : Link
INTERESTS	Online Learning, Causal Inference, Interpretability, Scheduling Systems	
EDUCATION	The University of Texas at Austin <i>Ph.D. in Electrical Engineering(Com-Net-Sys)</i> August. 2013 - Present <ul style="list-style-type: none">Adviser : Prof. Sanjay ShakkottaiGPA : Major - 4.00, Overall - 3.96 Indian Institute of Technology, Kharagpur <i>B.Tech in Electrical Engineering</i> 2009 - 2013 <ul style="list-style-type: none">Cumulative GPA : 9.24/10Graduated ranked 5th out of 90 students.	
HONORS AND AWARDS	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Sen, R., Suresh, A.T., Shanmugam, K., Dimakis, A. G., & Shakkottai, S. (2017). Model-Powered Conditional Independence Test. arXiv preprint arXiv:1709.06138. (Preprint - Accepted for publication in NIPS, 2017)Sen, R., Shanmugam, K., Dimakis, A.G. & Shakkottai, S.. (2017). Identifying Best Interventions through Online Importance Sampling. Proceedings of the 34th International Conference on Machine Learning (ICML, 2017)Sen, R., Shanmugam, K., Kocaoglu, M., Dimakis, A. & Shakkottai, S.. (2017). Contextual Bandits with Latent Confounders: An NMF Approach. Proceedings of the 20th International Conference on Artificial Intelligence and Statistics (AISTATS, 2017)Krishnasamy, S., Sen, R., Johari, R., & Shakkottai, S. (2016). Regret of Queueing Bandits. In Advances in Neural Information Processing Systems (NIPS, 2016) (pp. 1669-1677).Krishnasamy, S., Sen, R., Shakkottai, S., & Oh, S. (2016). Detecting Sponsored Recommendations. ACM Transactions on Modeling and Performance Evaluation of Computing Systems (TOMPECS), 2(1), 6. (A shorter version appeared as a poster paper in ACM Sigmetrics, 2015.)Khalid, A., Sen, R., & Chattopadhyay, A. (2013, July). Si-dfa: Sub-expression integrated deterministic finite automata for deep packet inspection. In High Performance Switching and Routing (HPSR), 2013 IEEE 14th International Conference on (pp. 164-170). IEEE.	
PROJECTS AND INTERNSHIPS	Data Science Intern Amplero , Seattle, Washington. <ul style="list-style-type: none">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.	(May 2016 - August 2016)

Model-Powered Conditional Independence Test

(Feb 2017 - Present)

WNCG, UT Austin

- Created a robust Conditional Independence tester by reducing the problem to binary classification
- Contains novel analysis of classification generalization bounds in the presence of *near*-i.i.d samples
- Python Package: <https://github.com/rajatsen91/CCIT>

Identifying Best Interventions through Online Importance Sampling

(Dec 2016 - Feb 2017)

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 Queuing 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 switch networks.

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.
- Github Link : https://github.com/rajatsen91/recosys_matlab

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 Tools:** Python (Sklern, Pandas, Numpy, PySpark), PyTorch, C, C++, MATLAB
- **Documentation:** LaTeX, MS Word