

Saurabh Sihag

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RESEARCH INTERESTS Broadly interested in statistical learning, information theory, high-dimensional statistics, and optimization.

EDUCATION **Rensselaer Polytechnic Institute, Troy, NY** Aug. 2016 - present
Doctor of Philosophy, Electrical Engineering
Dissertation Title: Statistical Learning and Inference over Networks
Advisor: Prof. Ali Tajer

Indian Institute of Technology, Kharagpur, India Jul. 2011 - May 2016
Bachelor of Technology and Master of Technology, Electrical Engineering
Dissertation Title: Object Recognition using Multi-resolution Deep Belief Networks
Advisor: Prof. Pranab K. Dutta

PROFESSIONAL EXPERIENCE **Research Intern** Fall 2018 and Summer 2019
IBM Thomas J. Watson Research Center, Yorktown Heights, NY
Mentor: Dr. James Kozloski, Computational Neuroscience and Brain Modeling Group

PUBLICATIONS **Journal Papers**

- J9 S. Sihag and A. Tajer, “Structure Learning of Similar Graphical Models: Ising and Gaussian Models”, (to be submitted to *IEEE Transactions on Information Theory*)
- J8 S. Sihag, J. Heydari and A. Tajer, “Sequential Parameter Estimation in Networked Data”, (to be submitted to *IEEE Transactions on Information Theory*)
- J7 S. Sihag, A. Tajer, and U. Mitra, “Multi-stage Group Testing for Network Anomaly Detection”, (in preparation, to be submitted to *IEEE Transactions on Signal Processing*)
- J6 S. Sihag, S. Naze, F. Taghdiri, C. Tator, R. Green, B. Colella, M. Khodadadi, K. Blennow, H. Zetterberg, L. Dominguez, R. Wennberg, D. Mikulis, C. Tartaglia, J. Kozloski, “Functional Brain Signals Constrained by Structural Brain Connectivity Predict Serum Neurofilament Light Chain” (in preparation)
- J5 S. Sihag and A. Tajer, “Secure Estimation under Causative Attacks”, *IEEE Transactions on Information Theory*, 2020.
- J4 S. Sihag, S. Naze, F. Taghdiri, C. Tator, R. Wennberg, D. Mikulis, R. Green, B. Colella, M.C. Tartaglia, J. Kozloski, “Multimodal Dynamic Brain Connectivity Analysis Based on Graph Signal Processing for Former Athletes with History of Multiple Concussions”, *IEEE Transactions on Signal and Information Processing over Networks*, 2020.
- J3 A. Tajer, S. Sihag, K. Alnajjar, “Non-linear state recovery in power system under bad data and cyber attacks”, *Journal of Modern Power Systems and Clean Energy*, vol. 7, pp. 1071-1080, Sep. 2019.
- J2 S. Sihag and A. Tajer, “Optimal Network Parameter Estimation: Single-shot Exchange of Local Decisions”, *IEEE Signal Processing Letters*, vol. 26, no. 9, pp. 1280-1284, Jun. 2019.
- J1 S. Sihag and A. Tajer, “Power System State Estimation under Model Uncertainty”, *IEEE Journal of Selected Topics in Signal Processing*, vol. 12, no. 4, pp. 593-606, Aug. 2018.

Conference Papers

- C12 S. Sihag, B. Varici and A. Tajer, “Learning shared structures in Ising model pairs” (submitted to *Conference on Neural Information Processing Systems (NeurIPS)*, 2020.)
- C11 S. Sihag and A. Tajer, “Approximate Recovery Of Ising Models with Side Information”, in Proc. *IEEE International Symposium on Information Theory*, 2020. (Accepted for publication)
- C10 S. Sihag and A. Tajer, “Structure Learning with Side Information: Sample Complexity”, in Proc. *Conference on Neural Information Processing Systems (NeurIPS)*, 2019.
- C9 S. Sihag, S. Naze, F. Taghdiri, M.C. Tartaglia, J. Kozloski, “GSP Analysis of Brain Imaging Data from Athletes with History of Multiple Concussions”, in Proc. *IEEE Global Conference on Signal and Information Processing*, 2019.
- C8 S. Sihag and A. Tajer, “Structure Learning of Similar Ising Models: Information-theoretic Bounds”, in Proc. *IEEE International Symposium on Information Theory*, Jul. 2019, Paris, France.
- C7 S. Sihag and A. Tajer, “Secure Estimation under Causative Attacks”, in Proc. *IEEE International Symposium on Information Theory*, Jul. 2019, Paris, France.
- C6 S. Sihag and A. Tajer, “Sample Complexity of Joint Structure Learning”, in Proc. *IEEE International Conference on Acoustics, Speech and Signal Processing*, May 2019, Brighton, UK.
- C5 S. Sihag and A. Tajer, “Non-Linear State Estimation in Power Systems under Model Uncertainty”, in Proc. *IEEE Global Conference on Signal and Information Processing*, Nov. 2018, Anaheim, CA.
- C4 S. Sihag and A. Tajer, “Scalable Network Parameter Estimation in the Presence of Anomalies”, in Proc. *IEEE International Conference on Acoustics, Speech and Signal Processing*, Apr. 2018, Calgary, Canada.
- C3 S. Sihag and A. Tajer, “Distributed Estimation under Network Model Uncertainty”, in Proc. *IEEE International Conference on Acoustics, Speech and Signal Processing*, Apr. 2018, Calgary, Canada.
- C2 S. Sihag, J. Heydari and A. Tajer, “Sequential Estimation of Distributed Parameters in Networks”, in Proc. *Conference on Information Sciences and Systems*, Mar. 2018, Princeton, NJ.
- C1 S. Sihag and A. Tajer, “Secure Parameter Estimation: Fundamental Tradeoffs”, in Proc. *IEEE Global Conference on Signal and Information Processing*, Nov. 2017, Montreal, Canada.

SKILLS AND COURSEWORK

Languages and Packages

Python (data analysis/ML packages including Tensorflow, Keras, Pandas, OpenCV), Matlab

Relevant Courses

- Information Theory
- Probabilistic Graphical Models
- Machine Learning
- Intro. to Stochastic Signals
- Bandit Algorithms
- Convex Optimization
- Large-scale Optimization
- Detection and Estimation Theory
- Mathematical Analysis
- Stochastic Processes and Modeling

HONORS AND ACCOMPLISHMENTS

- Baliga fellowship by ECSE, RPI (2016-17).
- Ranked 881 among ~450,000 candidates in JEE for admission to UG programs at the Indian Institutes of Technology (2011).

TRAVEL GRANTS

- Conference on Neural Information Processing Systems (NeurIPS), 2019
- IEEE International Symposium on Information Theory, 2019
- IEEE Global Conference on Signal and Information Processing, 2018

**PEER
REVIEWING****Journals**

IEEE Transactions on Signal Processing, IEEE Transactions on Communications, IEEE Transactions on Smart Grid, Journal of Alzheimer's Disease

Conferences

IEEE International Symposium on Information Theory, IEEE Sensor Array and Multichannel Signal Processing Workshop, NeurIPS