

# Dushyant Sahoo

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## EDUCATION

2017 - 2022 **University of Pennsylvania, Philadelphia, PA, U.S.A.**

Ph.D. in Electrical and Systems Engineering, Adviser: Prof. Christos Davatzikos

A.M. in Statistics (Dual Degree)

Coursework: Principles of Deep Learning, Convex Optimization, Non-convex optimization, Mathematical Statistics, Advanced Linear Algebra, Mathematics in Data Science

2011 - 2016 **Indian Institute of Technology, Delhi, India**

M.Tech. in Information and Communication Technology, Adviser: Prof. Rahul Garg

B.Tech. in Electrical Engineering (Dual Degree)

367 rank in IIT-Joint Entrance Exam amongst 0.5 million candidates, KVPY Scholarship

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## INDUSTRY AND RESEARCH EXPERIENCE

June'22 - Current **Accelerating option pricing using Deep Learning**, *ML Scientist, JP Morgan Chase & Co.*

- Developed novel ML based variance reduction method for Monte Carlo computation of option prices, resulting in 30x speedup in option pricing in Heston and HJM model
- Implemented using Tensorflow & GPU, resulting in total 600x speedup

Aug'17 - May'22 **Robust Latent Hierarchical Factors in Human Brain**, *Ph.D. Thesis*

- Developed deep matrix factorization method to extract hierarchical low rank latent models
- Solved problem using alternating minimization and adaptive gradient descent (AMSgrad)
- Improved the generalizability of factors using adversarial learning in unsupervised regime
- Incorporated domain adaptation to extract shared factors from multiple sources
- Extracted robust latent factors based biomarkers for Major Depressive Disorder

Aug'20 - Current **Early Stopping can Improve Langevin Dynamics Sampling**, *A.M. Thesis*

- Work motivated by implicit regularization of stochastic gradient flow for least squares
- Developed computationally efficient method to sample from log-concave functions

Aug'16 - Feb'17 **Sparse Causality Patterns**, *Research Internship, University of Pennsylvania*

- Developed matrix factorization based causality analysis to estimate sparse causal links
- Solved the non-convex optimization problem using proximal alternating minimization
- Reduced run time from two days to 4 hours through CUDA based implementation

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## PUBLICATIONS

### REFEREED CONFERENCES

- **D. Sahoo** and C. Davatzikos, “Learning Robust Hierarchical Patterns of Human Brain across Many fMRI Studies”, *Neural Information Processing Systems (NeurIPS) 2021*
- **D. Sahoo** and S. Dan “Variance Reduced Stochastic Proximal Algorithm for AUC Maximization”, *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2021*
- **D. Sahoo**, N. Honnorat and C. Davatzikos, “Sparse low-dimensional causal modeling for the analysis of brain function”, oral presentation at *Medical Imaging: Image Processing (SPIE) 2019*
- **D. Sahoo**, N. Honnorat and C. Davatzikos, “GPU accelerated extraction of sparse Granger causality patterns” oral presentation at *International Symposium on Biomedical Imaging (ISBI) 2018*

- S. Ramachandrula, M. Hambarde, A. Patial, **D. Sahoo** and S. Kochar, “Offline handwritten word recognition using MQDF-HMMs”, *Document Recognition and Retrieval (SPIE) 2015*
- N. Narendra, **D. Sahoo**, P. Reddy, A. Varghese, K. Kumar, M. Chandra and P. Balamuralidhar, “On using error correction for Mobile Augmented Reality applications”, *International Conference on Signal Processing, Communication and Networking (ICSCN) 2015*

## JOURNALS

- **D. Sahoo** and C. Davatzikos, “Hierarchical extraction of functional connectivity components in human brain using resting-state fMRI”, *IEEE Transactions on Medical Imaging 2020*
- A. Saha, X. Yu, **D. Sahoo** and M. Mazurowski, “Effect of MRI scanner parameters on breast cancer radiomics and radiogenomics”, *Expert systems with applications 2017*

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## PROGRAMMING SKILLS & TOOLS

Skills Python, C++, Bash, CUDA, MATLAB, R  
 Tools scikit-learn, numpy, scipy, pandas, TensorFlow

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## REVIEWER

Journal IEEE TMI  
 Conference AISTATS, ICLR, MICCAI, NeurIPS

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## TEACHING

Fall 2020 Principles of Deep Learning (University of Pennsylvania)  
 Spring 2017 Machine Learning (University of Pennsylvania)  
 Spring 2016 Advanced Functional Brain Imaging (IIT Delhi)  
 Fall 2015 Compressive Sensing (IIT Delhi)