Deepak Maurya

Personal Data

Research Interests: Theoretical Machine Learning
web page: https://d-maurya.github.io
Google Scholar: Link
Email: dmaurya@purdue.edu

Education

2021 - Present	**Purdue University**, PhD in Computer Science, GPA: 4.0/4.0 Advisor: Prof. Chris Clifton and Prof. Jean Honorio
2018 - 2021	**Indian Institute of Technology**, Madras, Chennai, India Master of Science in Computer Science & Engineering Thesis: Spectral Hypergraph Theory Advisors: Prof. Balaraman Ravindran, Prof. Shankar Narasimhan
2011-2016	**Indian Institute of Technology**, Madras, Chennai, India M.Tech & B.Tech - Dual Degree in Electrical Engineering Thesis: Identification of Linear Dynamic Systems using Dynamic Iterative PCA Advisors: Prof. Arun K. Tangirala, Prof. Shankar Narasimhan

Awards

- Summer research grant by Purdue graduate school for summer 2023 and summer 2024
- Best Student Paper at Indian Control Conference 2019
- Travel grant and registration fees to attend KDD 2019
- Travel grant to attend CoDS-COMAD 2020 and ICC 2019.

Publications

4.1 Accepted

1. HEAL: Unlocking the Potential of Learning on Hypergraphs Enriched with Attributes and Layers, Naganand Yadati, Tarun Kumar, **Deepak Maurya**, Partha Talukdar, Balaraman Ravindran, Learning on Graphs Conference, LoG 2023, [Paper]
2. Hypergraph Partitioning using Tensor Eigenvalue Decomposition, **Deepak Maurya**, Balaraman Ravindran, PLOS ONE, 2023, [Paper]
3. Identification of Errors-in-Variables ARX Models Using Modified Dynamic Iterative PCA, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, Journal of the Franklin Institute, 2022; 359(13):7069-90 [Paper]
4. Dynamic Iterative Principal Components Analysis for Closed-loop, Model Identification, IFAC-PapersOnLine, 55(1):393-8, Richa Katare, **Deepak Maurya**, Ravindra D Gudi, ACODS 2022, [Paper]
5. Hyperedge Prediction using Tensor Eigenvalue Decomposition, **Deepak Maurya**, Balaraman Ravindran, Journal of the Indian Institute of Science, 101(3):443-53, [Paper]
6. ARX Model Identification using Generalized Spectral Decomposition, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, In 24th International Symposium on Mathematical Theory of Networks and Systems (MTNS 2020), [Paper]
7. Optimal Filtering and Residual Analysis in Errors-in-variables Model Identification, Vipul Mann, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan. Industrial & Engineering Chemistry Research. 2020;59(5):1953-65. [Paper], [Code]
8. Identification of MISO Systems in Minimal Realization Form, Chaithanya K. Donda, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, IFAC-PapersOnLine, 53(1), pp.141-146, [Paper] [Slides].

9. Identification of Output-Error (OE) Models using Generalized Spectral Decomposition, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, In Fifth Indian Control Conference (ICC 2019) (pp. 28-33), IEEE. Won the Best Student Paper Award. [Paper], [Code], [Slides]
10. Identification of Errors-in-Variables Models Using Dynamic Iterative Principal Component Analysis, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, Industrial & Engineering Chemistry Research. 2018;57(35):11939-54. [Paper], [Code]
11. Identification of Linear Dynamic Systems using Dynamic Iterative Principal Component Analysis, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, IFAC-PapersOnLine, 49(7), pp.1014-1019. [Paper], [Code], [Slides]

4.2 Manuscript Under Preparation / Submission

1. An Efficient Certification of Graph Isomorphism on Selected Graph Classes, **Deepak Maurya**, Balaraman Ravindran, Srinivasan Parthasarathy
2. Minimax Optimal Rates For Robust GLMs Against Constant Proportion of Identifiable Outliers, **Deepak Maurya**, Jean Honorio
3. Outlier-robust Estimation of a Sparse Linear Model Using Invexity, Adarsh Barik, **Deepak Maurya**, Jean Honorio, [arXiv link]
4. On the true geometry and sample complexity of outlier-robust sparse precision matrix estimation, **Deepak Maurya**, Jean Honorio
5. A Novel Plug-and-Play Approach for Adversarially Robust Generalization, **Deepak Maurya**, Adarsh Barik, Jean Honorio, [arXiv link]
6. A Theoretical Study of The Effects of Adversarial Attacks on Sparse Regression, **Deepak Maurya**, Jean Honorio, [arXiv link]
7. Partial Inference in Structured Prediction, Chuyang Ke, **Deepak Maurya**, Jean Honorio, [arXiv link]

Industrial Experience

Data Scientist
July to Nov 2016

Mad Street Den, Chennai, Mentor: Dr. Aravindakshan Babu
Key Performance Indicators - Predictiors and Optimizers
Prediction of multiple key performance indicators (KPIs) like the number of page-views, add-to-carts for any e-commerce website. We implemented various efficient and scalable time series models using data tables package in R. This helped us to improve user engagement and the number of products bought from the e-commerce website.

Project Associate
May to Dec 2017

IIT Madras, Chennai, Mentor: Prof. Raghunathan Rengaswamy
Aluminium Smelting Furnace
Trained a classification and regression model to predict the pot leaks and temperature inside an aluminum smelting furnace, which has been successfully deployed. It helped us to reduce the downtime of furnace and hence enhance profitability. This project was done in collaboration with General Electric Global Research.

Teaching

- Teaching assistant at Purdue University
  1. CS 182: Foundations of Computer Science during Spring 2023, Fall 2023 (Dev-TA), and Spring 2024 (co-head TA)
  2. CS 578: Statistical Machine Learning during Spring 2022
  3. CS 314: Numerical Methods during Fall 2021, Fall 2022 and Fall 2024
- Teaching assistant for a MOOC course on Introduction to ML offered on NPTEL during July-Oct 2019, Jan-Apr 2020, and July-Dec 2020 enrolled by 20K, 30K, and 40K students respectively.

- Teaching assistant for course on Introduction to Research offered at IIT Madras during Jan-May 2019 semester.

Service

- Reviewer for Neurips 2024, ICLR 2025, AISTATS 2025, ICASSP 2025.
- I gave a talk on tensor data analysis in the data science summer school 2024 at IIT Madras. Talk available at this link.
- Co-organizer for Graphs & more Complex structures for Learning & Reasoning (GCLR) workshop held at AAAI 2024, AAAI 2023, AAAI 2022, and AAAI 2021.
- Volunteer for AAAI 2021, AISTATS 2021, and CoDs-COMAD 2021.

Scholastic Achievements

- All India Rank in **top 0.64%** in AIEEE 2011 attempted by **1.12M** candidates.
- All India Rank in **top 0.92%** in IIT-JEE 2011 attempted by **485K** candidates.
- All India Rank 451 in **top 0.36%** in GATE 2015 attempted by **126K** candidates.

Relevant Coursework

- Machine Learning Theory
- Hands on Learning Theory
- Randomized Algorithms
- Data Mining
- Probability, Statistics and Stochastic Process
- Nonlinear optimisation: Theory and algorithms
- Multivariate Data Analysis
- Applied Time Series Analysis
- System Identification
- Probabilistic Graphical Models