Deepak Maurya

Personal Data

Research Interests: Theoretical Machine Learning
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Education

2018 - 2021 (Expected)
Indian Institute of Technology, Madras, Chennai, India
Master of Science in Computer Science & Engineering, CGPA: 8.2 out of 10 (India)
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, CGPA: 7.72 out of 10 (India)
Thesis: Identification of Linear Dynamic Systems using Dynamic Iterative PCA
Advisors: Prof. Arun K. Tangirala, Prof. Shankar Narasimhan

Awards

- Best Student Paper at Indian Control Conference 2019
- Travel grant of $500 and student registration of $490 to attend KDD 2019
- Travel grant to attend CoDS-COMAD 2020 and ICC 2019, covering all expenses

Publications

4.1 Accepted

1. ARX Model Identification using Generalized Spectral Decomposition, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, To appear in 24th International Symposium on Mathematical Theory of Networks and Systems (MTNS 2020), [arXiv link]
2. 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]
3. 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]
4. Hypergraph Partitioning using Tensor Eigenvalue Decomposition, **Deepak Maurya**, Balaraman Ravindran, Shankar Narasimhan, Accepted for a poster presentation in Sets and Partitions workshop in NeurIPS 2019. [Poster], [arXiv link]
5. Hyperedge Prediction using Tensor Eigenvalue Decomposition, **Deepak Maurya**, Balaraman Ravindran, Shankar Narasimhan, Accepted for a poster presentation in Tensor Methods for Emerging Data Science Challenges (TMEDSC) workshop in KDD 2019. [Slides]
6. 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]
7. 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]
8. 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. Degree-corrected SBM for Hypergraphs, **Deepak Maurya**, Balaraman Ravindran
2. An Efficient Certification of Graph Isomorphism on Selected Graph Classes, **Deepak Maurya**, Balaraman Ravindran, Srinivasan Parthasarathy
3. HEAL: Embedding Multi-layer Hypergraphs. Naganand Yadati, Tarun Kumar, **Deepak Maurya**, Partha Talukdar, Balaraman Ravindran
4. Identification of Errors-in-Variables ARX Models Using Modified Dynamic Iterative PCA, **Deepak Maurya**, Arun K. Tangirala, Shankar Narasimhan, [arXiv link]
5. Least squares methods in a Nutshell, **Deepak Maurya**, Shankar Narasimhan
6. Incorporating prior knowledge about structural constraints in model identification, **Deepak Maurya**, Sivadurgaprasad chinta, Abhishek Sivaram, Raghunathan Rengaswamy, [arXiv link]

Research Projects

MS Thesis
Jan 2018 to Present

Spectral Hypergraph Theory
Guide : Prof. Balaraman Ravindran, Prof. Shankar Narasimhan
Utilizing the Laplacian spectrum of hypergraphs represented using tensors for various learning tasks such as hypergraph partitioning, hyperedge prediction, and graph isomorphism. The preliminary version of first two works are accepted in workshops held at NeurIPS 2019, KDD 2019 and the extended version is under review.

M.Tech Thesis
June 2015 to May 2016

Identification of Linear Dynamic Systems using Dynamic Iterative PCA
Guide : Prof. Arun K. Tangirala, Prof. Shankar Narasimhan
The work is concerned with identifying linear dynamic models from data that have errors in both outputs and inputs, popularly known as errors-in-variables (EIV) problem. We developed a novel approach in the principal component analysis framework which provides unbiased model estimates in an automated manner with minimal user intervention.

Service

- Co-organizer for Graphs & more Complex structures for Learning & Reasoning (GCLR) workshop held at AAAI 2021.
- Reviewer for ECML-PKDD 2020, ACODS 2018, 2020, ADCOM 2018, ICC 2019.
- 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.

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.

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.