

Education

BS-MS : Indian Institute of Science Education and Research

Bhopal

Major in Data Science & Engineering — Minor in EECS, **9.01/10 GPA**

Aug 2019 - May 2024

- **Coursework (Major):** Optimization, AI, Data Structures, Discrete Mathematics, Econometrics, Game Theory, Linear Algebra, Multivariable Calculus, Probability, Statistics, DS-ML, Algorithms, Databases, Computer Vision, Deep Learning, NLP, Spatial Data Science, Cloud Computing, Accelerated AI.
- **Coursework (Minor):** Theory of Computation, Computer Networks, Software Modelling, Process Mining, Network Science.
- **Relevant Course Projects:** PCL Detection, Effects of Sampling on the HSIC Dependence Measure, Algorithms for Fire Evacuation Planning, Counterfactual Generation Analysis, Identifying Crimes in Chicago, Leadership Romanticisation in Sports

Publications and Preprints

1. *[Journal]* Constantinou A, Kitson NK, Liu Y, Chobtham K, Amirkhizi AH, **Nanavati PA**, Mbuva R, Petrungaro B. *Open problems in causal structure learning: A case study of COVID-19 in the UK* Expert Systems with Applications. 2023 Dec 30;234:121069.
2. **Nanavati P**, Prasad R. *CLIMAX: An exploration of Classifier-Based Contrastive Explanations*. In 2023 IEEE 5th International Conference on Cognitive Machine Intelligence (CogMI) 2023 Nov 1 (pp. 49-58). IEEE.
3. **Nanavati P**, Nanavati AA. *Bowlership: Examining the Existence of Bowler Synergies in Cricket*. In International Conference on Complex Networks and Their Applications 2023 Nov 28 (pp. 124-133). Cham: Springer Nature Switzerland.
4. *[Preprint]* **Nanavati P**, Prasad R and Shanmugam K, 2025. Representation Learning Preserving Ignorability and Covariate Matching for Treatment Effects. arXiv preprint arXiv:2504.20579.
5. *[Preprint In Progress]* Das N, **Nanavati P**, Sharma M, Deshpande A, Shiragur K ‘*Cost-Effective Fairness Audit under Partial Feedback: A Learning Theoretic Approach*’
6. *[Preprint In Progress]* Madhavan R, **Nanavati P**, Shanmugam K, ‘*Debiasing LLMs via Causal Mediation Analysis*’

Research Experience

Indian Institute of Science, Bangalore

Bangalore

Project Assistant, Dept. of Computer Science and Automation, Advised by Dr. Siddharth Barman

Aug 2024 - Apr 2025

- I am currently working on two projects in causal fairness analysis:
 1. Designing causal regularizers through mediation analysis in order to debias LLMs.
 2. Minimizing sample complexity while auditing fairness in decision making systems.

Indraprastha Institute of Information Technology, Delhi

New Delhi

MS Thesis, Advised by Dr. Ranjitha Prasad, Dr. Karthikeyan Shanmugam (Google Deepmind)

Sep 2023 - Apr 2024

- We propose a method for estimating treatment effects for non-ignorable covariates in the presence of confounding [Preprint 4].
 1. Confounding is reduced via Inter-Domain Gradient Matching (IDGM), selection bias is reduced using covariate matching.
 2. We further theoretically justify that performing IDGM helps in isolating the causal effect.

Institut national de la recherche scientifique, Montreal

Montréal

MITACS Summer Research Intern, Advised by Dr. Leszek Szczecinski

May 2023 - Jul 2023

- I worked on modeling game outcomes based on individual skills in sports leagues such as the NFL and NHL:
 1. I worked as a backend developer to maintain a website showcasing game outcomes and predictions.
 2. I implemented a probabilistic algorithm for draws within the elo-davidson rating algorithm using kalman filtering.

Bayesian Artificial Intelligence Research Lab, QMUL

London

Visiting Researcher, Advised by Dr. Anthony Constantinou

Oct 2022 - Mar 2023

- I implemented algorithms for structure learning of causal DAGs from observational data [**Publication 1**].
 1. This involved cleaning and clustering unlabeled data, and
 2. Literature survey of various combinatorial and continuous optimization-based structure learning algorithms.

Indraprastha Institute of Information Technology, Delhi

New Delhi

BS Thesis, Advised by Dr. Ranjitha Prasad

Jan 2023 - Apr 2023

- We proposed CLIMAX, a post-hoc explainable technique. [**Publication 2**].
 1. We achieve better consistency and fidelity as compared to the available baselines (LIME and its derivatives) across modalities.
 2. Further, we propose influence subsampling in order to retaining effective samples and hence ensure sample complexity.

Indraprastha Institute of Information Technology, Delhi

New Delhi

Summer Research Intern, Advised by Dr. Ranjitha Prasad

May 2021 - Jul 2021

- Worked with ML Interpretability methods to gain insights in learning causal DAGs.
 1. I learnt about Causal inference and its applications in Explainable AI.
 2. We tried to incorporate influence functions in DAG Learning frameworks.

Awards

Accelerating Statistical Inference and Experimental Design with Machine Learning

Cambridge

Travel grant recipient, Invited Poster, Isaac Newton Institute, University of Cambridge

Jun 2025

Student Volunteer at The 39th Conference on Uncertainty in Artificial Intelligence

Pittsburgh

Travel Grant, sponsored by AUAI

Aug 2023

Student Volunteer at The 35th Annual Conference on Learning Theory

London

Travel Grant, sponsored by Deepmind

Jul 2022

Professor Ram Kumar Scholarship Recipient

Bangalore

Invited participant at GAME-ARTS Workshop, Indian Institute of Science

Jul 2024

Learning Experience

CODS-COMAD – 2024

Bangalore

Invited Student Participant and Student Travel Grant Recipient

Jan 2024

Summer Institute in Computational Social Science at IIITH

Hyderabad

Invited Student Participant

Jul 2022

ACM Winter School – FAccT, Sponsored by IBM Research

Bangalore

Invited Student Participant

Jan 2021

Students' Undergraduate Research Conference – Azim Premji University

Bangalore

Invited Student Participant and Poster Presenter [**Publication 3**]

Dec 2019

Interest & Technical Skills

Programming : Python, C, C++, Unix, SQL, Latex

Frameworks : Pytorch, Tensorflow, Keras

Professional Contributions

1. **Reviewer:** European Conference on Artificial Intelligence (ECAI), 2023
2. **Invited Talk:** 'Causality and Network Science': ACM Winter School on Network Science, 2024.
(<https://rb.gy/5vbdbp>)

Positions of Responsibility

Founding Chair

Bhopal

ACM Student Chapter at IISERB

Oct 2021 - Oct 2022

Head Of Outreach

Bhopal

Enthuzia : IISERB's Cultural Fest

May 2021 - Apr 2022

Member

Bhopal

Student Development Council

Apr 2020 - Feb 2021