Nakul Upadhya

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Education

University of Toronto (St. George) | Toronto, ON, CA   **Aug. 2022 – Current**
PhD in Mechanical and Industrial Engineering

- **Advisor**: Eldan Cohen (OptiMaL Lab @ UofT)
- **Thesis**: Approaches to Intrinsically Interpretable Machine Learning via Shape Functions
- **Research Areas**: Explainable AI, Model-Based Interpretability, Deep Learning,

Purdue University | West Lafayette, IN, US   **Aug. 2018 – May 2022**
Bachelors of Science in Industrial Engineering

Publications

- **Upadhya, N.**, Cohen, E. (2025). Empowering Decision Trees via Shape Function Branching. *39th Conference on Neural Information Processing Systems.* [paper] [code]
- **Upadhya, N.**, Cohen, E. (2024). NeurCAM: Interpretable Neural Clustering via Additive Models. *27th European Conference on Artificial Intelligence.* [paper] [code]
- Song, Q. C., Shin, H. J., **Upadhya, N.**, & Teo, T. (2023). Technology and Measurement in Asia. *Technology and Measurement around the Globe.* Cambridge University Press. [paper]

Professional Experience

GEMINI Medicine | Toronto, ON, CA   **March 2024 - Current**
PhD Researcher - Industry Partner

- Developed machine learning models to predict delirium in hospitalized patients using retrospective data from over 5,000+ patients, achieving high performance with only 15 clinical features chosen through iterative feature selection.
- Performed fairness analysis across various Ontario Marginalization Index axes, mitigating equalized-odds differences between advantaged and disadvantaged subgroups.

Konica Minolta | Toronto, ON, CA   **Aug. 2022 - June 2025**
PhD Researcher - Industry Partner

- Developed a full end-to-end quality prediction system using multivariate sensor time-series data, including a novel multi-task Neural GAM architecture for ordinal defect forecasting.
- Built a correlation-graph-based feature reduction pipeline that removed redundant sensors and improved both model sparsity and interpretability.
- Designed and deployed interactive analytics dashboards that delivered real-time predictions and feature-level shape-function explanations to manufacturing engineers.

Kohl's Technology | Menomonee Falls, WI, USA   **May 2022 - Aug. 2022**
Data Scientist (Intern)

- Collaborated with the procurement and supply chain teams to develop integer programs for inventory allocation across all 512 Kohl's stores.
- Designed an automated customer segmentation engine leveraging T-SNE and Mini-Batch K-Means to provide valuable insights to the sales and marketing divisions.
- Deployed machine learning and optimization algorithms using Google Cloud Platform services such as Vertex AI and BigQuery.

Whirlpool Corporation | Benton Harbor, MI, USA   **May 2021 - Aug. 2021**
Supply Chain Analyst (Intern)

- Led requirement gathering sessions with cross-functional teams of process owners for Lodestar – the new manufacturing execution system responsible for managing the production of over 25 million units a year
- Developed and implemented data visualization dashboards displaying scheduling and yield information for work center team leaders across all 9 Whirlpool plants in North America

Equifax | Atlanta, GA, USA   **May 2019 - Aug. 2019**
Software Engineer (Intern)

- Collaborated on an Agile SCRUM Team to develop applications leveraging Java Spring Boot and AWS cloud computing capabilities like Lambda, and EC2 infrastructure.

Teaching Experience

Department of Mechanical and Industrial Engineering | Toronto, ON, CA
University of Toronto

- MIE 223 - Data Science | Tutorial TA | Winter 2025/2026
- MIE 350 - Design and Analysis of Information Systems | Lab TA | Fall 2022/2023
- MIE 253/353 - Data Modeling | Lab TA | Winter 2023, Fall 2024/2025

Data Science Institute | Toronto, ON, CA
University of Toronto

- M-Lab CARTE AI Workshop| Lab Instructor & Content Developer | Fall 2025
- DSI-CARTE Machine Learning Bootcamp | Lab TA | Summer 2023-2025, Fall 2023
- DSI-CARTE Post-Doctoral Deep Learning Bootcamp | Lab TA | Summer 2023

Talks and Presentations

- School of Cities Workshop: Intro to Explainable AI, July 2025.
- Summer Undergraduate Data Science Lecture: Intro to ML. June 2024, 2025
- Vector-Gemini Research Day Oral Presentation, June 2024
- NeurCAM: Neural Clustering via Additive Models:
  - Symbolic + Modern AI Seminar @ UofT - Oral Presentation. April, 2024.
  - 27th European Conference on Artificial Intelligence - Oral & Doctoral Consortium Presentation. October, 2024.