Pracheta Amaranath (she/her/hers)

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SUMMARY

Ph.D. Candidate in Computer Science at the University of Massachusetts Amherst with expertise in **causal modeling, simulation** and **machine learning**. My research focuses on constructing **interpretable and efficient causal metamodels** of discrete-event simulations. I also work on using **simulation-based inference** techniques to advance **causal inference algorithms**. Experienced in machine learning, generative modeling, and probabilistic reasoning, I aim to build frameworks that bridge **simulation, causal inference, and real-world decision-making**.

EDUCATION

University of Massachusetts Amherst — Amherst, MA
Ph.D. Candidate — Expected 2026
Dissertation: The Interface of Simulation and Causal Modeling (Advised by David Jensen and Peter Haas)

University of Massachusetts Amherst — Amherst, MA
M.S in Computer Science — 2018-2020

Rastreeya Vidyalaya College of Engineering — Bangalore, India
B.E in Electronics Engineering (Major: Telecommunications) — 2011-2015

SKILLS

- **Programming:** Python (expert), R, C++ (familiar), PyTorch, Tensorflow, JAX
- **Machine Learning:** Causal Inference, Deep Learning, Generative Modeling, Probabilistic and Graphical Modeling, Time-series Modeling, Bayesian Inference, Statistics
- **Simulation:** Discrete-event simulation modeling (Simpy, PySim)
- **Systems:** Experience working on HPC clusters (Slurm), Google Cloud, AWS

RESEARCH EXPERIENCE

University of Massachusetts Amherst — Amherst, MA
Graduate Researcher — September 2020 – Present

Science for AI Governance
- Analyzed the use of current methods to identify text written by LLMs in the context of public comments

Army Research Office – Devcom Analysis Center
- Designed a simulation model as a testbed for logistic networks pertaining to the transport of equipment
- Developed a simulation metamodel that can be used for efficient analysis of complex simulation models (P1)

Knowledge Discovery Lab
- Developed a causal metamodel to efficiently analyze conditional and interventional scenarios for Markovian discrete-event simulations (P1)
- Developed a framework using simulation-based inference and generative neural networks for generating synthetic data to evaluate causal effect estimation algorithms (P2)

DREAM Lab
- Developed an algorithm to estimate the prevalence of multiple chronic conditions using maximum entropy, frequent itemset mining and machine learning (P3)

PROFESSIONAL EXPERIENCE

Microsoft Research — Bengaluru, India
Visiting Scholar — November 2024 – January 2025
- Investigated the use of generative methods in evaluating causal effect estimation algorithms

Google X, The Moonshot Factory — Mountain View, CA
Research Intern — June 2023 – January 2024
- Designed and developed a simulation model to empirically evaluate a computational biology pipeline

EBSCO Information Services Ipswich, MA

Semantic Analysis and Modeling Intern May 2020 – August 2020

- Developed an algorithm to extract information of population and gender metadata from clinical text
- Improved the article classification capabilities for EBSCO's content database using topic modeling and polysemy detection

Massachusetts Dept. of Public Health Amherst, MA

Data Science for the Common Good Fellow May 2019 – August 2019

- Analyzed the impact of social determinants of health to assess risks for communities in Massachusetts

Cisco Systems (India) Bengaluru, India

Systems Engineer July 2015 – July 2018

- Responsible for solution design and testing of routing, switching, wireless, data center and network programmability for enterprise customers

PUBLICATIONS

P1. **Pracheta Amaranath**, Peter J. Haas, David Jensen, and Sam Witty. "Causal Dynamic Bayesian Networks for Simulation Metamodeling." In 2023 Winter Simulation Conference (WSC), pp. 746-757. IEEE, 2023.

P2. **Pracheta Amaranath**, Vinitra Muralikrishan, Amit Sharma, and David Jensen. "Improving Generative Methods for Causal Evaluation via Simulation-Based Inference." arXiv preprint arXiv:2509.02892 (2025)

P3. **Pracheta Amaranath**, Ninad Khargonkar, Prasanna Srinivasan, Roshan Thaikkat, Hari Balasubramanian, Peter J. Haas. "Estimating the Prevalence of Multiple Chronic Diseases via Maximum Entropy." (In progress).

P4. Laura B. Balzer, Erica Cai, Lucas Godoy Garraza and **Pracheta Amaranath**. "Adaptive Selection of the Optimal Strategy to Improve Precision and Power in Randomized Trials." Biometrics, Volume 80, Issue 1, March (2024)

P5. Katherine Avery, Jack Kenney, **Pracheta Amaranath**, Erica Cai, and David Jensen. "Measuring Interventional Robustness in Reinforcement Learning." arXiv preprint arXiv:2209.09058 (2022).

TEACHING EXPERIENCE

University of Massachusetts Amherst Amherst, MA

Graduate Teaching Assistant

- Introduction to Simulation Fall 2025
- Machine Learning Spring 2023
- Programming with Data Structures Fall 2020

LEADERSHIP AND SERVICE

- Reviewer: TMLR 2025
- Co-Founder., Voices of Data Science., University of Masschusetts Amherst
- Student Steering Committee, Researchers, Educators and Business Leaders of Massachusetts (REBLS), 2019-2020

AWARDS

- Paper on "Causal Dynamic Bayesian Networks for Simulation Metamodeling" was nominated for the **Best Theoretical Paper Award**, Winter Simulation Conference, 2023
- Awarded a "**Dissertation Proposal Writing Fellowship**", Fall 2024, Manning College of Information and Computer Sciences
- **Third-rank**, B.E., Rastreeya Vidyalaya College of Engineering, Bengaluru, 2015

CONFERENCE PRESENTATIONS

- (2021) INFORMS Annual Conference: Estimating the prevalence of Chronic Diseases using the principle of Maximum Entropy
- (2019) Women in Data Science - Central Massachusetts: Estimating Chronic Diseases using the principle of Maximum Entropy
- (2019) Data Science for the Common Good: Event Showcase (University of Massachusetts, Amherst): Assessing health risks for communities in Massachusetts (in collaboration with Mass. Dept. of Public Health and Data Science for Common Good)