Praveen Nair

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Research Interests

Algorithmic fairness & social impact, causal discovery & inference, active learning

Education

2022 – 2024	**University of California, San Diego** – La Jolla, CA **M.S., Computer Science and Engineering**. *GPA: 3.83.* Thesis: "Active Learning and Epistemic Defenses of Fairness." Advisor: David Danks.
2018 – 2022	**University of California, San Diego** – La Jolla, CA **B.S., Data Science**. *GPA: 3.961, Magna Cum Laude.* Minors in history & linguistics, concentration in political science

Research Experience

Sep 2023 - Present

ION-C: Integration of Overlapping Networks with Constraints

Work with David Danks, Sergey Plis.

Answer-set programming algorithm for causal discovery across datasets with overlapping variables. Designed batched simulations, implemented causal learning algorithms, analyzed results. Problem formulated in ASP system *clingo*, work in Python and Slurm. Currently on arXiv.

Thesis: Active Learning and Epistemic Defenses of Fairness

March 2023 - Jun 2024

Advisor: David Danks (Data Science & Philosophy).

Used active learning and causal modeling to demonstrate that differences in group characteristics and sizes can lead to large disparities in uncertainty when there is decision-dependent missingness of outcomes, with implications for many high-stakes decision-making problems. Used Bayesian causal modeling with r-blavaan, derived formula for infomax active learning in our setting.

June 2021 - June 2022

Stowers Lab, Scripps Research Institute. PI: Lisa Stowers.

Primarily, used tools such as DeepLabCut and B-SOID on remote computing cluster to develop computer vision pipeline for behavioral analysis of video. Supported multiple projects on neurological underpinnings of physiological arousal, scent marking, olfaction, and behavior.

June 2021 - December 2021

UC San Diego Computer Science & Engineering. PI: Christine Alvarado.

Studied effects of early undergraduate CS research program on students' senses of identity as researchers and computer scientists. Used thematic analysis methods on open-ended reflection data, as well as Python for preprocessing, analysis, and interrater reliability calculation.

October 2020 - June 2021

Qualcomm Institute @ UC San Diego. PI: Leanne Chukoskie.

Survey project about student experiences with engagement in online learning at UCSD during COVID-19 adjustments. Co-first-author of paper published in Frontiers in Education, designed survey questions, analyzed survey and course review dataset in R, wrote paper Results section

Publications

2024 **ION-C: Integration of Overlapping Networks via Constraints**
Praveen Nair, Payal Bhandari, Mohammadsajad Abavisani, Sergey Plis, David Danks.
arXiv preprint. https://arxiv.org/abs/2411.04243v1

2024 **Active Learning and Epistemic Defenses of Fairness.** (Master's thesis, UC San Diego.)
Praveen Nair. https://escholarship.org/uc/item/2hm001k0

2022 **Engagement in online learning: student attitudes and behavior during COVID-19**
Brooke Hollister*, **Praveen Nair***, Sloan Hill-Lindsay, Leanne Chukoskie. *(*co-first-author)*
Frontiers in Education. https://doi.org/10.3389/feduc.2022.851019

Teaching Experience

Fall/Winter   **Teaching assistant, DSC 180A/B: Data Science Project.** Professor: Suraj Rampure.
2022-23 &   Supervised undergraduate senior capstone projects, met with project groups, graded assignments,
2023-24   advised on course content, coordinated with academic and industry mentors.

Spring 2023,   **Teaching assistant, DSC 80: Practice and Application of Data Science.** *Professors: Tauhidur*
Spring 2024   *Rahman & Sam Lau.* Led discussion sections of 80-100 students with live coding, held very busy
office hours, graded assignments, and wrote and graded portions of exams.

Other Experience

June 2020 -   **Sports Editor, UCSD Guardian**
June 2022   Wrote over 75 articles for UCSD's campus newspaper, edited many more, created 71-minute doc-
umentary about campus history awarded by San Diego Press Club, featured by SD Union-Tribune.

Summer   **Percolata, Software Engineering and Machine Learning Intern**
2020   Software and machine learning experimentation for algorithmic trading product in Google Cloud
Platform. Worked with Python, GCP, multiple timeseries prediction & deep learning frameworks.

Projects

September   **Patterns of Fairness in Machine Learning**
2021 -   Along with Anne Xu and Daniel Tong, user-extensible empirical analysis of ML fairness assessing
March 2022   combinations of models, metrics, and datasets. Project repository available here.

Spring 2023   **Logistic Regression Penalizing Demographic Disparities**.
Final project for Convex Optimization. Built on Bechavod and Ligett (2018) to develop fairness
penalizers for logistic regression; derived dual formulation and solved with CVXPY. Report here.

Technical Skills

Languages: Primarily Python and R, also Java, Go, MATLAB, HTML/CSS, Javascript.
Software: LaTeX, Git, Docker/Kubernetes, DeepLabCut, AWS, Google Cloud Platform, Slurm.
Research Methods: Simulation design, survey design & analysis, thematic coding, visualization