Aditya Mittal

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Research Interests

My research interests include designing novel algorithms in fair machine learning and responsible artificial intelligence (AI) systems. My goal is to understand the statistical mechanisms of implementing fairness constraints, their effects on model performance, and how these factors can be optimized to balance ethical considerations with practical effectiveness. Areas of interest include promoting fairness & transparency in AI systems, statistical learning, and privacy.

Education

- **University of California, Davis**   Davis, United States

  Bachelor of Science in Statistics - Machine Learning Track; GPA: 3.899/4.00   *Sept 2021 - June 2025*

  - **Minors**: Computer Science and Mathematics
  - **Relevant Coursework**: Multi-variable Calculus, Probability Theory, Data Structures (Python and C), Algorithm Design & Analysis, Applied Linear Algebra, Abstract Mathematics, High-Performance Statistical Computing
  - **Undergraduate Thesis**: *TowerDebias: A Novel Debiasing Property Based on the Tower Property*

- **Foothill College**   Foothill, United States

  Non-Degree Seeking; Dual Enrollment Coursework   *Aug 2019 - Apr 2021*

  - **Relevant Coursework**: Object-oriented Programming in Java (A-), Object-oriented Programming in Python (A+)

- **Cupertino High School**   Cupertino, United States

  High School Diploma   *Jan 2017 - June 2021*

Research Experience

- **Undergraduate Research Assistant**   Davis, CA

  Department of Computer Science, UC Davis   *Sept 2023 – Present*

  - **TowerDebias (Undergraduate Thesis Project)**: Project Advisor: *Dr. Norman Matloff*. We have developed a novel post-processing technique aimed at reducing bias associated with sensitive variables (e.g., race) on predictions made by black-box machine learning models.
  - **Empirical Investigations**: Designed experiments to analyze the trade-offs between fairness (correlation reductions) and utility (accuracy retention) across diverse datasets.
  - **Scholarly Contributions**: We are currently preparing a manuscript on the contributions of *TowerDebias* for submission to a peer-reviewed journal.

- **Author (R Package)**   Davis, CA

  Department of Computer Science, UC Davis   *June 2023 – Sept 2024*

  - **Data Science Looks at Discrimination (R Package)**: Project Lead: *Dr. Norman Matloff*. Our package offers graphical and analytical tools for discrimination analysis through EDA and fair predictive modeling.
  - **EDA Methods**: Developed methods using linear and logistic regression (with interactions allowed) models to analyze discrimination linked to sensitive variables.
  - **Methods for Fair Modeling**: Implemented fairness constraints on existing parametric and non-parametric models, allowing user control over the fairness-accuracy tradeoff.
  - **Scholarly Contributions**: Software published on CRAN; we are currently preparing a paper for journal submission.

- **Undergraduate Research Assistant**   Davis, CA

  Department of Computer Science, UC Davis   *June 2024 – Sept 2024*

  - **Knowledge Graph Project (Summer Project)**: Project Lead: *Dr. Setareh Rafatirad*. Integrated graph neural networks (GNNs) with large language models (LLMs) to construct knowledge graphs across multiple hardware security datasets, predicting links between weaknesses, vulnerabilities, and attack patterns.

Journal[J]/Conference[C] Publications and Preprints[P]

- **[P]**: **Aditya Mittal** and Norman Matloff. TowerDebias: A Novel Debiasing Method Based on the Tower Property. *arXiv*, 2024.

- **[P]**: **Aditya Mittal**, Norman Matloff, Taha Abdullah, Arjun Ashok, Brandon Estrada. dsld: A Socially Relevant Tool for Teaching Statistics. *arXiv*, 2024.

Talks

- **TowerDebias: A Novel Debiasing Method Based on the Tower Property**
  - **Oral Presentation**: UC Davis Undergraduate Research Conference   February 2024
- **Discrimination Analysis in a Box: *Data Science Looks at Discrimination* (R package)**
  - **Oral Presentation**: Joint Statistical Meetings   August 2024
  - **Poster Session**: UC Davis Scholarship of Teaching and Learning   December 2023

Industry Experience

- **Cisco**   San Jose, CA
  Business Analyst Intern; Data, Insights, and Analytics Team   *June 2023 - Sept 2023*
  - **Logistics Scorecards and Dashboards**: Developed interactive, scalable dashboards to assess quarterly performance of Cisco's supply chain partners and KPIs for Quarterly Business Reviews.

- **Cisco**   San Jose, CA
  Business Analyst Intern; Global Trade Compliance Team   *June 2022 - Sept 2022*
  - **Case Management Solution**: Developed a centralized support request system using Smartsheet to replace existing services and save $25,000 annually in licensing and support costs.

University Experience

- **Undergraduate Reader**   Davis, CA
  Department of Statistics, UC Davis   *Jan 2023 – June 2023*
  - **Grading and Assistance**: Graded homework, exams, and projects, providing feedback to enhance course content and improve learning outcomes.
  - **Course Assistance**: Graded for **STA 103:** Applied Statistics for Business, **STA 106:** Analysis of Variance, **STA 137:** Applied Time Series Analysis.

- **Alpha Phi Omega, Professional Service Fraternity**   Davis, CA
  UC Davis   *Feb 2023 - June 2023*

- **Economics & Business Student Association**   Davis, CA
  UC Davis   *Feb 2023 - June 2023*

Honors

- **Dean's Honor List**   Davis, CA
  College of Letter's and Sciences, UC Davis   *Sept 2021 – June 2024*
  - **Terms Awarded**: Fall (2021), Winter(2022), Spring (2022), Spring (2024)

Certifications

XCS224N - Natural Language Processing with Deep Learning; Machine Learning Specialization; Neural Networks and Deep Learning; Structuring Machine Learning Projects; Improving Deep Neural Networks; ChatGPT Prompt Engineering for Developers.

Programming Languages & Skills

Languages: Python (including PyTorch & TensorFlow), R, C, Matlab.