

Ayan Majumdar

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🔗 Ayan Majumdar

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Education

2021 – ongoing

Ph.D. in Computer Science

Max Planck Institute for Software Systems, Saarbrücken, Germany

Area: *Machine Learning, Deep Learning, Fairness, Explainability*

Advisor: Prof. Dr. Krishna P. Gummadi, Prof. Dr. Isabel Valera

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2017 – 2021

M.Sc. in Computer Science

Saarland University, Saarbrücken, Germany

Thesis: *Generating Counterfactuals for Causal Fairness*

Outline: *Deep generative models and their implicit assumptions in generating counterfactuals from observed data in the context of fairness.*

Advisor: Prof. Dr. Krishna P. Gummadi, Prof. Dr. Isabel Valera

GPA: 1.2/1.0 (German Scale)

2011 – 2015

B.Tech. in Electronics & Communication

Heritage Institute of Technology, Kolkata, India

Project: *Automated traffic detection using image processing*

Outline: *Utilize blob detection techniques for detecting traffic from video sequences.*

Supervisor: Prof. Anindya Sen

GPA: 8.8/10.0

Research Interests

Trustworthy Machine Learning

📌 Fairness, Explainability, Robustness

Deep Learning

📌 Generative Models, Neural Networks, Representation Learning

Machine Learning

📌 Supervised, Semi-supervised, Self-supervised Learning, Causality

Publications




Conference Proceedings

- 1 **Majumdar, A.**, & Valera, I. (2024). CARMA: A practical framework to generate recommendations for causal algorithmic recourse at scale. In *2024 ACM Conference on Fairness, Accountability, and Transparency* (pp. 1745–1762).
- 2 Nanda, V., **Majumdar, A.**, Kolling, C., Dickerson, J. P., Gummadi, K. P., Love, B. C., & Weller, A. (2023). Do invariances in deep neural networks align with human perception? In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 37, pp. 9277–9285).
- 3 Rateike*, M., **Majumdar*, A.**, Mineeva, O., Gummadi, K. P., & Valera, I. (2022). Dont Throw it Away! The Utility of Unlabeled Data in Fair Decision Making. In *2022 ACM Conference on Fairness, Accountability, and Transparency* (pp. 1421–1433).





Work Experience

- Oct. 2019 – Mar. 2021  **Research Assistant**
Max Planck Institute for Software Systems, Saarbrücken, Germany
Project: *Exploring bias and fairness with deep generative models*
Role: Lead project regarding exploration of bias in deep generative models for facial image data; design methodologies and experiments.
Supervisor: Prof. Dr. Krishna P. Gummadi
- Apr. 2018 – Mar. 2019  **Research Assistant**
SFB1102, Saarland University, Saarbrücken, Germany
Project: *Mutual Intelligibility in Slavic Languages*
Role: Develop web-user studies, automate collection and processing of large-scale textual data for machine translation experiments.
Supervisor: Prof. Dr. Dietrich Klakow
- Jul. 2015 – Aug. 2017  **Systems Engineer**
Infosys Ltd., Bengaluru, India
Role: Oversee functionality of SIP and VoIP in session border controllers.
- Feb. 2016 – Nov. 2016  **Research Assistant**
IIST, Shibpur, India
Project: *Community-based Routing in Delay Tolerant Networks*
Role: Implement a simulator for a novel community-based routing algorithm using social metrics for delay tolerant networks in post-disaster scenarios.
Supervisor: Raj Rakshit, Prof. Tamaghna Acharya





Teaching Assistance

- Summer 2024  **Machine Learning (Core Lecture)**, Saarland University
- Summer 2021  **Machine-Assisted Decision Making (Seminar)**, Saarland University
- Summer 2019  **Statistical Natural Language Processing (Advanced Lecture)**, Saarland University

Talks and Posters





- 2024  **Scaling Up Causal Algorithmic Recourse with CARMA**
ACM FAccT 2024 (Rio de Janeiro), EWAF 2024 Poster Session (Mainz)
- 2023  **Towards Practical Causal Algorithmic Recourse**
Recourse Workshop, Saarland University (Saarbrücken)
- 2022  **Don't Throw it Away! The Utility of Unlabeled Data in Fair Decision Making**
MPI-IS (Tübingen), MILA Quebec (Montreal), ACM FAccT 2022 (Seoul)
- 2020  **Counterfactual data generation for fairness using VAE**
Cornell, Maryland, Max Planck Pre-doctoral Research School (Saarbrücken)

Relevant Coursework and Projects

- Courses  Artificial Intelligence, Information Retrieval and Data Mining, Machine Learning, Statistical Natural Language Processing, Neural Networks, Computer Vision, Human-centered Machine Learning, Machine Learning in Cybersecurity
- Projects  **Predicting the Vulnerability of Windows Machines to Malware**
Outline: *Predicted the vulnerability of Windows PCs to malware* ([details](#))
-  **Word2Mat: A New Type of Word Representation**
Outline: *Extended word2vec to embed words as matrices for improved contextuality* ([details](#))
-  **Exploring Personalized Image Captioning**
Outline: *Studied Attend2You, a personalized image captioning method* ([report](#))

Technical Skills


Programming, Packages and Frameworks

- Languages  Python, R, Java, C, C++
- Machine Learning  PyTorch, Keras, TensorFlow, NumPy, Scikit-learn, Pandas, Jupyter, SciPy
- Trustworthy ML  CleverHans, Foolbox, robustness, AIF360
- Others  Latex, Stan, HTML, CSS, Shell Scripting, Django



Software

- Version control  Git, Clearcase
- Operating Systems  Linux, MacOS, Windows



Online Certifications

- Coursera  1. **Algorithms:** Algorithmic toolbox, Data structures, Graph algorithms, String algorithms
2. **Machine Learning:** Foundations, Regression, Deep Learning: Sequence Models


Academic Activities

- Program Committee  ICLR 2023-24, ICML 2023-24, FAccT 2024, ECML 2023, NeurIPS 2023, EWAf 2023
- Other Activities  Invited to Microsoft Research Conference *Frontiers of Machine Learning*, 2020

Language Skills

- Native/Fluent  English ●●●●●● Bengali ●●●●●●
- Proficient/Intermediate  Hindi ●●●●●● Deutsch ●●●●●●

Achievements

-  Infy Insta award (2017) and Spot award (2016) for significant contributions to the project, Infosys, India.