

Sumantrak Mukherjee

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EDUCATION

- **Birla Institute of Technology and Science** Pilani, India
Bachelor of Engineering Hons - Electronics and Instrumentation *June 2019 - May 2023*
Courses: Neural Networks and Fuzzy Logic, Deep Learning, Probability and Statistics, Linear Algebra, Calculus, Discrete Mathematics, Operating Systems, Object Oriented Programming, Controls Systems, Industrial Instrumentation and Control, Programming in C

EXPERIENCE

- **Junior Researcher - DSA DFKI GmbH** Kaiserslautern, Germany
Advised by Prof. Dr. Sebastian Vollmer *Oct 2023 - Present*
 - Researching causal inference, its applications in sequential decision making
 - Researching event modelling with point processes
 - Assisting in thesis supervision, teaching, hiring, and proposal writing
- **Bachelors Thesis - DSA DFKI GmbH** Kaiserslautern, Germany
Supervised by Prof. Dr. Sebastian Vollmer and Dr. Mengyan Zhang *Jan 2023 - April 2023*
 - Worked on **Scalable Causal Bandits with Adequate Causal Discovery**
 - Integrated **Differential Bayesian Structure Learning** with reward maximisation
 - Designed and empirically tested a scalable algorithm for linear causal bandits
- **Research Collaboration - Columbia University** Remote
Supervised by Dr. Zenna Tavares(Columbia University) *Jan 2022 - Aug 2022*
 - Implemented models of **rational agents** for (PO)MDPs with human biases and bounded rationality.
 - Created **JuliaProgrammingPuzzles.jl** to **benchmark** ParametricInversion.jl
- **Julia Summer of Code** Remote
Supervised by Dr. Sebastian Vollmer, Dr. Jiahao Chen, Dr. Moritz Schauer *May 2021 - Jul 2021*
 - Implemented **Fairness Inprocessing Algorithms** and integrated into MLJ interface as wrapper functions
 - Experimented with techniques to **stabilize adversarial training** and improve **pairwise fairness**.
- **Learning Mate** Remote
AI/ML Intern *May 2021 - Jul 2021*
 - Built an **ensemble model** to predict at-risk students using a curated **dataset** and **feature extraction**.
 - Collaborated with psychiatrists to **cluster at-risk students** and design tailored interventions.
- **Employee Outlook** Remote
Data Science Intern *Dec 2020 - Apr 2021*
 - Trained a **language model** using SPaCy and BERT to extract **keywords** from user reviews to rank users.
 - Developed and **Dockerized** a prototype, deploying the solution on **AWS EC2 Cluster**.

PUBLICATIONS AND WORKSHOPS

- **CLAM: Causal Spatial Disaggregation to Infer Local Effects From Coarse Data - NeurIPS CausScien Workshop 2025:** Sumantrak Mukherjee, Gerrit Grossmann, Sebastian Vollmer
- **HawkesNest: A Multi-Axis Benchmark for Spatio-Temporal Pattern Complexity - Under Review at AAAI 2025:** Yahya Aalaila, Sumantrak Mukherjee, Gerrit Grossmann, Sebastian Vollmer
- **SQUID: A Bayesian Approach for Physics-Informed Event Modeling - Under Review at EurIPS 2025 Workshop DiffSys:** Sumantrak Mukherjee, Sebastian Vollmer, Gerrit Grossmann,
- **Co-Exploration and Co-Exploitation via Shared Structure in Multi-Task Bandits - Preprint:** Sumantrak Mukherjee, Serafima Lebedeva, Valentin Margraf, Jonas Hanselle, Kanta Yamaoka, Viktor Bengs, Raj Bhalwankar, Peter Neigel, Eyke Hüllermeier, Sebastian Josef Vollmer
- **Neural Spatio Temporal Point Processes: Trends and Challenges - TMLR 2025:** Sumantrak Mukherjee, Mouad Elhamdi, George Mohler, David A Selby, Yao Xie, Sebastian Vollmer, Gerrit Grossmann
- **X Hacking: The Threat of Misguided AutoML - ICML 2025:** Rahul Sharma, Sumantrak Mukherjee, Sergey Redyuk, Andrea Sipka, Sebastian Vollmer, David Selby
- **When Counterfactual Reasoning Fails: Chaos and Real-World Complexity - Under Review at Nature Scientific Reports:** Yahya Aalaila, Gerrit Grossmann, Sumantrak Mukherjee, Jonas Wahl, Sebastian Vollmer
- **Peculiarities of Counterfactual Point Process Generation - STCausal Workshop at ACM SIGSPATIAL 2024:** Gerrit Großmann, Sumantrak Mukherjee, Sebastian Vollmer

- **Graph Agnostic Causal Bayesian Optimisation - NeurIPS BDU Workshop 2024:** Sumantrak Mukherjee, Mengyan Zhang, Seth Flaxman, Sebastian Vollmer
- **Had enough of experts? Elicitation and evaluation of Bayesian priors from large language models - Stat 14.2 (2025) and NeurIPS BDU Workshop 2024:** David Selby, Kai Spriestersbach, Yuichiro Iwashita, Dennis Bappert, Archana Warriar, Sumantrak Mukherjee, Muhammad Nabeel Asim, Koichi Kise, Sebastian Vollmer
- **Had enough of experts? Elicitation and evaluation of Bayesian priors from large language models - NeurIPS BDU Workshop 2024:** David Selby, Kai Spriestersbach, Yuichiro Iwashita, Dennis Bappert, Archana Warriar, Sumantrak Mukherjee, Muhammad Nabeel Asim, Koichi Kise, Sebastian Vollmer
- **Flexible Group Fairness Metrics for Survival Analysis - DSHealth 2022:** Raphael Sonabend, Florian Pfisterer, Alan Mishler, Moritz Schauer, Lukas Burk, Sumantrak Mukherjee, Sebastian Vollmer

HONORS AND AWARDS

- Selected for **Julia Summer of Code 2021** for project **Fairness.jl**
- Awarded **50,000 INR** institutional funding for a **Reinforcement Learning Traffic Control System**.
- Won **Hult Prize India, 2021** and represented India at the Castle Accelerator.

PROJECTS

- **Vision Transformers (Neural Network and Fuzzy Logic):** Implemented Vision Transformers in **Pytorch** and **OpenCV**, trained on the **cassava leaf disease dataset**, and presented findings (top 5 of 41 projects).
- **Text Summarization (Deep Learning):** Explored **extractive** and **abstractive** text summarization techniques, including **text rank**, **latent semantic analysis**, and **BART** models.
- **Age-Invariant Face Recognition (Deep Learning):** Collected time-separated actor images, enhanced with **CLAHE**, extracted features using **SIFT**, **ORB**, **AKAZE**, and compared results via **ROC** curves.
- **ANN Control of an Inverted Pendulum (Industrial Instrumentation and Control):** Designed and simulated a **non-linear inverted pendulum** in **MATLAB/Simulink**, implementing a neural network controller to **reduce stabilization time**.
- **Reinforcement Learning-based Traffic Control System:** Developed a **synthetic dataset** using Google Maps API and government statistics. Fine-tuned models from **CoLight** and **Towards a Thousand Lights**.
- **Spark Plug Analysis Using Computer Vision:** Implemented computer vision models to **detect defects** and **count spark plugs** using a **synthetic dataset** created in AutoCAD for varied angles.
- **Hate Speech Detection on Facebook Confessions Page:** Scraped and prepared a **dataset** from BITS Confessions and fine-tuned a **RoBERTa**-based hate speech detection model, addressing **code-mixing** issues by translating non-English text.

TEACHING

- **Guest Lecture (Collaborative Intelligence - RPTU, Kaiserslautern):** Delivered lectures on Human-in-the-Loop and Active Learning, designed evaluations, and conducted office hours. (Jan 2024- May 2024)
- **Head Teaching Assistant (Neural Network Fuzzy Logic - BITS Pilani):** Led a team of 12 TAs, designed assignments on ML, CV, NLP, and RL, conducted lectures, and supervised final project evaluations. (Aug 2022 - Dec 2022)
- **Teaching Assistant (Neural Network and Fuzzy Logic - BITS Pilani):** Prepared/evaluated assignments for 120 students, conducted lectures on **NumPy** and **Pandas** for 84 attendees, and guided 3 teams on final projects. (Jan 2022 - May 2022)

CO-CURRICULAR AND VOLUNTEERING

- **Academic Service:** Reviewer for AAAI 2025, GIScience 2025 Workshop STCausal
- **Co-Organizer (STAR: Space Time Causality Reading Group):** Founded and co-organized a cross-institutional reading group to discuss advances in spatio-temporal causality research; Hosted all sessions and presented at 2 sessions. (March 2025 - Present)
- **Co-Organizer (DSARex, DFKI):** Initiated and organized sessions for the DSA Research Exchange Group; delivered a session on **Active Learning Methods**. (Jan 2024 - Present)
- **Chair (BITS ACM):** Led the Executive Committee, initiated 4 major projects (cybersecurity, blockchain, ML, development), and delivered a lecture on **Causality and Diffusion Processes**. (Aug 2022 - Jul 2022)
- **Special Interest Group Coordinator (BITS ACM):** Organized hackathons on **Reinforcement Learning**, managed events on CS topics, and led recruitment and onboarding of junior members. (Jul 2021 - Jul 2022)
- **Machine Learning SIG Coordinator (BITS ACM):** Conducted a lecture series on **Reinforcement Learning**, guided projects on **Computer Vision** and **NLP**, and designed recruitment tasks. (Aug 2020 - Jul 2021)