

Arshika Lalan

Google Research India

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EDUCATION

Birla Institute of Technology And Science (BITS), Pilani (K.K. Birla Goa Campus)

B.E. (Hons.), Computer Science and M.Sc. (Hons.), Economics

2017 - 2022

GPA: 8.70/10

WORK EXPERIENCE

Google Research India

Aug 2022 - Present

Pre-Doctoral Researcher in Multi-Agent Systems for Societal Impact (MASSI) Lab

Advisors: Prof. Milind Tambe, Dr. Aparna Taneja & Dr. Manish Jain

Developing bandit algorithms for optimization and allocation of healthcare resources to underserved communities in India.

Harvard University

Aug 2021 - Jul 2022

Research Assistant in Kreiman Lab

Advisors: Prof. Gabriel Kreiman & Dr. Mengmi Zhang

Worked on adopting continual learning algorithms for continuous domain adaptations.

Microsoft India

May 2021 - Jul 2021

Software Development Intern in Cloud+Artificial Intelligence team

Worked on adding user insights to the reporting services of the Playwright tool.

PUBLICATIONS

Conference Publications

* equal contribution

1. **Improving Health Information Access in the World's Largest Maternal Mobile Health Program via Bandit Algorithms**

A Lalan*, S Verma*, P Diaz, P Danassis, A Mahale, K Sudan, A Hegde, M Tambe & A Taneja.

Under Review @ Innovative Applications of Artificial Intelligence Conference (IAAI) 2024.

[IAAI'24]

2. **Sparse Distributed Memory Using Spiking Neural Networks on Nengo**

R Ajwani, **A Lalan**, B Bhattacharya & J Bose.

Bernstein Conference 2021.

[Bernstein'21]

Workshop Publications

1. **Analyzing and Predicting Low-Listenership Trends in a Large-Scale Mobile Health Program: A Preliminary Investigation**

A Lalan, S Verma, K Sudan, A Mahale, A Hegde, M Tambe, & A Taneja.

Oral Presentation @ Data Science for Social Good Workshop, KDD 2023.

[KDD-WS'23]

2. **Adherence Bandits**

J Killian*, **A Lalan***, A Mate*, M Jain, A Taneja, & M Tambe.

Artificial Intelligence for Social Good Workshop, AAAI 2023.

[AAAI-WS'23]

Preprints

1. **Continual Learning and Out of Domain Generalization in Continuous Domain Adaptation**

A Lalan, S Mandan, M Zhang & G Kreiman.

preprint 2022

[Preprint-3]

2. **Epigraphiology: A Graph Network driven Measure for Influence Diffusion of Scientific Articles**

S Dey, S Kotian, S Saha, A Agarwal, **A Lalan**, & G Sampatrao.

preprint 2021

[Preprint-2]

3. **Stock Price and Job Growth: A Causal Influence Study**

A Lalan, A Agarwal, S Saha, & S Kar.

preprint 2021

[Preprint-1]

ACHIEVEMENTS

- Cleared Regional Mathematics Olympiad (RMO); Qualified for Indian National Mathematics Olympiad (INMO). [2015]
- Accepted to the Brains, Minds and Machine Summer School, which accepts approximately 5% of all applicants. [2021]
- Selected for HackMIT and shortlisted under the "Microsoft Azure: Cause for Social Good" track. [2021]

RESEARCH PROJECTS

Multi-Agent Systems for Societal Impact (MASSI) Lab at Google Research

Advisors: Prof. Milind Tambe, Dr. Aparna Taneja & Dr. Manish Jain

Pre-Doctoral Researcher

Aug 2022 – Present

> Reinforcement Learning and Multi-Agent Systems Research

- Showcased non-Markovian behavior (which complicated the adoption of prior SOTA Markovian RMAB systems) in the nationwide Kilikari maternal health program with 3.2 million active beneficiaries. **[KDD-WS'23]**
- Co-formulated novel non-Markovian Time-Series Restless Bandits for optimizing multiple interventions.
- Developed the CHAHAK framework leveraging Time-Series Restless Bandits and UCB Monte-Carlo sampling to increase Kilikari's engagement and minimize automated dropouts through strategic intervention allocation.
- Collaboratively devised "Adherence Bandits", a specialized Restless Multi-Armed Bandits (RMABs) subclass dedicated to the engagement challenges of the public health domain. **[AAAI-WS'23]**

> Applied and Field Research

- Successfully devised AI solutions for the Kilikari program by engaging in productive collaboration with Harvard, NGO (ARMMAN), and Google Research.
- Demonstrated the ability for CHAHAK to increase content exposure of the cohort by 57% and preventing dropouts by 33% over a random policy. **[IAAI'24]**
- Assisting in designing a large-scale Randomized Control Trials (RCT) involving 35k beneficiaries and field testing Time-Series Restless Bandits' effectiveness applied in real-world public health scenarios.

Kreiman Lab at Harvard University

Advisors: Prof. Gabriel Kreiman & Dr. Mengmi Zhang

Undergraduate Thesis

Aug 2021 – Jul 2022

- Investigated the interplay between catastrophic forgetting (CF) and model's generalization ability on OOD tasks.
- Examined the adaptability of multiple SOTA continual learning methods to the continuous domain adaptation setting.
- Illustrated saturation pattern of CF and generalizability with additional OOD tasks in continuous domain. **[Preprint-3]**

Center for AI Research (APPCAIR) at BITS Pilani, Goa campus

Advisor: Prof. Snehashu Saha

Research Assistant

Oct 2020 – Feb 2021

- Conducted cross-validation on Influence-Diffusion scores using statistical methods to validate a distinctive citation scoring model named Epigraphology. **[Preprint-2]**
- Employed Granger Causality and Transfer Entropy analysis to determine the relationship between stock prices and job growth. Thus, established the causality relationships between the two on a global scale. **[Preprint-1]**

Biologically Inspired Neural Networks (BINN) Lab at BITS Pilani, Goa campus

Advisors: Prof. Basabdatta Sen Bhattacharya and Dr. Joy Bose

Research Assistant

Mar 2020 – Mar 2021

- Showcased that a biologically inspired Spiking Neural Network(SNN)-based Sparse Distributed Memory (SDM) exhibits comparable memory capacity performance to conventional SDMs.
- Established that the SNN-based SDM architecture was agnostic to the type of SNN chosen. **[Bernstein'21]**

RELEVANT COURSES

Computer Science	Data Structures & Algorithms, Machine Learning, Artificial Intelligence, Logic, Object Oriented Programming, Database Systems, Operating Systems, Computer Networks, Compiler Construction.
Mathematics	Probability & Statistics, Calculus, Linear Algebra & Complex Analysis, Differential Equations, Discrete Structures.
Economics	Applied Econometrics, Econometric Methods, Game Theory, Microeconomics.

TEACHING EXPERIENCE

Designed assignments, lab problems, quizzes and conducted tutorials as a teaching assistant (TA) for the following courses:

- **Object Oriented Programming (CS F214)**, Instructor: Prof. Neena Goveas
- **Database Systems (CS F212)**, Instructor: Prof. Swati Agarwal
- **Econometric Methods (ECON F241)**, Instructor: Prof. Aswini Kumar Misra

POSITION OF RESPONSIBILITY

- **Campus Representative** | *Women in Machine Learning and Data Science (WiMLDS)* *May 2020 - May 2021*
- **Chief Coordinator** | *Department of Journalism and Media Affairs (DoJMA), BITS Goa* *May 2019 - May 2020*