

## Education

### Harvard University

2023 - Present

*PhD in Computer Science, Advisor: Milind Tambe*

Select coursework: Theory of Algorithmic Fairness by Cynthia Dwork, AI for Social Impact by Milind Tambe.

### ABV-Indian Institute of Information Technology and Management, Gwalior

GPA: 8.53/10

*Integrated Bachelor's + Master's in Information Technology*

2015 - 2020

Outstanding grade in bachelor's and master's thesis and in 7 courses across CS and Mathematics.

## Work Experience

### Facilitator - Mastercard & The Alan Turing Institute

London, UK

Mentor: *Adeline Pelletier* [↗](#), *Carlos Mougan* [↗](#)

May 2024

- Led a team of 12 PhD students constituting machine learning, ethics, and legal experts to help define technical fairness notions in multi-class multi-label financial transactions for Mastercard.
- Proposed novel bias mitigation techniques and developed a framework for operationalizing fairness in practice.

### Pre-Doctoral Researcher - Google Research

Bengaluru, IN

Mentor: *Prof. Milind Tambe* [↗](#), *Aparna Taneja* [↗](#)

June. 2021 - August 2023

- Managed a large-scale Randomized Control Trials (RCT) involving 100K+ beneficiaries to show applicability of Restless Multi-Armed Bandit (RMAB) models in a Mobile Health program in India. [AAAI 2022 [↗](#), IAAI 2023 [↗](#)]
- Improved efficiency in learning through Decision-Focused-Learning [AAAI 2023a [↗](#), AAMAS 2023 [↗](#)] and added robustness in estimation via a regret-minimizing double oracle approach [AAAI 2023b [↗](#)].
- Developed a Multi-Action Index for sequential resource planning based on time-series forecasting for non-markovian environments [IJCAI 2023 [↗](#), IAAI 2024 [↗](#)].

### Data Scientist - United Health Group

Gurgaon, IN

Mentor: *Kishore V. Ayyadevara* [↗](#)

Aug 2020 - May 2021

- Worked alongside Chief Medical Officer to model hospital readmission risk for 40M+ beneficiaries.
- Utilized high-dimensional ICD-10 embeddings to encode patients' sequential visit history producing explainable predictions for caregivers.
- Enhanced real-time capabilities to track patient wellness journeys using the largest healthcare graph database in the world (10B+ nodes).

## Master's Thesis

### Learning to Communicate through Deep Multi-Agent Reinforcement Learning

July 2019 - July 2020

Advisor: Prof. Joydip Dhar [↗](#)

- Demonstrated the emergence of language systems in speaker and listener agents for written, visual, and population-based referential games. [AAAI 2020 [↗](#), LaReL ICML 2020 [↗](#), AAMAS 2021 [↗](#)]
- Developed an autonomously coordinated multi-agent model for watershed management optimized through inter-agent communication and intrinsic social-motivation rewards [AASG AAMAS 2023 [↗](#)].

## Awards, Grants & Honours

Travel Grant for attending Data Study Group at The Alan Turing Institute, London, UK . . . . .	2024
Accepted into Harvard's Technical AI Safety Fellowship . . . . .	2024
Student Travel Grant for presenting research poster at AAAI, New York, US . . . . .	2020
Student Travel Grant for attending IEEE High Performance Computing Conference, Hyderabad, IN . . . . .	2019
Rotaract National Technical Quiz Pune, India - 1 <sup>st</sup> in India among 500+ teams . . . . .	2018
Ramanujan Mathematics Olympiad - 3 <sup>rd</sup> in State among 400+ participants . . . . .	2013
Regional Mathematics Olympiad - 22 <sup>nd</sup> in State among 2000+ participants . . . . .	2013
National Cyber Olympiad - 8 <sup>th</sup> in India among 30000+ participants . . . . .	2012
Qualified for Indian National Mathematics Olympiad thrice - Top 900/50000 in India . . . . .	2011-2013

## Invited Talks

- Google Deepmind Game Theory Group, September 2024. *Prioritization Strategies for LLM Designed Reward Functions for Restless Bandits*
- Harvard SEAS AI for Social Good Seminar, February 2024. *Ensuring Group Fairness in Decision Focused Learning through RMABs*
- Chopal Seminar Series at Google Research India, April 2023. *A Review of Restless Multi-Armed Bandits for Mobile Health*
- Multi-Agent Systems for Social Impact Seminar at Google Research India, September 2021. *Robustness in Restless Multi-Armed Bandits*
- UHG-Optum India Data Science Seminar, February 2021. *Tutorial on Graph Neural Networks for Healthcare*
- Symposium on CyberPhysical Systems at Indian Institute of Science, July 2019. *Deep Reinforcement Learning for Damage Adaptation in Robotics*
- UHG-Optum India Data Science Seminar, June 2019. *Attention Mechanisms for Optical Character Recognition*
- Abhigyan Abhikaushalam Students Forum Seminar Series, January 2019. *An Introduction to Git and Contributing to Open Source Software*
- Abhigyan Abhikaushalam Students Forum Seminar Series, March 2018. *Game Development using Unity3D*

## Academic Service & Volunteering

<b>PC Member</b>	Autonomous Agents for Social Good Workshop at AAMAS 2024
<b>Reviewer</b>	MINT NeurIPS 2024, IAAI 2025, AAMAS 2025, AASG AAMAS 2024, TSRML NeurIPS 2022
<b>Teaching</b>	AI for Social Impact Course - Harvard Fall 2024, Open Source Software - IIITM Gwalior 2019

## Selected Open-Source Projects

- Developed and open-sourced **Jupyter-Probe** [↗](#), a library to monitor, declare, and manage resource usage on shared Jupyter environments. Published the library on PyPI software repository to be used as pip package.
- Contributor to **TensorForce** [↗](#), a library for production-grade Reinforcement Learning (3K+ github stars). Implemented bindings with RL simulation environments such as Deepmind Pycolab and Unity ML Agents.
- Contributor to scientific python libraries for Astronomy - **AstroPy** [↗](#), and Heliophysics - **SunPy** [↗](#). Added features [↗](#) in the Time module for astronomical calculations which is at the core of the libraries' functionality.

## Accepted and Published Papers

- *Group Fairness in Predict-Then-Optimize Settings for Restless Bandits*  
Verma S., Zhao Y., Shah S., Boehmer N., Taneja A., Tambe M.  
Conference on Uncertainty in Artificial Intelligence (**UAI 2024**)
- *Improving Health Information Access in the World's Largest Maternal Mobile Health Program via Bandit Algorithms*  
Lalan A. \*, **Verma S. \***, Killian J., Rodriguez, P., Danassis P., Mahale A., Sudan M., Hegde A., Taneja A., Tambe M.  
AAAI Conference on Innovative Applications of AI (**IAAI 2024**)
- *Limited Resource Allocation in a Non-Markovian World: The Case of Maternal and Child Healthcare*  
Danassis P., **Verma S.**, Killian J., Taneja A., Tambe M.  
International Joint Conference on Artificial Intelligence (**IJCAI 2023**)
- *Restless Multi-Armed Bandits for Maternal and Child Health: Results in Decision-Focused Learning*  
**Verma S.**, Mate A., Wang K., Taneja A., Tambe M.  
International Conference on Autonomous Agents and Multiagent Systems (**AAMAS 2023**)
- *Scalable Decision-Focused Learning in Restless Multi-Armed Bandits with Application to Maternal and Child Care* ☞  
Wang K. \*, **Verma S. \***, Shah S., Mate A., Taneja A., Tambe M.  
AAAI Conference on Artificial Intelligence 2023 (**AAAI 2023**)
- *Robust Planning over Restless Groups: Engagement Interventions for a Large-Scale Maternal Telehealth Program* ☞  
Killian J. \*, Xu L. \*, Biswas A. \*, **Verma S. \***, Nair V., Rodriguez, P., Johnson-Yu S., Taneja A., Tambe M.  
AAAI Conference on Artificial Intelligence 2023 (**AAAI 2023**)
- *Increasing Impact of Mobile Health Programs: SAHELI for Maternal and Child Care* ☞  
**Verma S. \***, Singh G. \*, Mate A., Verma P., Gorantla S., Madhiwalla N., Hegde A., Thakkar D., Jain M., Tambe M., Taneja A.  
AAAI Conference on Innovative Applications of AI (**IAAI 2023, \*\*IAAI 'Innovative' Application Award\*\***)
- *Field Study in Deploying Restless Multi-Armed Bandits: Assisting Non-profits in Improving Maternal and Child Health* ☞  
Mate A. \*, Madaan L. \*, Taneja A., Madhiwalla N., **Verma S.**, Singh G., Hegde A., Varakantham P., Tambe M.  
AAAI Conference on Artificial Intelligence 2022 (**AAAI 2022**)
- *Towards Sample-Efficient Learners in Population based Referential Games through Action Advising* ☞  
**Verma S.**  
International Conference on Autonomous Agents and Multiagent Systems (**AAMAS 2021**)
- *Emergence of Writing Systems through Multi-Agent Cooperation (Student Abstract)* ☞  
**Verma S.**, Dhar J.  
AAAI Conference on Artificial Intelligence 2022 (**AAAI 2020**)
- *Deep Reinforcement Learning for Single-Shot Diagnosis and Adaptation in Damaged Robots* ☞  
**Verma S.**, Nair H.S., Agarwal G., Dhar J., Shukla A.  
ACM IKDD Joint Conference on Data Science and Management of Data (**CoDS-COMAD 2020**)

- *IIITM Face: A Database for Facial Attribute Detection in Constrained and Simulated Unconstrained Environments* ↗  
Arya, K., **Verma S.**, Gupta K., Agarwal S., Gupta P.  
ACM IKDD Joint Conference on Data Science and Management of Data (**CoDS-COMAD 2020**)

## Workshop Papers

- *Analyzing and Predicting Low-Listenership Trends in a Large-Scale Mobile Health Program: A Preliminary Investigation* ↗  
Lalan A., **Verma S.**, Sudan K., Mahale A., Hegde A., Tambe M., Taneja A.;  
**Data Science for Social Good workshop at KDD 2023**
- *Understanding DFL in Restless Multiarmed Bandit Problem through Large Scale Field Study* ↗  
**Verma S.**, Mate A., Wang K., Taneja A., Tambe M.;  
**Trustworthy and Socially Responsible ML workshop at NeurIPS 2022**
- *On the Pitfalls of Visual Learning in Referential Games* ↗  
**Verma S.**;  
**Language in Reinforcement Learning workshop at NeurIPS 2022**
- *Restless Bandits in the Field: Real-World Study for Improving Maternal and Child Health Outcomes* ↗  
Mate A., Madaan L., Taneja A., Madhiwalla N, **Verma S.**, Singh G., Hegde A, Varakantham P., Tambe M.;  
**Machine Learning for Public Health workshop at NeurIPS 2021, \*\*Best Paper award\*\***
- *Emergence of Multilingualism in Population based Referential Games* ↗  
**Verma S.**;  
**Language in Reinforcement Learning workshop at ICML 2020**