

Shresth Verma

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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 st in India among 500+ teams	2018
Ramanujan Mathematics Olympiad - 3 rd in State among 400+ participants	2013
Regional Mathematics Olympiad - 22 nd in State among 2000+ participants	2013
National Cyber Olympiad - 8 th 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

PC Member

Autonomous Agents for Social Good Workshop at AAMAS 2024

Reviewer

MINT NeurIPS 2024, IAAI 2025, AAMAS 2025, AASG AAMAS 2024, TSRML NeurIPS 2022

Teaching

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: SAHEL 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**)

- *IITM 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