Sushmita Bhattacharya
Ph.D. Student
Harvard University

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Research Interests

Reinforcement learning, Multiagent systems, Robotics, Machine learning, Deep learning.

Education

- **Harvard University** — Cambridge, MA, USA
  Ph.D. in Computer Science — *July 2020 - Present*
  Advisor: Dr. Stephanie Gil

- **Arizona State University** — Tempe, AZ, USA
  Ph.D. in Computer Science — *August 2018 - June 2020*
  Advisor: Dr. Stephanie Gil

- **Indian Institute of Technology Bombay** — Mumbai, India
  M.Tech. in Computer Science — *Fall 2013-Spring 2015*
  Advisor: Dr. N. L. Sarda

- **Indian Institute of Engineering Science and Technology Shibpur** — Howrah, India
  B.E. in Computer Science — *Fall 2007-Spring 2011*
  Advisor: Dr. Prasun Ghosal.

Publications

- *Reinforcement Learning for POMDP: Rollout and Policy Iteration with Application to Autonomous Sequential Repair Problems*, **Sushmita Bhattacharya**, Sahil Badyal, Thomas Wheeler, Stephanie Gil, and Dimitri Bertsekas, in IEEE Robotics and Automation Letters (RA-L), 2020 (10.1109/LRA.2020.2978451).

- *Multiagent Rollout and Policy Iteration for POMDP with Application to Multi-Robot Repair Problems*, **Sushmita Bhattacharya**, Siva Kailas, Sahil Badyal, Stephanie Gil, and Dimitri Bertsekas, accepted in Conference on Robot Learning (CoRL), 2020.

Research Projects

- **Reinforcement learning for POMDP**
  - Developed online rollout algorithms for large scale Partially Observable Markov Decision Process with huge state-space. Improved cost of the rollout policy using approximate policy iteration where successive policies were approximated using neural networks.
  - Developed partitioned state-space and used multiple neural networks to deal with exploration-exploitation issues and facilitate parallel computation.
  - Applied the algorithms to a class of time-critical dynamical sequential repair problems, and results outperformed a few state-of-art methods.

- **Multiagent reinforcement learning for POMDP** — *Ongoing work*
  - Deloveped scalable multiagent rollout algorithms for large scale POMDP problems with huge state space and huge control space. Demonstrated cost improvement property using approximate policy iteration with the scalable algorithm.
  - The proposed algorithm reduced computations from an exponential (w.r.t number of agents) to a linear complexity and demonstrated coordinated behavior, making it suitable for POMDP applications with large teams of robots.

- Applied the algorithms to a class of multiagent coordinated time-critical dynamical sequential repair problems, and results outperformed a few state-of-art methods.
- The proposed methods worked well given imperfect communication among the agents, e.g. local communication and intermittent cloud communication.

Work Experience

- Research Assistant at Harvard University *July 2020 - Present*
- Graduate Research and Teaching Assistant at Arizona State University *August 2018 - June 2020*
- Software developer in Microsoft India Development Center. *December 2016 - July 2018*
- Data Scientist in Honeywell Technology Solution Labs. *July 2015 - December 2016*
- Teaching Assistant in Indian Institute of Technology Bombay *July 2013 - June 2015*
- Developer in Cognizant Technology Solutions *June 2011 - June 2013*

Teaching Assistantships

- CSE 691-Topics in Reinforcement Learning (Instructor: Dr. D. P. Bertsekas) *ASU Spring 2020*
- CSE 591-Coordination of Multi-Robot Systems (Instructor: Dr. S Gil) *ASU Fall 2019*
- CSE 691-Topics in Reinforcement Learning (Instructor: Dr. D. P. Bertsekas) *ASU Spring 2019*
- CSE 471-Introduction to Artificial Intelligence (Instructor: Dr. S Gil) *ASU Spring 2019*
- CSE 574-Planning and Learning Methods in AI (Instructor: Dr. S Gil) *ASU Fall 2018*
- CS 308 - Embedded Systems Lab (Instructor: Dr. Kavi Arya) *IITB Spring, 2014*
- CS 387 - Database and Information Systems Lab(Instructor: Dr. N. L. Sarda) *IITB Autumn 2014*

M.Tech. Project

Big Data Analysis in distributed streaming database

- Developed application for studying customer spending habits using regression analysis with offline Hadoop map reduce jobs and storing the results in a reliable HBase key-value store to facilitate online detection of anomalous transactions using data mining techniques with Apache Storm.

Awards

Engineering Graduate Fellowship from Ira A. Fulton Schools of Engineering (Spring 2020) for extraordinary academic achievements.

Achievements & Extra Curricular Activities

- Secured All India Rank 57 among 2,24,160 candidates appeared in Graduate Aptitude Test in Engineering, 2013 CSE.
- Interests: painting, music.