Sushmita Bhattacharya
Research Assistant
Harvard University

https://sushmitab.github.io/
sushmita_bhattacharya@g.harvard.edu

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.

Research Interests

I am interested in the domain of Reinforcement learning, Robotics, multi-agent systems, Machine learning, Deep learning.

Publication

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

Awards

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

Research Project

- I am working on Reinforcement Learning for Partially Observable Markov Decision Processes. Our group is looking for novel variants of approximate policy iteration with the application to autonomous sequential repair problem.
- My research involves scalable rollout algorithm for multi-agent reinforcement learning especially in the context of POMDP applications over infinite horizon.

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*

M. Tech. Project & Seminar

- **Big Data Analytics in a Distributed Database Environment** *(July 2014 - present)*
  (Guide: Prof. N. L. Sarda)
  - **Objective:** *ATM Fraud Detection*
  - **Approach:** Storing large amount of transaction data in a reliable store. Detecting outliers using data mining techniques on historical data. Update of store after outliers detection.
  - **Current Work:** Exploring various tools and techniques for storing and processing big data and methods of data mining. Experimenting with relative performance of traditional RDBMS and Hadoop system (HDFS, HBase, Pig etc).

- **Streaming Data Processing and Management** *(Jan 2014 - May 2014)*
  (Guide: Prof. N. L. Sarda)
  - Studied streaming data and its difference from traditional relational data and processing.
  - Surveyed stream query language and special purpose storage and indexing for streams.
  - Reviewed STREAM - a Stanford implementation for stream data management system.

Course Projects

- **Implementation of Table Partitioning in PostgreSQL** *(Autumn, 2013)*
  (Guide: Prof. S. Sudarshan in Implementation Techniques for Relational Database Systems)
  - Modified source code of PostgreSQL to gain table (range) partitioning functionality
  - Changed code for insert, delete and update of tuples to take place in proper partition.
  - Added code for creating index(s) in the partitioned tables if one is present in main table.

- **Color and Size Based Fruit Sorter using FireBird V** *(Autumn, 2013)*
  (Guide: Prof. Kavi Arya and Prof. Krithi Ramamritham in Embedded and Real Time Systems)
  - Built modular hardware and software components for feature based, real time fruit sorter.
  - Coded various sensors and actuators in Firebird V. Written code for serial communication between Firebird V and PC.
  - Designed and performed experiments with various test-sets and got **90% accuracy**.

- **Part of Speech Tagging** *(Autumn, 2013)*
  (Guide: Prof. Pushpak Bhattacharya in Natural Language Processing)
  - Developed a part of speech tagging system for English sentences in **Java**, with an average precision of 93%.
  - Implemented using **Hidden Markov Model** and **Viterbi algorithm**.

- **Understanding and Simulation of Network Performance in Dense Wifi Settings** *(Spring, 2014)*
  (Guide: Prof. Mythili Vutukuru in Mobile Computing)
  - Analyzed various statistics and parameters from network trace files in a wireless setup using **Python**.
  - Simulated the same experiment using **NS3** simulation tool and tuned various network parameters to reflect the real experiment.

- **Geometry Generalization for Map Simplification** *(Spring, 2014)*
  (Guide: Prof. N. L. Sarda in Spatial Database)
  - Performed simplification of the linear geometries without affecting the topology of geometries using modified Ramer-Douglas-Peucker algorithm in **Java**.
  - Achieved runtime of 300 ms to simplify a set of linestrings with 900 data points.

- **Exploited Vulnerabilities of Webview in Android** *(Spring, 2014)*
  (Guide: Prof. Bernard Menezes in Cryptography and Network Security II)

- Designed attacks on Android Webview and analyzed methods to stop those attacks.
- Exploited vulnerabilities in calling Java code from Javascript and user interface through the developed Android Apps.

Teaching Assistantship

- 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*

Skill Set

- *Programming Languages:* C, C++, Core Java, PL/SQL
- *Scripting Languages:* Python, Bash
- *Operating Systems:* Linux, Windows
- *Tools:* LaTeX, SVN, Eclipse, Lex, Yacc, Android SDK, Make, NS3, Gnuplot

Achievements & Extra Curricular Activities

- Secured **57** rank in **GATE CS-2013** amongst 2,24,160 candidates.
- Interests: painting, music.