Anirban Majumdar

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Research Interests

Formal Verification, Automata Learning, Symbolic AI, (Partially Observable-) Markov Decision Processes, Parameterized Systems, Model Checking, Temporal Logics.

Education

Ph.D. in Computer Science 2018–2021
ENS Paris-Saclay, France
Supervisors: Patricia Bouyer, Nathalie Bertrand

M.Sc. in Computer Science 2016–2018
Chennai Mathematical Institute, India

B.Sc. in Mathematics and Computer Science 2013–2016
Chennai Mathematical Institute, India

Academic Positions

Independent Researcher 2024–Present
Research on learning algorithms for one-counter automata, policy synthesis in POMDPs, reinforcement learning with timed specifications, etc.

Postdoctoral Researcher 2021–2024
Université Libre de Bruxelles, Belgium
Mentor: Jean-François Raskin
Research on automata learning of timed systems, strategy synthesis in MDPs. Developed tools for learning of event-recording automata.

Publications [DBLP] [Google Scholar]

1. **Learning Event-recording Automata Passively**
   To appear, in *ATVA 2025*, with Sayan Mukherjee and Jean-François Raskin.

2. **Algorithms for Robbins' Problem Using Markov Decision Processes.**
   In *Principles of Verification: Cycling the Probabilistic Landscape*, with Léonard Brice, Thomas F. Bruss and Jean-François Raskin.

3. **Greybox Learning of Languages Recognizable by Event-Recording Automata.**
   In *ATVA 2024*, with Sayan Mukherjee, and Jean-François Raskin.

4. **Bi-objective Lexicographic Optimization in Markov Decision Processes with Related Objectives.**
   In *ATVA 2023*, with Damien Busatto-Gaston, Debraj Chakraborty, Sayan Mukherjee, Guillermo A. Pérez and Jean-François Raskin.

5. **Reconfiguration and Message Losses in Parameterized Broadcast Networks.**
   In *LMCS (2021)*, with Nathalie Bertrand and Patricia Bouyer.

6. **Playing with Repetitions in Data Words Using Energy Games.**
   In *LMCS (2020)*, with Diego Figueira and M Praveen.

7. **Synthesizing Safe Coalition Strategies.**
In *FSTTCS 2020*, with Nathalie Bertrand and Patricia Bouyer.

8. **Computing the Width of Non-deterministic Automata.**
In *LMCS (2019)*, with Denis Kuperberg.

9. **Concurrent Parameterized Games.**
In *FSTTCS 2019*, with Nathalie Bertrand and Patricia Bouyer.

10. **Reconfiguration and Message Losses in Parameterized Broadcast Networks.**
In *CONCUR 2019*, with Nathalie Bertrand and Patricia Bouyer.

11. **Width of Non-deterministic Automata.**
In *Stacs 2018*, with Denis Kuperberg.

12. **Static and Dynamic Synthesis of Bengali and Devanagari Signatures.**
In *IEEE Transactions on Cybernetics (2018)*, with Moises Diaz, Sukalpa Chanda, Miguel A. Ferrer, Chayan Kr. Banerjee, Cristina Carmona-Duarte, Parikshit Acharya and Umapada Pal.

13. **Multiple Generation of Bengali Static Signatures.**
In *ICFHR 2016*, with Moises Diaz, Sukalpa Chanda, Miguel A. Ferrer, Chayan Kr. Banerjee, Cristina Carmona-Duarte, Parikshit Acharya and Umapada Pal.

Theses

Ph.D. Thesis: *Verification and Synthesis of Parameterized Concurrent Systems*
Supervisors: Patricia Bouyer-Decitre, Nathalie Bertrand

M.Sc. Thesis: *Playing with Repetitions in Data Words*
Supervisor: M. Praveen

Tools

- `tLsep` – Greybox Learning of ERA-recognizable languages.
Python implementation of an active learning algorithm for event-recording automata.
Source: github.com/mukherjee-sayan/ERA-greybox-learn
- `LEAP` – Passive Learning of ERA-recognizable languages.
Python implementation of a passive learning algorithm for event-recording automata.
Source: github.com/anirban11/leap
- `Robbins_MDP` – Solving Robbins' Problem using MDPs.
Algorithmic exploration of optimal stopping problems using symbolic methods.
Source: github.com/anirban11/Robbins_MDP

Programming skills

- **Languages:** Python, Haskell, Matlab, HTML
- **Conceptual Knowledge:** Z3, Uppaal, PRISM

Academic Internships

ENS Lyon, France Summer 2017
Research on Good-for-Games Automata with Denis Kuperberg

IMSc, Chennai Summer 2016
Research on Bisimulation Equivalence for Pushdown Automata with Teodor Knapik

ISI, Kolkata Summer 2015
Research on Pattern Recognition with Umapada Pal