

Mohan sai teja Dantam

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Curriculum Vitae

Research statement

- My research focuses on stochastic games, Markov decision processes, and automata, with an emphasis on strategy synthesis, simultaneous satisfaction of multiple objectives, some of which could be quantitative.
- I am interested in extending these techniques to related areas such as *reinforcement learning and formal verification*, as well as exploring their applications in fields like *machine learning, finance and computational biology*.

Education

- Oct 2021– **Ph.D, LFCS, University of Edinburgh**
○ Advisor: *Prof. Richard Mayr*
- 2018–2019 **MPRI (Masters in CS), ENS Paris-Saclay, Cachan**
○ Advisor: *Prof. Amaury Pouly*, GPA: 14.2/20
- 2014–2018 **B.Tech CS with honors, Indian Institute of Technology, Bombay**
○ Advisor: *Prof. S.Akshay*, GPA: 8.84/10
○ Minor: Mathematics

Peer-reviewed Publications

- [1] M. Dantam, R. Mayr, Finite-Memory Strategies for Almost-Sure Energy-MeanPayoff Objectives in MDPs, **ICALP, 2024**, [\[arXiv\]](#).
- [2] M. Dantam, R. Mayr, Approximating the Value of Energy-Parity Objectives in Simple Stochastic Games, **MFCS, 2023**, [\[arXiv\]](#).
- [3] M. Dantam, A. Pouly, On the decidability of reachability in continuous time linear time-invariant systems, **HSCC, 2021**, [\[arXiv\]](#).

Pre-Prints

- [4] * L. Watson, E. Gan, M. Dantam, B. Mirzasoleiman, R. Sarkar, Inference and interference: The role of clipping, pruning and loss landscapes in differentially private stochastic gradient descent, 2023. arXiv: [2311.06839](#).

* Indicates contribution ordering.

Research and Work Experience

- 09/24 - 02/25 **Embedding R into Python, MLCOE TSRL, J.P.Morgan**
○ Reviewed existing methods to embed R into Python
○ Developed API requirements and analysed drawbacks of current embeddings
○ Coded required python extension modules in C++ with `pybind11`
- 01/20 - 08/20 **Convex Invariants for Affine Programs, Prof. Joël Ouaknine, MPI**
○ Investigated the automatic generation of polytope invariants for linear and affine dynamical systems
○ Proved the decidability of the existence of separating convex invariants in two-dimensional systems with a single matrix, and extended the result to certain multi-matrix cases under spectral constraints

Teaching Assistant Experience

- **Algorithms and Data Structures (ADS)** : Tutor, Marker → 2022
- **Algorithmic Game Theory and Applications (AGTA)** : Tutor, Marker → 2022
- **Discrete Math and Probability (DMP)** : Marker → 2022, 2023
- **Formal Verification (FV)** : Demonstrator, Marker → 2023
- **Machine Learning Theory (MLT)** : Tutor → 2023 , Marker → 2022, 2023

Tutor Responsible for clearing doubts/ solving exercises with a group (5-30) of students
Demonstrator Helping with debugging/ doubts in a lab setting

Awards & Achievements

- Recipient of **EDCS** scholarship for Ph.D. 2021
- Awarded the International Scholarship for Masters in MPRI 2018
- **All India Rank 193** in **JEE Advanced** among 150,000 students 2014
- KVPY Fellowship, Government of India 2013

Skills & Tools

- Proficient : C, C++
- Familiar : Python (Pytorch), git, bash

Selected Academic Projects

- 02/2019 **Heuristic Optimization for the Low Autocorrelation Binary Sequence (LABS) Problem**, *Prof. Carola Doerr, Prof. Christoph Dürr*, MPRI
- Benchmarked several local search heuristics—including steepest descent, tabu search, and Kernighan-Lin—for the LABS combinatorial optimization problem
 - Conducted a comparative analysis and systematically studied the influence of initial conditions on algorithmic performance
- 2017-2018 **Treewidth-Based Methods for Data Automata**, *Prof. S.Akshay*, IIT Bombay
- Extended treewidth-based techniques to a class of register automata, enabling new decidability results for the emptiness problem
 - Introduced a novel graph semantics with bounded treewidth for register systems, and identified necessary restrictions for realizability
- 2018 **Verifying LCS has Non-recursive Complexity**, *Prof. S.Akshay*, IIT Bombay
- Presented the paper "Verifying Lossy Channel Systems has Non-Recursive Complexity" by Ph. Schnoebelen.
- 2018 **On Size-Ramsey Number of Paths**, *Prof. Nikhil Karamchandani*, IIT Bombay
- Investigated the size-Ramsey number of graphs and presented a proof of the linearity of size-Ramsey number of paths by Andrzej Dudek and Paweł Prałat
- 2017 **Properties of Tree Walking Automata**, *Prof. S.Akshay*, IIT Bombay
- Conducted an in-depth literature review on tree walking automata (TWA), and presented key results including the subsumption of TWA by bottom-up tree automata, closure properties under complementation, and the strict inclusion of deterministic TWA by their non-deterministic counterparts
- 2017 **Pseudorandom Generators and Complexity**, *Prof. Nutan Limaye*, IIT Bombay
- Studied foundational results in cryptographic pseudorandomness, including one-way functions and the Goldreich-Levin theorem, through the lens of computational complexity. Presented and discussed key sections from Arora and Barak's textbook