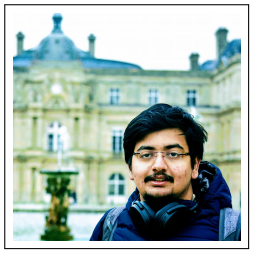
Ritam Raha



Personal Data

Address:	University of Antwerp, Campus Middelheim, Belgium
email:	ritam.raha18@gmail.com | ritam.raha@uantwerpen.be
Current Education:	Joint Doctoral Student (cotutelle) in Computer Science University of Antwerp & LaBRI, University of Bordeaux
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Research Interest

My research interest lies in the intersection of *Modelling, Learning & Verification*. I am interested in learning human-interpretable models from complex systems or modelling them into formal models like Automata, Games and then applying different Formal Verification techniques to ensure safety. My area of interest includes Formal Verification, Logic and Automata, and Artificial Intelligence.

Education

Current 2019-Present	**University of Antwerp, Belgium & University of Bordeaux, France** Ph.D. Student in Computer Science Advisor: Guillermo A. Pérez & Nathanaël Fijalkow
2017-2019	**Chennai Mathematical Institute, India** M.Sc. in Computer Science Thesis: Reachability Games With Strong AND Relaxed Energy Constraints (Advised by Nicolas Markey & Loïc Hélouët, INRIA Rennes)
2014-2017	**Chennai Mathematical Institute, India** B.Sc. in Mathematics & Computer Science

Publication

- (Submitted) Scalable Anytime Algorithms for Learning Formulas in Linear Temporal Logic.
  Ritam Raha, Rajarshi Roy, Nathanaël Fijalkow, Daniel Neider

  Description: Linear temporal logic (LTL) is a specification language for finite sequences (called traces) widely used in program verification, motion planning in robotics, process mining, and many other areas. We consider the problem of learning LTL formulas for classifying traces; In this work, we introduce a new algorithm to this problem which is scalable than existing techniques both in terms of sample size and formula size.

- (Conference) Revisiting Parameter Synthesis for One-Counter Automata. CSL 2022
  Guillermo A. Pérez, Ritam Raha

  Description: Our interest in one-counter automata (OCA) with parameters stems from their usefulness as modelling and verifying the behaviour of programs whose control flow is determined by counter variables. We study the synthesis problems for this model that asks, whether there exists a valuation of the parameters such that all infinite runs of the automaton satisfy some ω-regular property. We show that these problems are decidable via reducing it to a newly introduced fragment of Logic.

- (Journal) Reachability Games with Relaxed Energy Constraints. Information and Computation
  Guillermo A. Pérez, Ritam Raha

  Description: This is the extended version of the GandALF paper where we also solves the existence of relaxed bound questions for the Reachability Games.

- (Conference) Reachability Games with Relaxed Energy Constraints. GandALF 2019
  Loïc Hélouët, Nicolas Markey, Ritam Raha

  Description: Weighted games are a common way to formally address questions related to consumption, production and storage of resources. It is a turn-based two player games used in modelling the interactions of the system with its hostile environment. In this work, we solve these games with relaxed upper and lower-bound constraints on the source.

Tool

- SCARLET (SCalable Anytime algoRithm for LEarning lTl): A prototype for Learning LTL formulas from positive and negative traces, implemented in Python 3. It is publicly available at GitHub.

Courseworks

Computer Science Courses	Basic & Advanced Automata Theory, Design of Algorithms, Data Mining & Machine learning, Reinforcement Learning, Model Checking & System Verification, Complexity Theory, Logic - Automata & Games, Optimization Techniques, Concurrent Programming, Linear Programming and Convex Optimization
Programming Courses	Python, Java, Haskell, Applied Machine Learning
Mathematics Courses	Algebra I, II & III (Group, Rings, Vector Spaces, Fields), Calculus I, II & III, Topology, Differential Equations, Real & Complex Analysis

Internship Experience

Winter 2018	**Master's Intern at INRIA, Rennes** Worked under Prof. Nicolas Markey and Prof. Loic Helouet on "Reachability Games with Relaxed Energy Constraints"
Summer 2018	**Research Intern at LaBRI, Bordeaux** Worked under Prof. Nathanael Fijalkow, Vincent Penelle, Filip Mazowiecki and Nathan Lhote on "Weighted Automata with Ambiguity and Extensions"
Summer 2017	**Research Intern at LSV, ENS Cachan** Worked under Prof. Philippe Schnoebelen on "Piecewise Testable Index of Words and Its Algorithmic Evaluation"
Summer 2016	**Summer Intern at Institute of Mathematical Sciences, Chennai** Worked under Prof. Teodor Knapik, a visiting faculty at IMSc., from University of Caledonia, on *"Automatic Structures and Presentations"* and also an official intern at TCS summer programme by IMSc.

Research Experience & Talks

- Reviewed several papers in peer-reviewed conferences and journals e.g., FORMATS, FSTTCS, IC, IPL
- Presented my work in several workshops and conferences like HIGHLIGHTS & MOVEP
- Presented my work in weekly seminars in different universities

Teaching Experience

- Co-supervised Master's Thesis Internship for two CS students in the University of Antwerp
- Worked as a Teaching-Assistant on "Concurrency Theory" course under Prof. Madhavan Mukund
- Worked as a Teaching-Assistant on "Mathematical Logic" course under Prof. M. Praveen
- Worked as a part-time teacher for VISTAMIND, Chennai

Programming Skills

Languages:	Python (Advanced), C++ (Basic), Bash
SAT/SMT solvers:	CVC4, Z3
Others:	LaTeX, HTML & CSS

References

- **Guillermo Alberto Perez** (Ph.D. advisor) *Head of the Formal Techniques in Software Engineering (FOTS) lab, a part of the AnSyMo research group.*

  Email Id: guillermoalberto.perez@uantwerpen.be

- **Nathanael Fijalkow** (Ph.D. advisor) *full-time (permanent) researcher at CNRS in LaBRI, Bordeaux*

  Email Id: nathanael.fijalkow@labri.fr

- **Nicolas Markey** (Master's thesis advisor) *CNRS senior researcher at IRISA*

  Email Id: nicolas.markey@irisa.fr

- **B. Srivathsan** *Professor, Chennai Mathematical Institute*

  Email Id: sri@cmi.ac.in

- **Madhavan Mukund** *Professor and Dean of Studies, Chennai Mathematical Institute*

  Email Id: madhavan@cmi.ac.in

- **Rajarshi Roy** (co-author of the tool paper) *Doctoral Student, Max Planck Institute for Software Systems, Germany*

  Email Id: rajarshi@mpi-sws.org