

EDUCATION

École Normale Supérieure (ENS) Paris-Saclay, Université Paris-Saclay Ph.D. in Computer Science, Advisor: Prof. Alain Finkel and Prof. Serge Haddad . <ul style="list-style-type: none">– Thesis: “Verification of infinite-state systems and machine learning”– To be completed around October 2021	Paris, France 2018 – Current
Technion – Israel Institute of Technology M.S. in Mathematics, Advisor: Prof. Roy Meshulam <ul style="list-style-type: none">– Thesis: “D-collapsibility and its applications”	Haifa, Israel 2015 – 2018
Technion – Israel Institute of Technology B.S. in Mathematics with specialization in Computer Science	Haifa, Israel 2011 – 2015

EXPERIENCE

Programming Projects Project developed during the PhD <ul style="list-style-type: none">– LeaRNNify - PDV¹: A tool performing verification of Recurrent neural networks’s according to a given regular language. This tool is written in Python using the PyTorch library and is based on the ideas developed in [3].– MinCov²: Python implementation of an algorithm computing the clover for a given Petri net. This tool is based on the ideas developed in [5].	Paris, France 2018 – current
Intel Student position during my Bachelor’s studies (2 days a week) <ul style="list-style-type: none">– Involved in two projects. Both were in-house tools used to help with chip verification. Written mainly in C#.– Member of the “Tools and Practices” committee.	Haifa, Israel 2013 – 2015

SKILLS

- **Programming:**
 - Python:** Used as my weapon of choice in all recent projects. From *MinCov* an implementation of a verification algorithm, to *LeaRNNify - PDV* a machine learning project.
 - Cython:** Recently started translating small sections of my Python code to Cython in order to get performance boosts for critical computations.
 - C#:** During my free time I’ve started working on a game using Unity, where the code is written in C#.
 - C, C++:** Used during my undergraduate studies and my work in Intel.
- **Machine Learning:** Learning and using **PyTorch** for the last year. In *LeaRNNify - PDV* I helped develop a tool learning and verifying Recurrent Neural Networks.
- **Scientific Programming:**
 - SageMath:** Used SageMath for my M.S. thesis in order to find simplicial complexes with specific properties.
 - Matlab:** Used during my undergraduate studies.

¹github.com/LeaRNNify/Property-directed-verification

²github.com/IgorKhm/MinCov

SCHOLARSHIPS AND AWARDS

- Full Ph.D. Scholarship from ENS Paris-Saclay 2018 – 2021
- Excellent Instructor - 3×Awards 2016 - 2018
- Full M.S. Scholarship from Technion – Israel Institute of Technology 2015 – 2018

PUBLICATIONS

- [1] B. Barbot, B. Bollig, A. Finkel, S. Haddad, I. Khmelnitsky, M. Leucker, D. Neider, R. Roy, and L. Ye, *Extracting context-free grammars from recurrent neural networks using tree-automata learning and a* search*, (Accepted in ICGI'21, to be published in its proceedings), 2021.
- [2] A. Finkel, S. Haddad, and I. Khmelnitsky, “Coverability, termination, and finiteness in recursive Petri nets”, 2021, (Submitted to a special issue journal for Petri Nets 2019).
- [3] I. Khmelnitsky, D. Neider, R. Roy, B. Barbot, B. Bollig, A. Finkel, S. Haddad, M. Leucker, and L. Ye, *Property-directed verification and robustness certification of recurrent neural networks*, (Accepted in ATVA'21, to be published in its proceedings), 2021.
- [4] A. Finkel, S. Haddad, and I. Khmelnitsky, “Commodification of accelerations for the Karp and Miller Construction”, *Discrete Event Dynamic Systems*, pp. 1–20, 2020.
- [5] A. Finkel, S. Haddad, and I. Khmelnitsky, “Minimal coverability tree construction made complete and efficient”, in *Foundations of Software Science and Computation Structures (FOSSACS)*, 2020, pp. 237–256.
- [6] S. Haddad and I. Khmelnitsky, “Dynamic recursive petri nets”, in *Application and Theory of Petri Nets and Concurrency*, 2020, pp. 345–366.
- [7] A. Finkel, S. Haddad, and I. Khmelnitsky, “Coverability and termination in recursive petri nets”, in *Application and Theory of Petri Nets and Concurrency*, 2019, pp. 429–448.
- [8] A. Finkel, S. Haddad, and I. Khmelnitsky, “R efication des acc el erations pour la construction de Karp et Miller”, in *MSR'19*, 2019.

ACADEMIC PROJECTS AND ACTIVITIES

- Member of LeaRNNify³ 2020 – current
A research project at the interface of formal methods and artificial intelligence. Its aim is to bring together two different kinds of algorithmic learning, namely grammatical inference and learning of neural networks.
- Member of scientific committee and organiser of ForMal⁴ spring school, 2018 – 2019
Spring school focused on the topics of Formal Methods and Machine Learning.

TEACHING

- **Teaching Assistant** at ENS Paris-Saclay 2019 – 2020
Discrete mathematics
Architecture and systems
- **Teaching Assistant** at Technion 2015 – 2018
Linear algebra
Combinatorial algorithms

LANGUAGES

- **English:** Fluent
- **Hebrew:** Native
- **Russian:** Oral fluency
- **French:** Beginner

³www.learnnify.org

⁴www.formal-paris-saclay.fr