Elena Gutiérrez

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About Me

I am a 4th-year Ph.D. student at the IMDEA Software Institute in Madrid, supervised by Prof. Pierre Ganty, expecting to graduate before October 2020.
My research interests are mainly focused on the theory of finite and weighted automata and its applications to software verification and machine learning.
Before joining IMDEA, I studied a Double Degree in Mathematics and Computer Science at Universidad Autónoma de Madrid.

Research Experience

Sept. 2016 - Present IMDEA Software Institute and Universidad Politécnica de Madrid
PhD. in Software, Systems and Computing supervised by Prof. Pierre Ganty

Working on the language-theoretical aspects of finite and weighted automata constructions including pushdown automata and weighted context-free languages; learning-automata, minimization and other optimization algorithms for finite automata and weighted automata.

May. 2019 - Nov. 2019 National Institute of Informatics in Tokyo (Japan)
6-month internship supervised by Prof. Ichiro Hasuo

Developing a genetic-algorithm-based metaheuristic (in C) for solving the problem of finding the word with the highest weight in a weighted automaton over the reals. The goal is to use it in combination with a procedure that translates recurrent neural networks into weighed automata to enable an efficient analysis of these networks.

2013 - 2015 IMDEA Software Institute
3-month summer internships supervised by Prof. Pierre Ganty

Exploring the use of Horn clauses for the formal verification of programs. As a result I developed a Prolog algorithm that translates non-linear logic programs into linear preserving their meaning.

Publications

2020 **Genetic Algorithm for the Weighted Maximization Problem on Weighted Automata**
E. Gutiérrez, T. Okudono, M. Waga and I. Hasuo. Published in GECCO 2020

2019 **A Congruence-based Perspective on Automata Minimization Algorithms**
P. Ganty, E. Gutiérrez and P. Valero. Published in MFCS 2019

2018 **The Parikh Property for Weighted Context-Free Grammars**
P. Ganty and E. Gutiérrez. Published in FSTTCS 2018

2017 **Parikh Image of Pushdown Automata**
P. Ganty and E. Gutiérrez. Published in FCT 2017

Bachelor's Thesis

2016 **Linearisation of Index Bounded Sets of Horn Clauses**.
Supervised by Prof. Pierre Ganty
A Prolog algorithm that transforms non-linear logic programs into linear preserving their meaning.

Education

2016 - Present PhD. in Software Systems and Computing
Universidad Politécnica de Madrid
Expected graduation date: October 2020

2011 - 2016 Double Degree in Mathematics and Computer Science (360 ECTS)
Universidad Autónoma de Madrid | Average Grade (out of 10) - 8.2

Languages

English Fluent TOEFL iBT (Feb. 2016). Total (out of 120): 104
Spanish Native
French Basic

Programing Languages

- **Most experienced with:** C, Prolog, Python and LaTeX
- **Some experience with:** Haskell, C++, HTML, Shell

Grants

2017- 2021 Predoctoral Contract for PhD. Training Grant (FPI)
Provided by the Spanish Ministry of Economy, Industry and Competitiveness

Schools/Seminars Attended

- womENcourage 2018, ACM Celebration of Women in Computing. 3–5, October, 2018. Belgrade, Serbia.
- 2nd School on Formal Verification by The Hebrew University. 17–21, December, 2017. Jerusalem, Israel.
- Microsoft Research PhD. Summer School. 4–8, July, 2016. Cambridge, UK.

Conference/Public Talks

June, 2020 *A Congruence-based Perspective on Automata Minimization Algorithms*
Presentation at the Séminaire de l'équipe Méthodes Formelles at LaBRI. June 23rd, 2020

June, 2020 *A Congruence-based Perspective on Automata Minimization Algorithms*
S3, Seminar Series at Imdea Software Institute. June 16th, 2020

Aug., 2019 *A Congruence-based Perspective on Automata Minimization Algorithms*
Presentation at MFCS 2019 in Aachen, Germany. August 29th, 2019

March, 2019 *Undecidability and Context-Free Languages*
S3, Seminar Series at Imdea Software Institute. March 25th, 2019

Feb., 2019 *¿Cómo garantizar que un programa hace lo que esperas?"*
I+D+M^2. Mujeres en Montegancedo. February 11th, 2019

Dec., 2018 *The Parikh Property for Weighted Context-Free Grammars*
Presentation at FSTTCS 2018 in Ahmedabad, India. December 12th, 2018

Sept., 2018 *The Parikh Property for Weighted Context-Free Grammars*
Formal Methods and Verification Seminar at Université Libre de Bruxelles. Sept. 26th, 2018

April, 2018 *Weighted Context-Free Grammars: Does Parikh's Theorem still hold?*
S3, Seminar Series at Imdea Software Institute. April 3rd, 2018

Sept., 2017 *Parikh Image of Pushdown Automata*
Presentation at FCT 2017 in Bordeaux, France. September 11th, 2017

March, 2017 *Parikh Image of Pushdown Automata*
S3, Seminar Series at Imdea Software Institute. March 7th, 2017

Additional Information

Teaching experience Support classes for students at secondary education
Mathematics, English, Physics and Chemistry

Volunteer work AFS International ONG
Coordination of exchange activities for foreign students in Spain
Soñar Despierto Foundation
Support classes for students coming from marginalized backgrounds

Interests Running (medium: 10 km, and long: 21 km distances)