Paulo Santos

Paulo Alexandre Canelas dos Santos
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Research Interests

I am currently a Doctoral student at Laboratory of Large Scale Systems (LASIGE) in Department of Informatics, Faculty of Sciences, University of Lisboa. I have a special interest in programming languages, evolutionary algorithms, and most recently the combination of both to allow improved automatic program synthesis and repair systems. I consider myself as a very persistent person, always ready to engage in new ideas. Outside of "geek world", I am an easy-going person who likes traveling and exploring the local gastronomy (you could say I am a foodie).

Education

2020–2024 (expected) **PhD in Informatics**, *Faculty of Sciences*, University of Lisbon.
PhD Advisor: Alcides Fonseca.

2018–2020 **MSc. Software Engineering**, *Faculty of Sciences*, University of Lisbon.
Dissertation: Towards the Conceptualization of Refinement Typed Genetic Programming.

2015–2018 **BSc. Informatics Engineering**, *Faculty of Sciences*, University of Lisbon.

Publications

Submitted **Type-safe Synthesis for Genetic Probabilistic Programming**.
Guilherme Espada*, **Paulo Santos***, and Alcides Fonseca. 2021. In the *Languages for Inference* (*LAFI*) track for the Principles of Programming Languages (POPL 2021) conference.

2020 **Extending Java with Refinements**.
Catarina Gamboa, **Paulo Santos**, and Alcides Fonseca. 2020. In *Program Semantics, Specification and Verification: Theory and Applications* (*PSSV-2020*).

2020 **The Usability Argument for Refinement Typed Genetic Programming**.
Alcides Fonseca, **Paulo Santos**, and Sara Silva. 2020. In Parallel Problem Solving from Nature – PPSN XVI.

2020 **Refined typed genetic programming as a user interface for genetic programming**.
Paulo Santos, Sara Silva, and Alcides Fonseca. 2020. In *Proceedings of the 2020 Genetic and Evolutionary Computation Conference Companion* (*GECCO '20*).

2019 **Dependent and Refined-Typed Genetic Programming**.
Paulo Santos, Alcides Fonseca, Vasco Vasconcelos, Andreia Mordido, and Sara Silva. 2019. In the national conference of *INForum - Informatics Symposium*.

Academic Enrollment

February 2021 **Invited Teaching Assistant**.
Teaching and Scientific Divulgation which is a course in the PhD program requiring the students to teach theoretical-practical classes. I will be responsible for the Object Oriented Development course (2nd Year).

September 2020 **EDP University Challenge - Portugal**, Top15.
Every year the major energy company in Portugal, Energy of Portugal (EDP), organizes a competition for the students in University. In this edition, I achieved the top 15 out of 1152 teams (4138 students) with the project ecoServer: a system to optimize the energy impact of servers in data centers.

February 2020 **LASIGE Workshop'20**, Best Poster - 1st.
In the annual gathering of the LASIGE research unit, MSc. and PhD. students compete on a challenge to develop and expose a poster on their current work. In the 2020 edition, the poster I presented about my MSc. Thesis obtained the first place.

November 2019 **COST ACTION CA15140 - ImAppNIO**.
During the MSc. Thesis period I attended a Doctoral School at University of Coimbra, the Improving Applicability of Nature-Inspired Optimisation by Joining Theory and Practice Training School, to more deeply improve my knowledge in evolutionary computation essential for my thesis.

Research Experience

Accepted 2020 **Visiting Student**, Institute for Software Research, Carnegie Mellon University.
Accepted in the CMU|Portugal program. Visiting postponed due to coronavirus.

May 2019 - Currently **Student Researcher**, *LASIGE*, Faculty of Sciences, University of Lisbon.
Engaged in creating a new functional programming language allowing the programmer to synthesize refined-typed programs with genetic programming.

Research Projects

2020 **ÆON - A Programming Language for Refinement Typed Program Synthesis**.
Æon is a programming language with polymorphism and refinement types used as the basis for Refinement Typed Genetic Programming (RTGP) which allows the complete synthesis of programs. In this project, I was responsible for developing the language syntactic sugar frontend, the evolutionary approach, and the optimizations on the non-deterministic synthesizer from liquid types.

2020 **Genetic Probabilistic Programming Framework**.
This work proposes the combination of Genetic Programming (GP), as a search method for finding a probability model layout, with DPP, for learning the parameters of the layout. In this work, I was responsible for developing the probabilistic programming language, the non-deterministic synthesis of the program expressions, and the genetic programming approach.