Curriculum Vitae

Diogo Miguel Ferreira Poças

Personal information

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About me

I am a professor and researcher at the Department of Informatics, FCUL (Faculdade de Ciências da Universidade de Lisboa). My ongoing research focuses on two topics: session types for modeling communication protocols and programs; and algorithmic game theory, specifically equilibria computation in games. In the past, I worked on analog computing models for solving differential equations; and on hybrid computing models that model the power of physical experiments connected to a digital machine.

Research interests

Session types, Algorithmic game theory, Analog computing, Computational complexity

Education

2014–2017 PhD in Mathematics at McMaster University, Hamilton, ON, Canada.

2013–2014 MSc in Mathematics at McMaster University, Hamilton, ON, Canada (transfer to PhD after one year).

2011–2013 MSc in Mathematics and Applications at IST (Instituto Superior Técnico), Lisbon, Portugal (*Final grade average: 20/20*).

2008–2011 BSc in Applied Mathematics and Computation at IST (Instituto Superior Técnico), Lisbon, Portugal (*Final grade average: 19/20*).

Academic positions

Since 2020 Invited Assistant Professor at the Department of Informatics, FCUL (Faculdade de Ciências da Universidade de Lisboa), Lisbon, Portugal.

Since 2020 Integrated Researcher at the LASIGE Research Unit.

2018-2020 Postdoctoral Researcher at the Chair of Operations Research, TUM (Technische Universität München), Munich, Germany.

Publications

Refereed journal publications

[1] Robust Revenue Maximization Under Minimal Statistical Information (with Y.Giannakopoulos and A. Tsigonias-Dimitriadis). Accepted in *ACM Transactions on Economics and Computation* (2022).

[2] A Unifying Approximate Potential for Weighted Congestion Games (with Y. Giannakopoulos). Accepted in *Theory of Computing Systems* (2022).

[3] Existence and Complexity of Approximate Equilibria in Weighted Congestion Games (with G. Christodoulou, M. Gairing, Y. Giannakopoulos and C. Waldmann). Accepted in *Mathematics of Operations Research* (2022).

[4] The Power of Machines That Control Experiments (with J.F. Costa and V.B. de Brito). *International Journal of Foundations of Computer Science* (2022).
doi:10.1142/S0129054122500010

[5] The Competitive Pickup and Delivery Orienteering Problem for Balancing Carsharing Systems (with L. Martin, S. Minner and A.S. Schulz). *Transportation Science* (2021).
doi:10.1287/trsc.2021.1041

[6] A New Lower Bound for Deterministic Truthful Scheduling (with Y. Giannakopoulos and A. Hammerl). *Algorithmica* (2021).
doi:10.1007/s00453-021-00847-2

[7] Optimal pricing for MHR and λ-regular distributions (with Y. Giannakopoulos and K. Zhu). *ACM Transactions on Economics and Computation* (2021).
doi:10.1145/3434423

[8] Tracking computability of GPAC-generable functions (with J. Zucker). *Journal of Logic and Computation* (2021).
doi:https://doi.org/10.1093/logcom/exaa081

[9] Approximability in the GPAC (with J. Zucker). *Logical Methods in Computer Science* (2019).
doi:10.23638/LMCS-15(3:24)2019

[10] Analog networks on function data streams (with J. Zucker). *Computability: The Journal of the Association CiE* (2018).
doi:10.3233/COM-170077

[11] Transient growth in stochastic Burgers flows (with B. Protas). *Discrete and Continuous Dynamical Systems - Series B* (2018).
doi:10.3934/dcdsb.2018052

[12] Solving Smullyan puzzles with formal systems (with J.F. Costa). *Axiomathes* (2017).
doi:10.1007/s10516-017-9339-1

[13] Computations with oracles that measure vanishing quantities (with E. Beggs, J.F. Costa and J.V. Tucker). *Mathematical Structures in Computer Science* (2016).
doi:10.1017/S0960129516000219

[14] An analogue-digital Church-Turing thesis (with E. Beggs, J.F. Costa and J.V. Tucker). *International Journal of Foundations of Computer Science* (2014).
doi:10.1142/S0129054114400012

[15] Simple reaction systems and their classifications (with L. Manzoni and A.E. Porreca). *International Journal of Foundations of Computer Science* (2014).
doi:10.1142/S012905411440005X

[16] Oracles that measure thresholds: the Turing machine and the broken balance (with E. Beggs, J.F. Costa and J.V. Tucker). *Journal of Logic and Computation* (2013).
doi:10.1093/logcom/ext047

Refereed conference publications

[17] Higher-order Context-free Session Types in System F (with D. Costa, A. Mordido and V.T. Vasconcelos). *13th International Workshop on Programming Language Approaches to Concurrency and Communication-cEntric Software (PLACES 2022)*.
doi:10.4204/EPTCS.356.3

[18] The Different Shades of Infinite Session Types (with S.J. Gay and V.T. Vasconcelos). *25th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS 2022)*.
doi:10.1007/978-3-030-99253-8_18

[19] On the Complexity of Equilibrium Computation in First-Price Auctions (with A. Filos-Ratsikas, Y. Giannakopoulos, A. Hollender and P. Lazos). *22nd ACM Conference on Economics and Computation (EC 2021)*.
doi:10.1145/3465456.3467627

[20] Robust revenue maximization under minimal statistical information (with Y.Giannakopoulos and A. Tsigonias-Dimitriadis). *16th International Conference on Web and Internet Economics (WINE 2020)*.
doi:10.1007/978-3-030-64946-3_13

[21] A Unifying Approximate Potential for Weighted Congestion Games (with Y. Giannakopoulos). *13th International Symposium on Algorithmic Game Theory (SAGT 2020)*.
doi:10.1007/978-3-030-57980-7_7

[22] A New Lower Bound for Deterministic Truthful Scheduling (with Y. Giannakopoulos and A. Hammerl). *13th International Symposium on Algorithmic Game Theory (SAGT 2020)*.
doi:10.1007/978-3-030-57980-7_15

[23] Existence and complexity of approximate equilibria in weighted congestion games (with G. Christodoulou, M. Gairing, Y. Giannakopoulos and C. Waldmann). *47th International Colloquium on Automata, Languages, and Programming (ICALP 2020)*.
doi:10.4230/LIPIcs.ICALP.2020.32

[24] Tracking computability of GPAC-generable functions (with J. Zucker). *International Symposium on Logical Foundations of Computer Science (LFCS 2020)*.
doi:10.1007/978-3-030-36755-8_14

[25] Register requirement minimization of fixed-depth pipelines for streaming data applications (with T. Goldbrunner, N. Anh Vu Doan, T. Wild and A. Herkersdorf). *32nd IEEE International System-on-Chip Conference (SOCC 2019)*.
doi:10.1109/SOCC46988.2019.1570548393

[26] On the power of threshold measurements as oracles (with E. Beggs, J.F. Costa and J.V. Tucker). *12th International Conference on Unconventional Computation and Natural Computation (UCNC 2013)*.
doi:10.1007/978-3-642-39074-6_3

Book chapters

[27] Fixed point techniques in analog systems (with J. Zucker). *Mathematical and Computational Approaches in Advancing Modern Science and Engineering* (2016).
doi:10.1007/978-3-319-30379-6_63

[28] An analogue-digital model of computation: Turing machines with physical oracles (with T. Ambaram, E. Beggs, J.F. Costa and J.V. Tucker). *Advances in Unconventional Computing: Emergence, Complexity and Computation* (2016).
doi:10.1007/978-3-319-33924-5_4

[29] Testes de primalidade. *Números, cirurgias e nós de gravata: 10 anos de Seminário Diagonal no IST*, IST Press (2012).

Dissertations

[30] Analog computability with differential equations. PhD. Dissertation. Advisor: J. Zucker (2017).

[31] Complexity with costing and stochastic oracles. M.Sc. Dissertation, *20 valores*. Advisor: J.F. Costa (2013).

Work in progress

[32] On the Complexity of Equilibrium Computation in First-Price Auctions (with A. Filos-Ratsikas, Y. Giannakopoulos, A. Hollender and P. Lazos). Submitted to *SIAM Journal on Computing*.

Teaching experience

2022 *Programação II*, University of Lisbon. About 140 students. Lecturer for exercise classes.

2021 *Programação I*, University of Lisbon. About 140 students. Lecturer for exercise classes.

Princípios de Programação, University of Lisbon. About 180 students. Lecturer for exercise classes.

Programação II, University of Lisbon. About 140 students. Lecturer for exercise classes.

Desenvolvimento Centrado em Objetos, University of Lisbon. About 180 students. Lecturer for exercise classes.

2020 *Programação I*, University of Lisbon. About 140 students. Lecturer for exercise classes.

Princípios de Programação, University of Lisbon. About 180 students. Lecturer for exercise classes.

Combinatorial Optimization, Technical University of Munich. About 40 students. Course taught in a flipped classroom approach. Lecturer for exercise classes.

2019 *Discrete Optimization and Machine Learning*, Technical University of Munich. 8 students. Seminar course. Individual meetings with students.

Special Topics in Algorithmic Game Theory, Technical University of Munich. About 50 students. Lecturer for exercise classes. Main responsible for preparing, presenting and grading exercises.

Complexity in Game Theory, Technical University of Munich. 6 students. Seminar course. Individual meetings with students.

2018 *Special Topics in Algorithmic Game Theory*, Technical University of Munich. About 50 students. Lecturer for exercise classes. Main responsible for preparing, presenting and grading exercises.

2013-2015 Teaching assistant, McMaster University. Overseeing study rooms (*Math Help Centre*). Lecturer for lab classes (*Engineering in Mathematics*).

MSc Student Supervision

Ongoing Inês Sardinha, *Algorithms for Infinite Session Types* (co-supervised with Vasco T. Vasconcelos).

Diogo Rodrigues, *Cybersecurity Aware Game 2.0*.

2022 Sónia Fernandes, *Interfaces em idiomas RightToLeft*.

Nuno Nelas, *Proof-of-Attention: uma implementação em blockchain segura e confiável?*

2020 Martin Wiesner, *A Study of the Hotelling Game with Capacity Constraints* (co-supervised with Andreas S. Schulz).

Erik Martori López, *Smoothed complexity on the local max-cut problem* (co-supervised with Andreas S. Schulz).

Grants

2015–2017 FCT (Fundação para a Ciência e Tecnologia) Doctoral Grant.

2009–2010 Programa Novos Talentos em Matemática (New Talents in Mathematics), Calouste Gulbenkian Foundation, Scientific Initiation Grant.
Advisor: Margarida Mendes Lopes, IST (Instituto Superior Técnico).

2008–2009 Programa Novos Talentos em Matemática (New Talents in Mathematics), Calouste Gulbenkian Foundation, Scientific Initiation Grant.
Advisor: Carlos Caleiro, IST (Instituto Superior Técnico).

Awards and honors

2021 Best Early Career Researcher Award, LASIGE. Awarded in recognition of outstanding scientific research developed.

2015 International Excellence Award, McMaster University. Awarded to international (visa) students with recognized excellence in academics, research, and extracurricular activities.

2012 Merit Scolarship, UTL (Universidade Técnica de Lisboa). Awarded to undergraduate or graduate students for exceptional academic performance.

2011 Professor Jaime Campos Ferreira Award, DMIST (Departamento de Matemática do Instituto Superior Técnico). Awarded to undergraduate students for academic merit in Mathematics.

Caixa Geral de Depósitos Award, CGD (Caixa Geral de Depósitos), IST (Instituto Superior Técnico). Awarded to students with the highest grade average in each program.

2009 Merit Scolarship, UTL (Universidade Técnica de Lisboa). Awarded to undergraduate or graduate students for exceptional academic performance.

2008 Silver Medal, Portuguese Math Olympics, SPM (Sociedade Portuguesa de Matemática). National competition among high school students.

2007 Silver Medal, Portuguese Math Olympics, SPM (Sociedade Portuguesa de Matemática). National competition among high school students.

Talks and presentations

2022-04-06 The different shades of infinite session types. *25th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS 2022)*, Munique, Alemanha.

2022-03-14 Dia do Pi (**scientific outreach**). *Informática em Ciências*.
`https://youtu.be/UIHDoyWE-r8`

2020-09-17 A Unifying Approximate Potential for Weighted Congestion Games. *Symposium on Algorithmic Game Theory*, Augsburg, Germany.

2020-07-09 Existence and Complexity of Approximate Equilibria in Weighted Congestion Games. *International Colloquium on Automata, Languages and Programming*, Saarbrücken, Germany.

2020-01-07 Tracking computability of GPAC-generable functions. *Symposium on Logical Foundations of Computer Science*, Deerfield Beach, FL, USA.

2018-08-06 Analog computability with differential equations (**invited talk**). *Computability and Complexity in Analysis*, Lake Kochel, Germany.

2016-06-15 Analog networks on function data streams. *Computability and Complexity in Analysis*, Universidade do Algarve, Faro, Portugal.

2015-06-08 Fixed point techniques in analog systems. *AMMCS-CAIMS Congress*, Wilfrid Laurier University, Waterloo, ON, Canada.

2013-07-04 On the power of threshold measurements as oracles. *Unconventional Computation and Natural Computation*, Università degli Studi di Milano-Bicocca, Milan, Italy.

Other activities

2022 Member of MSc defense committee, Marisa Mourão, *Quality Assurance: Testes de Aceitação para um Software de Gestão de Empresas*. MSc in Informatics Engineering, FCUL.

2021 Member of MSc defense committee, Mário Teixeira, *Transport-on-Demand (ToD) Planner for MaaS – Resources Management*. MSc in Informatics Engineering, FCUL.

2022 Reviewer, *25th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS 2022)*.

2021 Best Early Career Researcher Award, LASIGE. Prémio atribuído em reconhecimento a investigação científica excecional.

2021 Reviewer, *Transactions on Programming Languages and Systems (TOPLAS)*.

2021 Reviewer, *62nd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2021)*.

2021 Reviewer, *30th European Symposium on Programming (ESOP 2021)*.

since 2020 Member of Scientific Council, LASIGE Research Unit.

since 2020 Member of Department Council, Department of Informatics, FCUL.

2020 Reviewer, *13th Symposium on Algorithmic Game Theory (SAGT 2020)*.

2018 Reviewer, *Handbook of Computability and Complexity in Analysis*.

2013 Reviewer, *12th International Conference on Unconventional Computation and Natural Computation (UCNC 2013)*.