Guilherme Dias da Fonseca

Curriculum Vitæ

Date of birth:	May 11, 1978
Place of birth:	Rio de Janeiro, Brazil
Nationality:	Brazilian
Position:	Maître de conférences in Computer Science
University:	Aix-Marseille University
	IUT d'informatique
	Arles, France
E-mail:	guilherme.fonseca@lis-lab.fr
Web site:	https://pageperso.lis-lab.fr/guilherme.fonseca/

Career Since 2019, I'm a computer science professor at the IUT of Aix-Marseille University, doing my research at LIS Lab. Before, I had the same position at Université Clermont Auvergne from 2015 to 2019, doing my research at LIMOS. I got my HDR at Université Côte d'Azur in 2018, while spending a research year at INRIA, Sophia Antipolis, in the DataShape team. In 2014, I was a temporary professor (ATER) at Université de Montpellier, France, doing my research at LIRMM. Earlier, I was a professor at Unirio, Brazil from 2009 to 2012. In 2008, I was a Postdoc student at COPPE - UFRJ, advised by Celina de Figueiredo. I got my PhD at the University of Maryland, College Park in 2007, advised by David Mount.

Specializations: Computational geometry, algorithms, data structures, mathematics for computer science, discrete geometry, graphs, approximation

Teaching and Research Experience

2019 – present: **Associate Professor (Maître de conférences)**
Aix-Marseille University and LIS, France
Classes taught (500 hours): *Algorithms and Data Structures, Distributed Algorithms, Object-Oriented Programming, Mathematical Modeling, Operations Research, Operating Systems*

2015 – 2019: **Associate Professor (Maître de conférences)**
Université Clermont Auvergne and LIMOS, France
Classes taught (800 hours): *Algorithms and Data Structures, Distributed Algorithms, Mathematics for Computer Science, Documents and Interfaces, Mathematical Modeling*

2017 – 2018: **Visiting researcher (Délégation)**
INRIA, Sophia Antipolis, France
Team: Datashape (former Geometrica)
Director: Jean-Daniel Boissonnat

2014 – 2015: **Temporary Professor (ATER)**
Université Montpellier 2 and LIRMM, France
Classes taught (100 hours): *Imperative Programming; Algorithms and Complexity*

2009 – 2012: **Associate Professor (Professor adjunto)**
Universidade Federal do Estado do Rio de Janeiro, Brazil
Classes taught (900 hours): *Complexity of Algorithms, Formal Languages and Automata, Probability, Computer Graphics, Data Structures, Introduction to Programming*

2008 – 2009: **Postdoctoral Scholar**
Universidade Federal do Rio de Janeiro, Brazil
Classes taught (200 hours): *Complexity of Algorithms, Computational Geometry, Data Structures*

2006 (summer): **Instructor**
University of Maryland, USA
Class taught (48 hours): *Organization of Programming Languages*

2003 – 2007: **Teaching Assistant**
University of Maryland, USA
Classes: *Algorithms, Computational Geometry, Data Structures, Organization of Programming Languages*

Experience Teaching Programming Languages:
C, C++, Java, OCaml, Perl, Prolog, Python, Ruby, and Scheme

Education

2018: **Habilitation to Direct Research**
Université Côte d'Azur
Advisor: Jean-Daniel Boissonnat
Dissertation: *Approximate Polytope Membership Queries and Applications*
Papers: [8, 36, 37, 42, 43]

2008 – 2009: **Postdoctoral Scholar**
Universidade Federal do Rio de Janeiro, Brazil
Advisor: Celina M. H. de Figueiredo
Papers: [18, 19, 45]

2003 – 2007: **Ph.D. in Computer Science**
University of Maryland, USA
Advisor: David M. Mount
Dissertation: *Approximate Range Searching in the Absolute Error Model*
Papers: [17, 47]

2001 – 2003: **Master Degree in Computer Science**
Universidade Federal do Rio de Janeiro, Brazil
Advisor: Celina M. H. de Figueiredo
Thesis: *Kinetic Priority Queues*
Papers: [21, 23]

1996 – 2000: **Bachelor Degree in Computer Science**
Universidade Federal do Rio de Janeiro, Brazil
Advisor: Celina M. H. de Figueiredo
Final project: *The Stable Marriage Problem with Forbidden Pairs*
Paper: [22]

Languages

English: fluent French: fluent Portuguese: native speaker

PhD Students

2020 – present: Bastien Rivier [2, 26, 27]. Directing with Yan Gerard and funded by ANR project ADDS. Dissertation title: Untangling Segments in the Plane.

2017 – 2021: Loïc Crombez [6, 31, 32, 34]. Directing with Yan Gerard and funded by I-site cap 20-25. Disseration title: Finding Digital Convexity.

Journal Papers

[1] Loïc Crombez, Guilherme D. da Fonseca, Florian Fontan, Yan Gerard, Aldo Gonzalez-Lorenzo, Pascal Lafourcade, Luc Libralesso, Benjamin Momege, Jack Spalding-Jamieson, Brandon Zhang, and Da Wei Zheng. Conflict optimization for binary CSP applied to minimum partition into plane subgraphs and graph coloring. *ACM Journal of Experimental Algorithmics*, 28:1–13, 2023.

[2] Arun Kumar Das, Sandip Das, Guilherme D. da Fonseca, Yan Gerard, and Bastien Rivier. Complexity results on untangling red-blue matchings. *Computational Geometry*, 111:101974, 2023.

[3] Rahul Arya, Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Optimal bound on the combinatorial complexity of approximating polytopes. *ACM Transactions on Algorithms*, 18(4):1–29, 2022.

[4] Loïc Crombez, Guilherme D. da Fonseca, Yan Gerard, Aldo Gonzalez-Lorenzo, Pascal Lafourcade, and Luc Libralesso. Shadoks approach to low-makespan coordinated motion planning. *ACM Journal of Experimental Algorithms*, 27:1–17, 2022.

[5] Loïc Crombez, Guilherme D. da Fonseca, and Yan Gerard. Greedy and local search heuristics to build area-optimal polygons. *ACM Journal of Experimental Algorithms*, 27:1–11, 2022.

[6] Loïc Crombez, Guilherme D. da Fonseca, and Yan Gerard. Efficiently testing digital convexity and recognizing digital convex polygons. *Journal of Mathematical Imaging and Vision*, 62:693–703, 2020.

[7] Gautam K. Das, Guilherme D. da Fonseca, and Ramesh K. Jallu. Efficient independent set approximation in unit disk graphs. *Discrete Applied Mathematics*, 280:63–70, 2020.

[8] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Approximate polytope membership queries. *SIAM Journal on Computing*, 47(1):1–51, 2018.

[9] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. On the combinatorial complexity of approximating polytopes. *Discrete and Computational Geometry*, 58(4):849–870, 2017.

[10] Guilherme D. da Fonseca, Vinícius G. P. de Sá, and Celina M. H. de Figueiredo. Shifting coresets: Obtaining linear-time approximations for unit disk graphs and other geometric intersection graphs. *International Journal of Computational Geometry and Applications*, 27(4):255–276, 2017.

[11] Guilherme D. da Fonseca, Diana Sasaki, and Bernard Ries. On the ratio between perfect matchings and maximum weight matchings of grids. *Discrete Applied Mathematics*, 207:45–55, 2016.

[12] Emilio Vital Brazil, Guilherme D. da Fonseca, Celina M. H. de Figueiredo, and Diana Sasaki. The cost of perfection for matchings in graphs. *Discrete Applied Mathematics*, 210:112–122, 2016.

[13] Guilherme D. da Fonseca, Vinícius G. P. de Sá, Raphael Machado, and Celina M. H. de Figueiredo. On the recognition of unit disk graphs and the distance geometry problem with ranges. *Discrete Applied Mathematics*, 197:3–19, 2015.

[14] Guilherme D. da Fonseca, Vinícius G. P. de Sá, Celina M. H. de Figueiredo, and Raphael Machado. Efficient sub-5 approximations for minimum dominating sets in unit disk graphs. *Theoretical Computer Science*, 540–541(5):70–81, 2014.

[15] Guilherme D. da Fonseca. Fitting flats to points with outliers. *International Journal of Computational Geometry and Applications*, 21(5):559–569, 2011.

[16] Vinícius G. P. de Sá, Celina M. H. de Figueiredo, Guilherme D. da Fonseca, and Raphael Machado. Complexity dichotomy on partial grid recognition. *Theoretical Computer Science*, 412(22):2370–2379, 2011.

[17] Guilherme D. da Fonseca and David M. Mount. Approximate range searching: The absolute model. *Computational Geometry*, 43(4):434–444, 2010.

[18] Celina M. H. de Figueiredo and Guilherme D. da Fonseca. Enclosing weighted points with an almost-unit ball. *Information Processing Letters*, 109(21-22):1216–1221, 2009.

[19] Letícia R. Bueno, Luerbio Faria, Celina M. H. de Figueiredo, and Guilherme D. da Fonseca. Hamiltonian paths in odd graphs. *Applicable Analysis and Discrete Mathematics*, 3(2):386–394, 2009.

[20] Celina M. H. de Figueiredo, Guilherme D. da Fonseca, Vinicius G. P. de Sá, and Jeremy Spinrad. Algorithms for the homogeneous set sandwich problem. *Algorithmica*, 46(2):149–180, 2006.

[21] Guilherme D. da Fonseca, Celina M. H. de Figueiredo, and Paulo C. P. Carvalho. Kinetic hanger. *Information Processing Letters*, 89(3):151–157, 2004.

[22] Vânia M. F. Dias, Guilherme D. da Fonseca, Celina M. H. de Figueiredo, and Jayme L. Szwarcfiter. The stable marriage problem with restricted pairs. *Theoretical Computer Science*, 306(1-3):391–405, 2003.

[23] Guilherme D. da Fonseca and Celina M. H. de Figueiredo. Kinetic heap-ordered trees: Tight analysis and improved algorithms. *Information Processing Letters*, 85(3):165–169, 2003.

Conference Papers

[24] Guilherme D. da Fonseca. Shadoks approach to convex covering. In *39th International Symposium on Computational Geometry (SoCG 2023)*, volume 258 of *LIPIcs*, pages 67:1–67:9, 2023.

[25] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Economical convex coverings and applications. In *ACM-SIAM Symposium on Discrete Algorithms (SODA 2023)*, pages 1834–1861, 2023.

[26] Guilherme D. da Fonseca, Yan Gerard, and Bastien Rivier. On the longest flip sequence to untangle segments in the plane. In *International Conference and Workshops on Algorithms and Computation (WALCOM 2023)*, Lecture Notes in Computer Science, pages 102–112, 2023.

[27] Arun Kumar Das, Sandip Das, Guilherme D. da Fonseca, Yan Gerard, and Bastien Rivier. Complexity results on untangling red-blue matchings. In *15th Latin American Theoretical Informatics Symposium (LATIN 2022)*, Lecture Notes in Computer Science, pages 730–745, 2022.

[28] Loïc Crombez, Guilherme D. da Fonseca, Yan Gerard, and Aldo Gonzalez-Lorenzo. Shadoks approach to minimum partition into plane subgraphs. In *38th International Symposium on Computational Geometry (SoCG 2022)*, LIPIcs, pages 71:1–71:8, 2022.

[29] Loïc Crombez, Guilherme D. da Fonseca, Yan Gerard, Aldo Gonzalez-Lorenzo, Pascal Lafourcade, and Luc Libralesso. Shadoks approach to low-makespan coordinated motion planning. In *37th International Symposium on Computational Geometry (SoCG 2021)*, volume 189 of *LIPIcs*, pages 63:1–63:9, 2021.

[30] Rahul Arya, Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Optimal bound on the combinatorial complexity of approximating polytopes. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 786–805, 2020.

[31] Loïc Crombez, Guilherme D. da Fonseca, and Yan Gerard. Efficient algorithms for Battleship. In *International Conference on Fun with Algorithms (FUN 2020)*, pages 11:1–15, 2020.

[32] Loïc Crombez, Guilherme D. da Fonseca, and Yan Gérard. Peeling digital potatoes. In *Canadian Conference in Computational Geometry (CCCG)*, pages 124–132, 2019.

[33] Ahmed Abdelkader, Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Approximate nearest neighbor searching with non-euclidean and weighted distances. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 355–372, 2019.

[34] Loïc Crombez, Guilherme D. da Fonseca, and Yan Gérard. Efficient algorithms to test digital convexity. In *International Conference on Discrete Geometry for Computer Imagery (DGCI)*, pages 409–419, 2019.

[35] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Approximate convex intersection detection with applications to width and Minkowski sums. In *European Symposium on Algorithms (ESA)*, pages 3:1–14, 2018.

[36] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Near-optimal ε-kernel construction and related problems. In *International Symposium on Computational Geometry (SoCG)*, pages 10:1–15, 2017.

[37] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Optimal approximate polytope membership. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 270–288, 2017.

[38] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. On the combinatorial complexity of approximating polytopes. In *International Symposium on Computational Geometry (SoCG)*, pages 11:1–15, 2016.

[39] Guilherme D. da Fonseca, Vinícius G. P. de Sá, and Celina M. H. de Figueiredo. Linear-time approximation algorithms for unit disk graphs. In *Approximation and Online Algorithms (WAOA)*, volume 8952 of *Lecture Notes in Computer Science*, pages 132–143, 2015.

[40] Guilherme D. da Fonseca, Vinícius G. P. de Sá, Celina M. H. de Figueiredo, and Raphael Machado. Linear time approximation for dominating sets and independent dominating sets in unit disk graphs. In *Approximation and Online Algorithms (WAOA)*, volume 7846 of *Lecture Notes in Computer Science*, pages 82–92, 2013.

[41] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Optimal area-sensitive bounds for polytope approximation. In *ACM Symposium on Computational Geometry (SoCG)*, pages 363–372, 2012.

[42] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Polytope approximation and the Mahler volume. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 29–42, 2012.

[43] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Approximate polytope membership queries. In *ACM Symposium on Theory of Computing (STOC)*, pages 579–586, 2011.

[44] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. A unified approach to approximate proximity searching. In *European Symposium on Algorithms (ESA)*, volume 6346 of *Lecture Notes in Computer Science*, pages 374–385, 2010.

[45] Vinícius G. P. de Sá, Celina M. H. de Figueiredo, Guilherme D. da Fonseca, and Raphael Machado. Complexity dichotomy on degree-constrained vlsi layouts with unit-length edges. In *International Symposium on Combinatorial Optimization (ISCO)*, volume 36 of *Electronic Notes in Discrete Mathematics*, pages 391–398, 2010.

[46] Sunil Arya, Guilherme D. da Fonseca, and David M. Mount. Tradeoffs in approximate range searching made simpler. In *Symposium on Computer Graphics and Image Processing (SIBGRAPI)*, IEEE, pages 237–244, 2008.

[47] Guilherme D. da Fonseca. Approximate range searching: The absolute model. In *Algorithms and Data Structures (WADS)*, volume 4619 of *Lecture Notes in Computer Science*, pages 2–14, 2007.

[48] Celina M. de Figueiredo, Guilherme D. da Fonseca, Vinícius G. de Sá, and Jeremy Spinrad. Faster deterministic and randomized algorithms on the homogeneous set sandwich problem. In *Experimental and Efficient Algorithms (WEA)*, pages 243–252, 2004.