

## PERSONAL INFORMATION



## Guillaume DUCOFFE

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Sex M | Date of birth 19/09/1990 | Nationality French

## HIGHEST DEGREE

## Ph.D. in Computer Science

Université Côte d'Azur, Nice, France (*summa cum laude*)

## CURRENT JOB

since May 2017

## Research Scientist (C.S.)

National Institute for Research and Development in Informatics (I.C.I.), Romania

■ Dept. Modeling, Simulation, Optimization

Business or sector Communications, Information society sectors

*I am also informally attached to the team "Graphnets" between University of Bucharest and Max Planck Institute (Germany).*

## EDUCATION AND TRAINING

2014 – 2016

## Research Doctorate

Level 8

Université Côte d'Azur, Nice, France

■ Graph algorithms are the cornerstone of various problems in telecommunications, social networks, bioinformatics and economics, to name a few. However, most textbook algorithms do not scale to real-life graphs with tens of thousands of nodes and billions of edges. A main objective of the thesis is to establish a finer-grained complexity of the computation of some graph properties and graph primitives on large graphs. It has an emphasis on the computation of hyperbolicity, and other distance-related graph parameters, that all found applications in the study of geometrical routing schemes in networks.

■ Under the guidance of David Coudert [\[manuscript\]](#)

■ **Accessit "Charles Delorme" thesis award in Graph Theory**

2012 - 2013

## Parisian Master of Research in Computer Science

Level 7

École Normale Supérieure de Cachan, Cachan, France

■ Algorithmic, Graphs and Networks, Game theory, Complexity Theory, Quantum computing

2010 - 2013

## Master's Degree in Engineering

Level 7t

École Polytechnique Universitaire de Nice – Sophia Antipolis, Sophia Antipolis, France

■ Cryptography, System, Security & Networks

## WORK EXPERIENCE

- 
- Sept. 2014 – Jan. 2017 **Teaching Assistant (DCCE avec charge d'enseignement)**  
École Polytechnique Universitaire de Nice Sophia-Antipolis, France
- Algorithmic, Java and Python programming, Operating Systems (C POSIX), Web basics
- Business or sector** Communications, Information society sectors
- March. 2014 – Jul. 2014 **Research Intern**  
Columbia University in the City of New York, U.S.A.
- *“Security and Information Sharing in Social Networks”*: Design and theoretical limitations of learning algorithms for the Online Targeting problem.
  - supervised by Augustin Chaintreau and Roxana Geambasu. [[slides](#)]
- Business or sector** Communications, Information society sectors
- Oct. 2013 – Feb. 2014 **Research Intern**  
Inria Sophia Antipolis Méditerranée, France
- *“Algorithmic Applications of the Metric Structure of a Graph”*: Study on relations between the diameter of a graph and other metric parameters such as hyperbolicity. [[slides](#)]
  - supervised by David Coudert
- Business or sector** Communications, Information society sectors
- March 2013 – Aug. 2013 **Research Intern**  
Inria Sophia Antipolis Méditerranée, France
- *“Approximation Algorithms for computing in large graphs”*: Computation of hyperbolicity on large graphs (a parameter related to the stretch of geometrical routing schemes). [[report](#)]
  - supervised by David Coudert
- Business or sector** Communications, Information society sectors
- June 2012 – Sept. 2012 **Research Intern**  
Columbia University in the City of New York, U.S.A.
- *“Dynamics in Social Network”*: Proofs of the existence of equilibria, and bounds on the time of convergence to one, in a game-theoretic model for social communities. [[report](#)]
  - supervised by Augustin Chaintreau and Dorian Mazauric
- Business or sector** Communications, Information society sectors
- June 2011 – Aug. 2011 **Research Intern**  
Inria Sophia Antipolis Méditerranée, France
- *“Eulerian and Hamiltonian Directed Hypergraphs”*: Generalization of known results about Eulerian and Hamiltonian digraphs to the directed hypergraphs. [[report](#)]
  - supervised by Jean-Claude Bermond and Julio Araujo
- Business or sector** Communications, Information society sectors

PERSONAL SKILLS

Mother tongue(s) French

Other language(s)

|                | UNDERSTANDING |         | SPEAKING           |                   | WRITING |
|----------------|---------------|---------|--------------------|-------------------|---------|
|                | Listening     | Reading | Spoken interaction | Spoken production |         |
| English        | C1            | C1      | B2                 | B2                | C1      |
| TOEIC: 900/990 |               |         |                    |                   |         |
| Italian        | B1            | B1      | B1                 | B1                | B1      |
| Romanian       | A2            |         |                    |                   |         |

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user  
[Common European Framework of Reference for Languages](#)

Communication skills

- good presentation skills gained through my experience in scientific conferences
- good writing skills gained through my experience with scientific journals
- good pedagogical skills gained through my experience as a teacher

Organisational / managerial skills

- Creating and keeping deadlines (submitting papers)
- Teamwork (scientific collaborations)
- Reviewing, reporting, and research
- Making presentations (scientific conferences)

Job-related skills

- Theoretical Computer Science
  - Graph theory: metric properties, graph decompositions, algebraic methods
  - Complexity theory: NP-hardness, hardness in P, parallel reductions
  - Others: algorithmic game theory, PAC-learning, combinatorics, integer partitions
- Languages
  - Programming: **Java**, **C/C++/C#**, Scheme, Caml, Assembler ARM
  - Scripts: Python, Shell, Javascript, Action script, Matlab/Scilab
  - Web: X(H)TML, XSD/DTD, XSLT, XUL, CSS
- Operating Systems
  - Linux (Ubuntu/Fedora/Linux Mint), Windows

Digital competence

| SELF-ASSESSMENT        |                 |                  |                  |                 |
|------------------------|-----------------|------------------|------------------|-----------------|
| Information processing | Communication   | Content creation | Safety           | Problem solving |
| Independent user       | Proficient user | Proficient user  | Independent user | Basic user      |

Levels: Basic user - Independent user - Proficient user  
[Digital competences - Self-assessment grid](#)

- Project/Conception: Astah, Cosmos, Essential Modeler, Understand
- Verification/Debugging: Valgrind, Jprobe, ESC/java
- Development: Eclipse, NetBeans, Microsoft Visual Studio, Microsoft SQL Server
- Document Processing: Dreamweaver, Editix, Lex/Yacc

[Publications](#)  
[Presentations](#)  
[Projects](#)  
[Honours and awards](#)  
[Citations](#)

Selected publications:

- D> Coudert, G. Ducoffe, and A. Popa. **Fully Polynomial parameterized algorithms for some classes of bounded clique-width graphs**. In SODA'18 – Acm-SIAM Symposium on Discrete Algorithms, 2018. **Rank A\***
- N. Cohen, D. Coudert, G. Ducoffe, and A. Lancin. **Applying clique-decomposition for computing Gromov hyperbolicity**. Accepted in Journal of Theoretical Computer Science.
- G. Ducoffe. **Finding cut-vertices in the square roots of a graph**. In WG'17 – 43<sup>rd</sup> International Workshop on Graph-Theoretic Concepts in Computer Science, 2017.
- D. Coudert and G. Ducoffe. **Data center interconnection networks are not hyperbolic**. Journal of Theoretical Computer Science, 639(1):72–90, 2016. WOS:000379705900006
- D. Coudert, G. Ducoffe, and N. Nisse. **To approximate treewidth, use treelength! SIAM Journal of Discrete Mathematics**, 30(3):1424–1436, 2016. WOS:000385017100008 **Red Zone (AIS classification)**
- G. Ducoffe, N. Legay, and N. Nisse. **On the complexity of computing treebreadth**. In IWOCA 2016 – 27th International Workshop on Combinatorial Algorithms, pages 3–15, 2016. WOS:000389333200001
- G. Ducoffe. **The parallel complexity of coloring games**. In SAGT 2016 – 9th International Symposium on Algorithmic Game Theory, pages 27–39, 2016. WOS:000389020400003
- G. Ducoffe, M. Lécuyer, A. Chaintreau, and R. Geambasu. **Web's transparency for complex targeting: Algorithms, limits and tradeoffs**. In SIGMETRICS'15 – Proceedings of the 2015 ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems, pages 465–466, 2015.
- M. Lécuyer, G. Ducoffe, F. Lan, A. Papancea, T. Petsios, R. Spahn, A. Chaintreau, and R. Geambasu. **Xray: Enhancing the web's transparency with differential correlation**. In USENIX Security Symposium, pages 49–64, 2014.
- D. Coudert and G. Ducoffe. **Recognition of C4-free and 1/2-hyperbolic graphs**. SIAM Journal of Discrete Mathematics, 28(3):1601–1617, 2014. WOS:000343230800032 **Red Zone (AIS classification)**

Selected talks:

- **Revisiting Preferential Attachment with applications to Twitter**  
*ScientificSeminar – RESEARCH, Timisoara, 2017* [[PDF](#)]
- **The Theory of Web Transparency: Algorithms and Trade-offs**.  
*Workshop The Theory of Bringing Privacy Into Practice, Caltech, 2015* [[PDF](#)]
- **Convergence of Coloring Games with Collusions**.  
*Seminario, Universidad Adolfo Ibanez* [[PDF](#)]
- **On the diameter of minimal separators in a graph**.  
*Seminario Matematicas Discretas, DIM* [[PDF](#)]
- **On the hardness of computing the hyperbolicity**.  
*Seminars of the team COATI* [[PDF](#)]

Selected Projects:

- **Algorithm for large and Dynamic Networks**. Design of scalable algorithms in order to optimize transport networks and school placement in the agglomeration of Santiago. In collaboration with Inria, France and Universidad Adolfo Ibañez (Santiago, Chile. 2014-2016).
- **New Scientific Building Blocks, Tools, and Measurements to Tame the Data-Driven Web**. Design of scalable tools in order to audit online discriminations. In collaboration with Columbia University (NSF grant. New York, USA. 2015-2019).
- **Behavioral Network Analytics with Data Transparency**. Large-scale study of online discriminations. In collaboration with Columbia University (NSF grant. New York, USA. 2013-2018).

Honours and Awards:

- **Best Student Paper Award**, 15èmes Rencontres Francophones des Aspects Algorithmiques des Télécommunications
- **3rd Heidelberg Laureate Forum**, selected as a participant by an international scientific panel
- **ICUB Fellowships for Young Researchers**, “Separators in squares of graphs and their algorithmic applications to square root problems”.
- **Accessit “Charles Delorme” thesis award in Graph Theory**, attributed by an international scientific panel

Citations: > 153, h-index: 7, i10-index: 4 (Google Scholar)

