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Education

- 2014: *Habilitation à diriger des recherches* in Applied and Computational Topology - Paris-Sud University
- 2005: Ph.D. in Computational Geometry - École Polytechnique - advisor: Jean-Daniel Boissonnat
- 2002: M.Sc. in Algorithmics - École Polytechnique - granted *magna cum laude*

Current positions

- Since 2007: Permanent Researcher - Inria - *Geometrica / DataShape* team (Inria Saclay and Sophia-Antipolis)
 - ▶ founding member of the branch of the team in Saclay in 2007, and now head of this branch since Jan. 2016
- Since 2008: Part-time Associate Professor - École Polytechnique - CS Dept.
 - ▶ head of the Data Science curriculum in the CS Dept. since Sept. 2014

Previous positions

- Sept. - Dec. 2016: Senior Fellow (by invitation) - ICERM, Brown University - Mathematics Dept.
- April - Aug. 2008: Visiting Researcher - Stanford University - CS Dept.
- 2005 - 2007: Postdoctoral Scholar - Stanford University - CS Dept.- advisor: Leonidas Guibas - NSF funding
- 2002 - 2005: Ph.D. candidate - École Polytechnique - advisor: Jean-Daniel Boissonnat - MENRT fellowship

Research contributions and impact

My current field of research is applied and computational topology, in particular topological data analysis (TDA). My contributions span all aspects of TDA, from algebra and topology to algorithms and applications, with 2 books and more than 25 articles in the top conferences and journals in the field. I contributed to the theory's most fundamental results, such as the central *isometry theorem*, meanwhile I opened several new applied research directions (e.g. filtration sparsification, stable topological descriptors for geometric data) and had a leading role in their development. Before coming to this area (around 2007), I did my Ph.D. and postdoc in computational geometry, specializing on mesh generation then manifold reconstruction.

Featured recent publications (please refer to my web page for a full list)

- F. Chazal, V. de Silva, M. Glisse, S. Y. Oudot. *The structure and stability of persistence modules*. Briefs in Mathematics, Springer, 2016.
- M. Carrière and S. Y. Oudot. Structure and stability of the 1-dimensional Mapper. *Proc. 32nd International Symposium on Computational Geometry (SoCG)*, June 2016.
- S. Y. Oudot. *Persistence theory: from quiver representations to data analysis*. Mathematical Surveys and Monographs, number 209, American Mathematical Society, 2015.
- S. Y. Oudot and D. R. Sheehy. Zigzag Zoology: Rips Zigzags for Homology Inference. *J. Foundations of Computational Mathematics*, 2015.
- M. Buchet, F. Chazal, T. K. Dey, F. Fan, S. Y. Oudot, Y. Wang. Topological analysis of scalar fields with outliers. *Proc. 31st Sympos. on Computational Geometry (SoCG)*, June 2015.
- C. Maria and S. Y. Oudot. Zigzag Persistence via Reflections and Transpositions. *Proc. ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2015.

□ Invited presentations

I have been invited to give presentations at the following international venues:

- July 2017: *Workshop on Topological Data Analysis: Developing Abstract Foundations*, BIRS, Banff, Canada.
- May 2017: *Conference on Applied and Computational Topology*, Hausdorff Institute, Bonn, Germany.
- April 2016: *Workshop on Accelerating Algebraic Topology*, Aalborg University, Aalborg, Denmark.
- April 2015: *Workshop on Applications of Algebraic Topology*, Aalborg University, Aalborg, Denmark.
- June 2014: *Symposium on Computational Geometry - Workshop on Topological Data Analysis*, Kyoto, Japan.
- October 2013: *Annual Program Year Workshop on Topological Data Analysis*, IMA, Minneapolis, USA.
- November 2011: *Workshop on Computational Topology*, Fields Institute, Toronto, Canada.
- July 2010: *Applied Topology Conference: Methods, Computation & Science (ATMCS)*, Münster, Germany.
- September 2006: *Workshop on Application of Topology in Science and Engineering*, MSRI, Berkeley, USA.

Seminar invitations: I have been invited to give seminars at a number of research institutions in Europe, North America, South-Eastern Asia and the Pacific. Here is a selection since 2008 (excluding French institutions): Princeton U. (2016), Brown U. (2016), T. U. München (2016), U. Queensland (2015), Hong-Kong U. of Sci. and Tech. (2015), IST Vienna (2015), Kyoto U. (2014), U. Minnesota (2013), U. Edinburgh (2012), U. Toronto (2011), Ohio-State U. (2011), Stanford U. (2009, 2010), Bell Labs (2009), ETH Zürich (2008).

□ Teaching activities

I have taught the following graduate-level courses:

- Since 2015: *Topological Data Analysis* at École Polytechnique
- Since 2014: *Geometric Methods for Data Analysis* at École Centrale Paris
- 2008 - 2015: *Introduction to Computational Geometry* at École Polytechnique

I have also taught courses at the following international advanced schools:

- July 2016: *Mathematical Methods for High-Dimensional Data Analysis*, TU München, Germany
- April 2016: *Summer School MIMS-CIMPA* (satellite event of ATMCS), Tunis, Tunisia
- July 2015: *3rd Biomedical Image Analysis Summer School*, Institut Henri Poincaré, Paris, France

□ Supervision of graduate students and postdoctoral fellows

I have advised 5 Ph.D. candidates, among whom 2 have defended:

- Since Sept. 2016: Nicolas Berkouk, Ph.D. candidate - sole advisor
subject: *Categorification of topological graph structures*
- Since Sept. 2015: Jérémy Cochoy, Ph.D. candidate - sole advisor
subject: *Decomposition and stability of 2-dimensional persistence modules*
- Since Sept. 2014: Mathieu Carrière, Ph.D. candidate (defense expected Dec. 2017) - sole advisor
subject: *Topological Signatures for Geometric Data*
- 2013 - 2016: Thomas Bonis, Ph.D. (defended Dec. 2016) - daily supervision (official advisor: F. Chazal)
subject: *Statistical Learning Algorithms for Geometric and Topological Data Analysis*
- 2011 - 2014: Mickaël Buchet, Ph.D. (defended Dec. 2014, then postdoc at Ohio-State U. then Kyoto U.)
supervision shared at 50% with F. Chazal
subject: *Topological Inference from Measures*

I have also advised 2 postdocs:

- 2012 - 2013: Donald Sheehy (former Ph.D. student of Gary Miller at Carnegie-Mellon U., now assistant professor in CS at U. Connecticut) - sole advisor
- 2010 - 2011: Primoz Skraba, postdoc (former Ph.D. student of Leonidas Guibas at Stanford U., now senior researcher at the Jožef Stefan Institute (AI Lab), Slovenia) - supervision shared at 50% with F. Chazal

□ Organization of scientific meetings

- 2018: Organizer and chair of the mini-symposium on topological data analysis and learning at the *Curves and Surfaces* conference - Bordeaux area (280 participants from 35 countries at the last venue in 2014)
- 2017: Organizer and chair of the session on applied topology at the *Topological and Geometric Science of Information* (TGSi) conference - CIRM, Marseille (120 participants at the last venue in 2015)
- 2015: Founding member of the *Discrete and Computational Geometry Seminar* - Institut Henri Poincaré, Paris - monthly event, national standing (http://www.ihp.fr/en/activities/seminars_working_groups)
- 2011: Local arrangements chair for the *ACM Symposium on Computational Geometry* (SoCG)- Paris, France
 - ▶ the flagship conference in computational geometry (3 days, 180 attendees, <http://socg2011.inria.fr/>)
- 2009: Organizer of an international workshop on *Recent advances on topological and geometric data analysis* - Paris area (2 days, 35 attendees, http://geometrica.saclay.inria.fr/workshops/TGDA_07_2009/)

□ Services to the scientific community

- Since 2015: Member of the editorial board of the *Journal of Computational Geometry*
- 2012-2013: Guest editor of *Discrete and Computational Geometry*
- 2016/2010/2008: Program Committee member of the Eurographics *Symposium on Geometry Processing* (SGP)
- 2012: Program Committee member of the *ACM Symposium on Computational Geometry* (SoCG)
- 2011: Program Committee member of the conference *Shape Modelling International* (SMI)
- Since 2003: reviewer for more than 30 conferences and journals in total (average of 10-12 reviews per year)
- 2012-2014: Member of 3 Ph.D. defense committees (role: examiner)
- Since 2015: member of the scientific board and organisation committee of the *Discrete and Computational Geometry Seminar* at Institut Henri Poincaré, Paris

□ Institutional responsibilities

- Since Jan. 2016: member of the Scientific Advisory Board (*Commission Scientifique*) at Inria Saclay
- Since Jan. 2016: head of the branch of the *DataShape* research team at Inria Saclay
- Since Sept. 2014: head of the Data Science curriculum in the CS Dept. at École Polytechnique
- 2007: founding member of the branch of the *Geometrica* research team at Inria Saclay

□ Major international collaborations

I was the leader of a long-standing collaboration between the *Geometrica / Datashape* team at Inria and the group of Prof. Leonidas Guibas at Stanford U. between 2007 and 2013. On the Inria side, this collaboration was funded by one research grant from the *Fonds France-Stanford* at Stanford U. (9k\$ in total) and two research grants from the *Associate Teams* program at Inria (90k€ in total)—all three grants led by myself. The scientific production consisted of more than 20 joint articles, published in the top journals and conferences in the field. On average, there were 2 to 4 graduate student exchanges each year, for 3-months periods. There were about the same number of short-term visits by senior researchers, including myself and L. Guibas. In the end there have been 3 transfers of personnel: 1 Ph.D. student from Stanford U. (Primož Skraba) joined Inria as a postdoc in 2010, 1 Ph.D. student from Inria (Quentin Mérigot) joined Stanford U. as a postdoc in 2010, and 1 Ph.D. student from Stanford U. (Maks Ovsjanikov) joined École Polytechnique as an assistant professor in 2012.

□ Awards

- 2015-2018: *Excellence in Research* award (*Prime d'Excellence Scientifique*) - Inria - about 20% success rate.
- 2011-2014: *Excellence in Research* award (*Prime d'Excellence Scientifique*) - Inria - about 20% success rate.
- April 2014: Selection of F. Chazal, L. J. Guibas, S. Y. Oudot, P. Skraba: *Persistence-Based Clustering in Riemannian Manifolds*, *Journal of the ACM*, as one of the most notable articles of 2013 in computing. Source: ACM (http://computingreviews.com/recommend/bestof/notableitems_2013.cfm).
- Sept. 2010: Selection of J.-D. Boissonnat and S. Oudot: *Provably good sampling and meshing of surfaces*, *Graphical Models*, as the top cited article 2005-2010. Source: Elsevier.