Romain Pascual

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Ph.D. Student, under the supervision of Pascale Le Gall

Laboratory Mathématiques et Informatique pour la Complexité et les Systèmes (MICS)
CentraleSupélec, University Paris-Saclay
Rue Joliot Curie, 91190 Gif-sur-Yvette

Email: romain.pascual@centralesupelec.fr

Ph.D. Subject

The objective of my thesis is the design of assistance mechanisms for the design of geometric modeling operations. I am working under the supervision of Pascale Le Gall and in collaboration with Hakim Belhaouri and Agnès Arnould. My work lies at the interface between topology-based geometric modeling and algebraic graph transformations with Jerboa (http://xlim-sic.labo.univ-poitiers.fr/jerboa/).

- [Pascual et al., 2022]: article published in the special number "Application-oriented aspects of graphs and graph transformation" of the journal "Science of Computer Programming". In this article, we extend the formal framework of Jerboa to provide a categorical approach to the conception of rule scheme (rules extended with an orbit variable). This extension also entails the manipulation of oriented maps, a more commonly used model in topology-based geometric modeling.
- Article in review at the journal "Mathematical Structures in Computer Science". This article exploits the work of Thomas Bellet to extend rule schemes with orbit completion to guarantee the preservation of geometric consistency. The conditions are defined and studied in a set-based fashion as they are expressed with monadic second-order logic.
- Article in progress, a preliminary version has been presented at the "journées du GTMG 2021". This third paper deals with the inference of topological operations from two instances of an object (before and after modification) by a quotient algorithm.

Keywords Topology-based geometric modeling· Generalized maps · Graph transformation · Concistency preservation· Rule inference

Education

2019-… Ph.D. student at the MICS laboratory
Supervised by Pascale Le Gall, in collaboration with Agnès Arnould and Hakim Belhaouri from the XLIM laboratory (University of Poitiers).

2015-2019 *CentraleSupélec*, cursus Centralien (https://www.centracentlesupelec.fr/).
Student-researcher in the context of the research program at the MICS laboratory. Majors in computer science and research.

2017-2018 *Ecole normale supérieure Paris-Saclay* (https://wikimpri.dptinfo.ens-cachan.fr/)
Algorithmics and Foundation of Programming (ex-MPRI).

Teaching

2019-… Teaching assistant at CentraleSupélec, France. For BSc/MSc students in Engineering.

Algorithmics 39 hours of tutorials

Programming 102 hours of tutorials

Theoretical computer science 57 hours of tutorials and 4 hours of lectures

Talks and Participation in events

- GReTA seminar. *Combinatorial maps: transformations and application to geometric modeling*. 24 September 2021. https://www.irif.fr/ greta/event/2021-sep-24/. Online
- International School on Rewriting. 5 - 16 July 2021. https://dalila.sip.ucm.es/isr2021/. Online.
- Journées du GTMG (French event). 18 - 19 March 2021. https://gtmg2021.sciencesconf.org/. Online.

Other

2018 Internship at the HPCG laboratory at the University of Purdue (USA) on user-assisted urban modeling by simulation of inner-city growth.

References

[Pascual et al., 2022] Pascual, R., Le Gall, P., Arnould, A., and Belhaouari, H. (2022). Topological consistency preservation with graph transformation schemes. *Science of Computer Programming*, 214:102728.