Fabrice Lécuyer

PhD Student in Complex Networks at LIP6 Sorbonne

PhD project (2020 – ongoing)

Title *Ordering nodes to scale to massive real-world networks*

Supervisors Lionel Tabourier & Clémence Magnien

Description As we have access to arbitrarily big networks collected from various fields (biology, social ties, trade, web), graph algorithms can only scale if they have quasi-linear complexity. Ordering the nodes of the graph according to specific graph properties such as degree, centrality, or degeneracy can improve experimental runtime, theoretical bounds and the resulting quality of an algorithm. This project consists in implementing and comparing existing orders, and defining new orders that leverage properties of real-world graphs.

2023 **Seminars: Ordering nodes to scale to massive real-world networks**.
January invitation from the Lab for Web Algorithmics (University of Milan, Italy); May invitation from the Systopia lab (University of British Columbia, Canada).

2023 **Vertex cover quality certification on real-world networks**,
Fabrice Lécuyer, Lionel Tabourier, Clémence Magnien, submitted.

2023 **Charting mobility patterns in the scientific knowledge landscape**,
Chakresh Kumar Singh, Liubov Tupikina, Fabrice Lécuyer, Michele Starnini, Marc Santolini, submitted [pdf].

2023 **Tailored vertex ordering for faster triangle listing in large graphs**,
Fabrice Lécuyer, Louis Jachiet, Clémence Magnien, Lionel Tabourier, ALENEX [pdf].
Presented at: FRCCS'22 conference, MLG workshop of KDD'22 conference.

2022 **Quality certification of heuristics on real-world graphs**,
Fabrice Lécuyer, unpublished [pdf].
Presented at: JGA'22 workshop, FRCCS'23 conference [abstract].

2021 **[Replication] Speedup Graph Processing by Graph Ordering**,
Fabrice Lécuyer, Maximilien Danisch, Lionel Tabourier, ReScience [pdf].

Education

2015–2020 **Master in Computer Science**, *ENS Lyon*, France.
Major in theoretical computer sciences: graph theory, algorithmic, probability, complexity, algebra...
Minor in complex systems: network theory, epidemiology, thermodynamics, data processing...

2018–2019 **Gap year for travels and personal projects**.
Months-long backpacking experiences with minimum planning and equipment, to get a sight of different landscapes, political systems and languages, to meet people with different priorities and customs.

2017–2018 **Erasmus: Bachelor in Physics**, *Ludwig Maximilian Universität*, Munich, Germany.
Major: theoretical and applied physics. Minor: German language.

2013–2015 **Classes préparatoires in Science**, *Lycée Saint-Louis*, Paris, France.
Intensive preparation in maths, physics and computer sciences for competitive admission into leading schools of science and engineering. Admission in ENS Lyon, top-ranking research-oriented school.

Research experience

2020 six months **Dynamic community detection**, *Data Science Team, LIRIS*, Lyon.
Detect and analyse communities in fine-grained dynamical networks. Transpose static models to link streams. Confront them to various quality functions of the literature. Design scalable methods, test them on real and synthetic datasets. [report]

2017 **Hospital network modelling**, *Barabási lab, Northeastern*, Boston.

three months Model health trajectories based on millions of hospital admissions. Manipulate different models of mobility such as gravity or radiation, and compare them to census data. Study the correlation between social groups and specific diseases. [report]

2016 **Disability communication software**, *project with ten Master students*, Lyon.

one year Design a communication system for people with paralysis. Program electroencephalography headsets, define fast means of expression with linguists. Involve many health professionals and participate in two hackathons.

2016 **Biological regulatory networks**, *Institute in Cybernetic*, Nantes.

two months Analyse gene interaction networks and theoretical inference graphs. Parse real data about protein activation and inhibition, simulate the behaviour of multi-genes systems. [report]

Work experience

2022–... **Volunteer for solar energy**, *Enercitif*, Paris.
Help the NGO that installs solar pannels on parisian roofs to monitor operations and solicit new surfaces.

2021–2023 **PhD students representative**, *LIP6*, Paris.
Meet with the direction of the lab to work on administrative and scientific issues that PhD students face.

2020–2023 **Teaching assistant**, *Sorbonne Université*, Paris.
Algorithmics (complexity, iteration and recursion, binary trees, graphs), programming (learn mathematical programming using a restricted version of Python).

2019–2020 **Oral examiner in theoretical physics**, *Prépa CPE Chartreux*, Lyon.

2017–2018 **Frontend Software Developer**, *Carsync Fleet Management, Vispiron GmbH*, Munich.
Develop a new Angular2 product interface with a team of full-time developers.

2009–2013 **Web developer freelance**, *online game Terre de Feu*.
Design and develop backend and frontend from scratch. Manage a community of hundreds of players.

Other

Computer **c++, python, js, angular, sql, html5, css, php, git, c**, LaTeX, caml, linux, excel...

Languages **French (native), English (fluent c2)**, German (advanced c1), Spanish (intermediate b2).

Music piano teacher, classical singer (Munich Unichor, Paris Music Academy), violist, accordionist.

Interests sustainability, international relations, linguistics...