Colloquium: Sebastiano Vigna

Schedule for Monday 6 May 2019

[14:00 → 15:30] Masterclass (room 24-25/405)

Short presentations by PhD students of their work. Each presentation is followed by an open discussion with Sebastiano Vigna.

Martin Pépin

Supervisor. Antoine Genitrini

Tittle. Uniform random generation of executions in fork-join processes

Abstract. Concurrent programming has become an essential component of software development over the years but at the cost of more difficult programming abstractions. Many program analysis techniques have been proposed to increase the confidence into concurrent systems but they all face the so-called phenomenon of **combinatorial explosion**. Our approach to tackle this issue is to adopt a probabilistic view of the problem.

In this talk, I will establish a correspondance between a class of programs featuring non-determinism, parallel composition and synchronisation and a class of partially labelled graphs. Using this representation, I will present an efficient algorithm for sampling possible executions of the program **uniformly at random**, thus offering a practical and efficient way to explore the state space of the program.

References.

- Olivier Bodini, Antoine Genitrini, and Frédéric Peschanski. The combinatorics of non-determinism. In *IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2013)*. Schloss Dagstuhl-Leibniz-Zentrum fuer Informatik, 2013
- Olivier Bodini, Matthieu Dien, Antoine Genitrini, and Frédéric Peschanski. Entropic uniform sampling of linear extensions in series-parallel posets. In *International Computer Science Symposium in Russia*, pages 71–84. Springer, 2017

Hong-Lan Botterman

Supervisors. Clémence Magnien and Robin Lamarche-Perrin

Tittle. Combining path-constrained random walks to recover link weights in heterogeneous information networks

Abstract. Heterogeneous information networks (HIN) are abstract representations of systems composed of multiple types of entities and their relations. Given a pair of nodes in a HIN, we aim at recovering the exact weight of the incident link to these two nodes, knowing some other links present in the HIN. The starting point of the proposed method is a similarity-based approach. More precisely, path- constrained random walks are combined with each

other to recover the weight of missing/unobserved links. Furthermore, we show that it is possible to improve the recovery score by taking into account information-theoretic measures, in particular, a path-constrained mutual-information. This method is general enough to compute the link weight between any types of nodes. Experiments on empirical data show the applicability of the method.

References.

- Hong-Lan Botterman and Robin Lamarche-Perrin. Combining path-constrained random walks to recover link weights in heterogeneous information networks. In *International Workshop on Complex Networks*, pages 97–109. Springer, 2019
- Hadi Shakibian and Nasrollah Moghadam Charkari. Mutual information model for link prediction in heterogeneous complex networks. *Scientific reports*, 7:44981, 2017

Léo Rannou

Supervisors. Matthieu Latapy and Clemence Magnien

Tittle. Reachability queries and path problems in Stream Graphs

Abstract. A Stream Graph is a dynamic structure generalizing graph concepts and expanding them in order to take into account a temporal dimension. Stream Graphs can be used to model networks with a temporal nature such as financial transactions, transportation networks or IP traffic. Using connectedness we present a data structure allowing efficient reachabilitiy queries: the condensation of a stream graph. We show that this structure can also be used to compute two kinds of temporal paths: foremost paths and fastest paths.

References.

- Matthieu Latapy, Tiphaine Viard, and Clémence Magnien. Stream graphs and link streams for the modeling of interactions over time. *Social Network Analysis and Mining*, 8(1):61, 2018

[17:15] Cocktail (in front of Amphi 34B)

[18:00] Colloquium (Amphi 34B)