

Algorithmes de Partitionnement de Graphes Dynamiques

Dynamic Graphs Partitionning Algorithms

Encadrant: Nicolas Schabanel, LIAFA (U. Paris Diderot)
mail: `first.last@cnrs.fr` — Office 4005 (Bât Sophie Germain 4th Floor)

January 14, 2015

Understanding the dynamics of evolving social or infrastructure networks is a challenge in applied areas such as epidemiology, viral marketing, or urban planning. During the past decade, data has been collected on such networks but has yet to be fully analyzed. We propose to use information on the dynamics of the data to find stable partitions of the network into groups. For that purpose, we introduce a time-dependent, dynamic version of the facility location problem, that includes a switching cost when a client's assignment changes from one facility to another. This might provide a better representation of an evolving network, emphasizing the abrupt change of relationships between subjects rather than the continuous evolution of the underlying network. We show that in realistic examples this model yields indeed better fitting solutions than optimizing every snapshot independently. We have obtained several approximation algorithms in [1], some of which with matching lower bounds, and some others which have been recently improved in [2].

In this internship, we want to explore more realistic objective functions for evaluating the quality of the clustering, such as minimizing the sum of the diameters of the clusters (instead of the average distance to the centers of the clusters), see [3] for instance. The goal will be to design approximation algorithm. Typical tools includes linear programming, randomization, semi-definite programming, geometric analysis,... See [1, 2] for full bibliography.

The internship will take place at the LIAFA, U. Paris Diderot, and start around March 15, 2015.

References

- [1] David Eisenstat, Claire Mathieu, Nicolas Schabanel: Facility Location in Evolving Metrics. ICALP (2) 2014: 459-470.
- [2] Hyung-Chan An, Ashkan Norouzi-Fard, Ola Svensson: Dynamic Facility Location via Exponential Clocks. To be published in SODA, 2015.
- [3] Cristina G. Fernandes, Marcio I. Oshiro, and Nicolas Schabanel. Dynamic clustering of evolving networks: some results on the line. In AlgoTel, 2013. Url: [hal-00818985](https://hal.archives-ouvertes.fr/hal-00818985) (4 pages).