

Algorithms for the Analysis of Temporal Networks

Record number : OPR-588

Overview

RESEARCH DIRECTOR

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Information

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ADMINISTRATIVE UNIT(S)

Faculty of Sciences
Department of Computer Science

LEVEL(S)

Master's degree

LOCATION(S)

Campus de Sherbrooke

Project Description

The goal of the master's project is to develop tools for the analysis of temporal networks, i.e. networks that evolve over time. This topic has mostly been studied from a theoretical point of view, and the project aims at reducing the gap between practice and theory. This will be accomplished by adapting known graph algorithms, implementing them, and applying them to the social networks of the Accorderie community organization (see below). Therefore, this project has both a theoretical and an applied component.

The theoretical component will first consist in understanding the classical algorithms and metrics on networks (community detection, centrality, density, ...) and, especially, how to adapt them to networks that change over time. To do so, the student will have to browse the recent scientific literature on temporal graphs, evaluate existing implementations, and then participate in the elaboration of ideas to improve the state of the art, either from a practical or theoretical point of view.

As for the applied part, it is part of a collaboration between the University of Sherbrooke and the Accorderie, a community organization for the exchange of local services whose mission is to fight against poverty and social exclusion. This collaboration includes Pr H el ene Pigot of the DOMUS laboratory. The analysis tools to be developed aim to quantify the impact of the organization's social interventions, as well as to detect and combat isolation among seniors. It should be noted that the algorithms implemented may be used for other applications in the future.

To summarize, the main components of the project are as follows:

- to understand the state of the art in the analysis of temporal networks
- to adapt and/or create algorithms on these networks to detect communities and compute various metrics;
- to implement and evaluate these algorithms within an open source library;
- to interact with DOMUS and the Accorderie to apply the algorithms on social networks.

The desired skills to undertake this project are:

- comfort with basic graph/network concepts;
- a good knowledge of algorithms;
- ability to understand abstract and theoretical concepts and apply them;
- knowledge of python and/or C++.

To apply, send your CV + cover letter + transcript by email to manuel.lafond@USherbrooke.ca.

Discipline(s) by sector

Funding offered

Partner(s)

**Natural Sciences and
Engineering**

Yes

Laboratoire DOMUS, L'Accorderie de
Sherbrooke

18,000\$ per year

Computer Science, Applied Mathematics

The last update was on 31 May 2021. The University reserves the right to modify its projects without notice.