2017 Master ACN Project Proposal

Inference of Information Cascades in Social Networks

Context

Propagation of information or news in a social network is largely based on influence patterns in social networks. Influence can be defined as the impact one node in a social network has on another. Impact here can be measured through the intensity of propagation – in social networks this might be time to maximal diffusion, the number of users that receive the information, or through local measurements such as the re-sharing of the information, like sharing on Facebook or retweeting on Twitter, or the incitation of a reaction, like likes on Facebook.

The characterization of influential paths in a social network is of interest in many applications, such as: recommendation of items in a social network, identification of "specialized nodes" with influence for certain types of information, identification of information types through the path they take in a social network.

Description

A social network is a graph of nodes with directed or undirected edges (depending on the social network considered) between nodes. This graph and, most importantly, the underlying influence graph, is unknown to an outside observer. Information is propagated through this network, taking various paths depending on the different types of information. The objective of this project will be to study models of multi-type diffusion, in particular learning these diffusion pathways through the analysis of data. The problem is a specific case of learning multiple graphical models.

Tools from statistical learning and random graphs will be used for the analysis of a dataset (either a real dataset or a synthetic one).

The expected outcome of the project for the student will be a deep understanding of how information propagates in real graphs like social networks, and if time permits the implementation of an algorithm for learning multi-type cascades in social networks. Future extensions will include thorough analysis of the algorithm and characterization of optimality in such algorithms.

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