

Rumor Source Detection in Finite Graphs with Boundary Effects by Message-passing Algorithms

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ABSTRACT

Finding information source in viral spreading has important applications such as to root out the culprit of a rumor spreading in online social networks. In particular, given a snapshot observation of the network topology of vertices having the rumor, how to accurately identify the initial source of the spreading? In the seminal work by Shah and Zaman in 2011, this problem was formulated as a maximum likelihood estimation problem and solved using a rumor centrality approach for infinite graphs that are degree-regular. This however is optimal only if the underlying number of susceptible vertices is countably infinite, i.e., no boundary effect. In general, all practical real world networks are finite, and therefore these boundary effects cannot be ignored. In this paper, we solve the constrained maximum likelihood estimation problem by an extended rumor centrality for spreading in finite graphs with boundary effects. We derive a theorem to describe the location of the maximum likelihood estimator for degree-regular graph with a single end vertex and propose a message-passing algorithm that is near-optimal for multiple end vertices.

This paper will be presented at IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2017), 31 July ~ 3 August, Sydney, Australia.

Supervisor: Dr Chee Wei TAN

Research Interests: Graph Theory; Mathematical Modeling; Probabilistic Inference

All are welcome!



In case of questions, please contact Dr Chee Wei TAN at Tel: 3442 7652, E-mail: cheewtan@cityu.edu.hk, or visit the CS Departmental Seminar Web at <http://www.cs.cityu.edu.hk/news/seminars/seminars.html>.

