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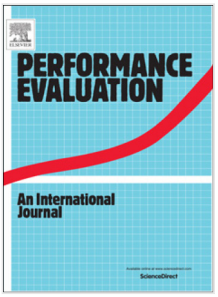

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PII: S0166-5316(16)30058-X
DOI: http://dx.doi.org/10.1016/j.peva.2016.06.004
Reference: PEVA 1868

To appear in: *Performance Evaluation*

Please cite this article as: J.C. Louzada Pinto, T. Chahed, E. Altman, A framework for information dissemination in social networks using Hawkes processes, *Performance Evaluation* (2016), http://dx.doi.org/10.1016/j.peva.2016.06.004

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A framework for information dissemination in social networks using Hawkes processes

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Abstract

We define in this paper a general Hawkes-based framework to model information diffusion in social networks. The proposed framework takes into consideration the hidden interactions between users as well as the interactions between contents and social networks, and can also accommodate dynamic social networks and various temporal effects of the diffusion, which provides a complete analysis of the hidden influences in social networks. This framework can be combined with topic modeling, for which modified collapsed Gibbs sampling and variational Bayes techniques are derived. We provide an estimation algorithm based on nonnegative tensor factorization techniques, which together with a dimensionality reduction argument are able to discover, in addition, the latent community structure of the social network. At last, we provide numerical examples from real-life networks: a Game of Thrones and a MemeTracker datasets.

Keywords: Information diffusion, social networks, Hawkes processes, nonnegative tensor factorization, topic models

1. Introduction

Information diffusion/dissemination in social networks refers to users broadcasting (sharing, posting, tweeting, retweeting, liking, etc.) information to

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