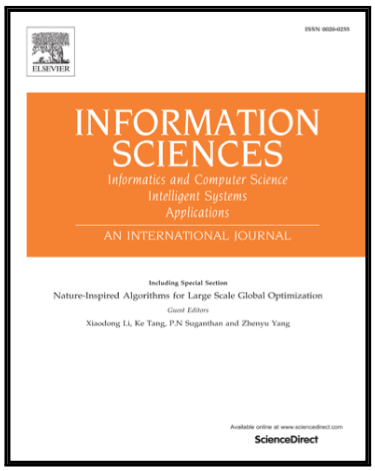

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Efficient and Effective Influence Maximization in Social Networks: A Hybrid-Approach

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Abstract

Influence maximization (IM) is the problem of finding a seed set composed of k nodes that maximize their influence spread over a social network. Kempe et al. showed the problem to be NP-hard and proposed a greedy algorithm (referred to as *SimpleGreedy*) that guarantees 63% influence spread of its optimal solution. However, *SimpleGreedy* has two performance issues: at a micro level, it estimates the influence spread of a single node by running Monte-Carlo (MC) simulations that are fairly expensive; at a macro level, after selecting one seed at each step, it re-evaluates the influence spread of *every node* in a social network, leading to significant computational overhead. In this paper, we propose *Hybrid-IM* that addresses the two issues in both micro and macro levels by combining *PB-IM (Path Based Influence Maximization)* and *CB-IM (Community Based Influence Maximization)*. Furthermore, we identify two technical issues that could improve the performance of Hybrid-IM more and propose two strategies to address those issues. Through extensive experiments with four real-world datasets, we show that Hybrid-IM achieves great improvement (up to 43 times) in performance over state-of-the-art methods and finds the seed set that provides the influence spread very close to that of the state-of-the-art methods.

Keywords: Social network, Information diffusion, Influence maximization, Monte-Carlo simulations

1. Introduction

The rapid growth of social network services (SNSs) such as Facebook and Twitter has greatly increased the number of people who use SNSs. SNSs serve as a medium through which people share their opinions and knowledge with others. Companies hope to spread the information related to themselves over a

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