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Social influence modeling using information theory in mobile social networks

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Abstract

Social influence analysis has become one of the most important technologies in modern information and service industries. Thus, how to measure social influence of one user on other users in a mobile social network is also becoming increasingly important. It is helpful to identify the influential users in mobile social networks, and also helpful to provide important insights into the design of social platforms and applications. However, social influence modeling is an open and challenging issue, and most evaluation models are focused on online social networks, but fail to characterize indirect influence. In this paper, we present a mechanism to quantitatively measure social influence in mobile social networks. We exploit the graph theory to construct a social relationship graph that establishes a solid foundation for the basic understandings of social influence. We present an evaluation model to measure both direct and indirect influence based on the social relationship graph, by introducing friend entropy and interaction frequency entropy to describe the complexity and uncertainty of social influence. Based on the epidemic model, we design an algorithm to characterize propagation dynamics process of social influence, and to evaluate the performance of our solution by using a customized program on the basis of a real-world SMS/MMS-based communication data set. The real world numerical simulations and analysis show that the proposed influence evaluation strategies can characterize the social influence of mobile social networks effectively and efficiently.

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Keywords:

mobile social networks, social influence, information entropy, social relationship graph, direct influence, indirect influence

1. Introduction

Mobile social networks [6, 19] are the networks where individuals with similar interests converse and connect with one another through their mobile phones and/or tablets. It is used widely as an important communication media with exponential growth. Especially, mobile communication and mobile web technologies have brought revolutionary changes to our daily lives. In the last decade, lots of online social networks, such as Facebook, Twitter, and LinkedIn, emerged and tightly connected web users all over the world. People can directly engage in these networks, build their own friendship networks, and share their opinions, insights, information, experiences, and perspectives with each

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