Predicting Trust Relationships in Social Networks Based on WKNN

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Abstract: Trust relationships between user pairs play a vital role in making decisions for social network users. In reality, available explicit trust relations are often extremely sparse, therefore, inferring unknown trust relations attracts increasing attention in recent years. In this paper, a new approach originating from machine learning is proposed to predict trust relationships in social networks by exploring an improved k-nearest neighbor algorithm based on distance weight (WKNN). Firstly, we extract three critical attributes from users' personal profiles and interactive information; then, an improved KNN algorithm named WKNN is proposed; finally, comparative analysis between them is performed by using real-world dataset from Epinions to evaluate their performance in trust prediction. Empirical evaluation demonstrates that the proposed framework (WKNN model) is feasible and effective in predicting trust relationships.

Key words: Trust relationships, social networks, WKNN, KNN.

1. Introduction

With the popularity of online social networks and product-recommending sites, more and more users construct their profiles online and explicitly maintain the relationships with others by social networks. It is possible and common to interact with unfamiliar people; therefore, it is often a question "Should I trust the person?" [1]. Since trust relationships constitutes the basis of interaction and transaction between users, inferring implied trust relations attracts more and more attention in recent years.

Previous work regarding trust inference mainly relies on trust propagation techniques, which is based on the established trust relationships and the structure of social networks [2]. However, the available web of trust is too sparse [3] to apply propagation techniques. In light of these, we suggest
to predict trust relationships between users more accurately by utilizing both user personal data from user's profile and user interaction data from rating information. Moreover, we observed that a user trusts another user can be described by trustee's good reputation and credibility, or their common interests, or good rating interactions between them. In this paper, we propose a new approach (WKNN model) to predict trust relationships. Our contributions are summarized as the following:

1) Demonstrating that authority similarity, interest similarity and rating similarity are three critical attributes to deduce trust relationships in social networks
2) Proposing a new algorithm named WKNN to model trust prediction problem