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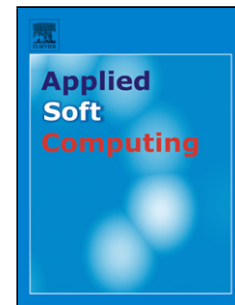
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Inferring Tag Co-occurrence Relationship across Heterogeneous Social Networks

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Abstract

Predicting the occurrence of links or interactions between objects in a network is a fundamental problem in network analysis. In this work, we address a novel problem about tag co-occurrence relationship prediction across heterogeneous networks. Although tag co-occurrence has recently become a hot research topic, many studies mainly focus on how to produce the personalized recommendation leveraging the tag co-occurrence relationship and most of them are considered in a homogeneous network. So far, few studies pay attention to how to predict tag co-occurrence relationship across heterogeneous networks. In order to solve this novel problem mentioned previously, we propose a novel three-step prediction approach. First, image-tag bins are generated by utilizing the TF-IDF like method, which help reduce the search space. And then, weight path-based topological features are systematically extracted from the network. At last, a supervised model is used to learn the best weights associated with different topological features in deciding the co-occurrence relationships. Experiments are performed on real-world dataset, the Flickr network, with comprehensive measurements. Experimental results demonstrate that weight path-based heterogeneous topological features have substantial advantages over commonly used link prediction approaches in predicting co-occurrence relations in Flickr networks.

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Keywords: Tag Co-occurrence, link prediction, heterogeneous network, Flickr, weight path

1. Introduction

A mass of real-world information networks, such as Facebook, MySpace, Twitter, and FourSquare etc., exhibit a range of interesting properties and patterns [1, 2]. Along this line of research, one of the recurring topics is to develop models that predict and reconstruct the emergence of such network structures. Researchers have racked their brains trying to design models that could precisely predict the global structure of the information network [3, 4, 5, 6, 7, 8, 9, 10].

Most of the information networks are highly dynamic. Their dynamic structures evolve quickly over time by addition of new links which indicate the appearance of new interactions between vertices or nodes of the network [11, 12]. For example, the tag-tag link in social tagging systems enables users to explore what other users are interested in. More and more researchers focus on improving item recommendation by using tagging information. However, the traditional tag-based methods carry item recommendations by leveraging well-known tag co-occurrence, which

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