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Combining Paper Cooperative Network and Topic Model for Expert Topic Analysis and Extraction

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Abstract: Paper cooperation network embodies expert topic similarity in an extent, thus, a novel method is proposed for expert topic analysis and extraction by combining paper cooperation network and topic model. In the method, we extract each paper's author information and construct an expert cooperation network. At the same time, by means of LDA model, a probabilistic topic model is also built to analyze papers' latent topics. Then, by making full use of the feature that adjacent nodes in the expert cooperation network share similar themes distribution, we make a constraint on expert topic distribution in Gibbs sampling process of solving the probabilistic topic model. Experimental results on NIPS dataset show that the proposed method can effectively extract expert topics, and the expert paper cooperation network plays a very good supporting role on the extracting task.

Keywords: expert topic analysis, paper cooperation network, probabilistic topic model, Gibbs sampling, expert topic extraction

1. Introduction

Experts are very important resources in today's knowledge society. In all walks of life, experts, with broad professional knowledge, proficient skills and rich experiences, are urgently needed to review, guide, supervise and inspect all kinds of project approval, project implementation and project acceptance. From scientific research institution to social production departments, experts are also needed to organize a team, guide product development, and tackle key problems, so that these institutions and departments can improve work and production efficiency. Therefore, it is an important scientific problem to obtain the relevant experts from the vast network knowledge. Expert topic analysis and extraction plays an important role in expert search and expert recommendation.

Expert topic analysis is that extracts expert research areas and obtains expert topics from experts' homepages, experts' published papers, and experts' social networks. Existing topic analysis method is mainly divided into three categories. The first category is a topic analysis model based on Latent Semantic Analysis (LSA) [1]. In the category method, singular value decomposition in matrix theory is applied to divide a larger TF-IDF matrix into three smaller matrices to construct a new low-dimensional latent semantic space and find a simpler expression for the document. The second category is a probabilistic topic analysis model based on Probabilistic Latent Semantic Analysis (PLSA)

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