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Modeling of Cross-disciplinary Collaboration for Potential Field Discovery and Recommendation Based on Scholarly Big Data

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Abstract

The promise of cross-disciplinary scientific collaboration has recently been proven by both technological innovation and scientific research. Much effort has been spent on research collaboration recommendation. A remaining challenge is to make valuable recommendation to specific researchers in specific fields in order to obtain more fruitful cross-disciplinary collaboration. Cross-disciplinary information hides in big data and the relationships between different fields are complicated, complex, and subtle. This paper proposes a method for cross-disciplinary collaboration recommendation (CDCR) to analyze cross-disciplinary collaboration patterns in scholarly big data, and recommend valuable research fields for possible cross-disciplinary collaboration. A cross-disciplinary discovery algorithm based on topic-modeling is designed to extract potential research fields. Collaboration patterns are examined by analyzing the research field correlations. A recommendation algorithm is developed to provide a specific recommendation list of potential research fields according to the discovered cross-disciplinary collaboration patterns with researchers' profiles. Evaluations conducted based on a real scholarly dataset demonstrate the effectiveness of the proposed method in recommending potentially valuable collaborations.

Keywords: cross-disciplinary; research collaboration recommendation; research field discovery; collaboration pattern; scholarly big data

1. Introduction

As scholarly big data emerges, tremendous research progress and achievements, usually articulated in published articles, are captured in a digital scholarly database [1]. Cross-disciplinary research collaboration among experts in different fields will facilitate advanced research. These collaborations utilizing expertise and techniques from multiple domains, fields, and disciplines are ubiquitous in academia [2], which have been proven effective in generating innovative academic research and practical applications. Research has shown that research collaboration contributes greatly to scientific productivity [3]. Collaboration recommendation technology has helped researchers to find more related collaborations. Scientific recommenders seek solutions to the problems of information overload which are omnipresent in scholarly big data in such matters as promoting author relations, and detecting relevant research papers, or articles, and venues [4]. Co-authorship has traditionally been used to identify valuable collaborators in corresponding fields [5]. A citation network of academic articles can build article recommendation systems within bibliographic databases [6]. However,

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