Finding Rising Stars in Social Networks

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Abstract. This paper addresses the problem of finding rising stars in academic social networks. Rising stars are the authors which have low research profile in the beginning of their career but may become prominent contributors in the future. An effort for finding rising stars named PubRank is proposed, which considers mutual influence and static ranking of conferences or journals. In this work an improvement of PubRank is proposed by considering authors’ contribution based mutual influence and dynamic publication venue scores. Experimental results show that proposed enhancements are useful and better rising stars are found by our proposed methods in terms of average citations based performance evaluation. Effect of parameter alpha and damping factor is also studied in detail.

Keywords: Rising stars, author contribution, dynamic publication venue score, PageRank, Academic Social Networks.

1 Introduction

Academic social networks are made up of co-author and citation based relationships between authors and research papers, respectively. Co-author means the authors writing paper together and citation based relationships occur when one paper cites other papers or is cited by other papers. Academic social network analysis has many interesting research tasks such as expert finding [7], author interest finding [6] citation recommendations [8] name disambiguation [17] and rising star finding [20]. This work is focused on finding rising stars. The motivation is to find new born researchers with abilities to become stars or experts in future. All those persons, who may not be at the top at the moment or are not experienced, but are capable to be at the top position in their respective fields in near future, are referred to as Rising Stars. Finding rising stars is very useful for appointing young faculty members to increase research productivity of department, finding reviewers for conferences and journals which can provide reviews on time and making them members of different academic committees to get benefit from their dynamic and energetic behavior.

An effort made for finding rising stars considers mutual influence and static (a ranking list of publication venues) importance named PubRank [20]. The idea was if a
junior author influences/collaborates with a well known researcher and the publication venue is of high rank (1,2,3 where 1 is higher level, 2 is normal level and 3 is low level) he has bright chances to become a star in future. There were two major problems with the existing method (1) the authors did not consider the author contribution oriented mutual influence in PubRank which is very important when one wants to calculate the influence of one author on another. Here, contribution means the order in which the authors appears in the paper such as first author, second author and so on, with first author is usually considered the main contributor of that work. The junior author who influences/collaborates with well known researchers as main contributor of work has more chances than that of a junior author simply influencing/collaborating with well known researchers and (2) using static rankings is not practical as quality of work published in publication venues changes every year so as the ranking of publication venues and old static ranking lists available on the web does not provide latest rankings of publication venues. Due to aforementioned reasons we are motivated to propose StarRank algorithm which overcomes the limitations of PubRank in easy way. Our proposed method considers author contribution based mutual influence of authors on each other’s in terms of order in which authors appears in the paper as well as latest (dynamic) scores of rankings for publication venues which is calculated using entropy. Our intuition to use entropy is based on the fact that the venues which are stricter in accepting papers to their areas of research are of higher level and has less entropy as compared to the venues which are not very strict in accepting papers to their areas of research and has higher entropy. Here one thing needs to be made clear that usage of entropy for scoring publication venues is workable for conferences/journals but not for workshops as they accept topic specific papers but they do not need to be of high quality because they are not finished or top level papers mostly.

Our hypothesis is supported with the detailed experimentation which shows that our proposed StarRank outperformed existing method clearly for rising star finding task. The effect of algorithm parameters is also studied in details to find their suitable values for rising star finding task.

The major contributions of this work are (1) contribution oriented co-author weight (2) entropy based dynamic publication venue score (3) unification of contribution oriented weight and dynamic publication venue score (4) and experimental evaluation of our proposed method on the real world dataset of DBLP.

The rest of the work is arranged as follows. Section 2 provides the literature review of tasks performed in academic social networks followed by the applications of page rank in these networks. Section 3 provides the existing method with the detailed approach proposed by us for finding rising stars. Section 4 provides dataset description, performance evaluation procedure, parameter settings with results and discussions in different scenarios and section 5 finally provides the concluding remarks.

Several concepts are used interchangeably in this paper such as academic social networks and co-author networks, conferences/journals and publication venues, papers, research papers and publications etc.