

## Chapter 20

# Influential Researcher Identification in Academic Network Using Rough Set Based Selection of Time-Weighted Academic and Social Network Features

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### ABSTRACT

*Researchers entering into a new research area are interested in knowing the current research trends, popular publications and influential (popular) researchers in that area in order to initiate their research. In this work, we attempt to determine the influential researcher for a specific topic. The active participation of the researchers in both the academic and social network activities signifies the researchers' influence level across time. The content and frequency of social interaction to a researcher reflects his or her influence. In our system, appropriate time-based social and academic features are selected using entropy based feature selection approach of rough set theory. A three layer model comprising semantically related concepts, researcher and social relations is developed based on the appropriate (influential) features. The researchers' topic trajectories are identified and recommended using Spreading activation algorithm. To cope up with the scalable academic network, map reduce paradigm has been employed in the spreading activation algorithm.*

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## INTRODUCTION

Influence is the power of a person to have an important effect on some course of events. In an academic network, the behavior of a particular researcher affects the behavior of other researchers. Researchers publish their new innovations as articles, post some tweets related to academic events, critique on techniques or explanation of concepts etc. The researchers also publish articles on various topics. These actions of the researcher in an academic network might encourage other researchers either use the new innovation or criticize his new innovation. In a social network like Twitter, the number of followers might increase based on the nature of users and the tweets posted by them. The other users may get influenced based on the information in tweet and may get many positive replies for the tweet. The user's behavioral changes are triggered. The trigger might be from many researchers and the level of change will differ among the users across time and topic. Such changes in influence level can be tracked to determine the most influential researcher in a topic. In order to track the changes different measures can be adopted.

Any researcher interested in carrying out research in a specific area, need current information about the researcher whose research work has influenced many researchers. The researcher might refer the scientific articles of the particular influential researcher to proceed with his/her research. For example, a researcher entering from the area Computer Networks into Machine Learning will require information about the current influential researchers in Machine Learning area so that publications of such researchers can be referenced. In addition, new researchers would get an opportunity to know about the research trends in a particular topic. In order to support the research to be carried out by the researchers in new areas, influential researcher identification turns out to be an essential information resource. Influential researchers have been determined through academic network analysis, but however today social networks play an important role in determining influence and research focus. Hence, in this work, we try to determine the influential researcher in a topic using academic and social features. Today, research work is available publicly both through research publications and social network discussions almost as soon as it is carried out and thus is able to influence future research. Considering this important factor, as a first of its kind work, time-weighted features have been used to determine influential researchers in order to achieve better ranking.

For effective influential researcher analysis, appropriate features have to be employed. Feature selection is a machine learning technique to detect appropriate features and eliminate noisy or irrelevant features. The feature selection technique increases the algorithm speed and improves the output accuracy. In our work we have selected relevant features using the Entropy reduction algorithm. The concept of selecting relevant features for influential researcher identification is a novel approach. Based on the selected influential features, three layers of time-weighted features are formed as network. Spreading activation with map reduce paradigm is applied on three layered network to determine the influential researcher. The map reduce paradigm is used to handle scalability and identify the influential researcher with less execution time.

Whenever any user searches the web for Influential researchers in a particular topic, the influential researchers identified by our system can be recommended as top influential researchers. Our approach attempts to assist the users in obtaining better recommended list of influential researchers than existing approaches.

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