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Micro-blog topic recommendation based on knowledge flow and user selection

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ABSTRACT

Micro-blog topic recommendation aims to solve the problem of low efficiency for micro-blog topic recommendation caused by excessive micro-blog data. This paper proposed a micro-blog topic recommendation based on knowledge flow and user selection to improve the accessing speed of micro-blog and efficiency of topic recommendation. The micro-blog topic recommendation's core tasks have two sides. One is analyzing the user's preference for the micro-blog topic based on the user's historical behavior. The other is recommending the topic to other users who have the similar historical behavior. First, users are clustered according to users' previous preference to micro-blog topic. After that, the micro-blog topics of knowledge flow in different class (i.e., belongs to different users) are recommended. Finally, the knowledge flow according to the user selection of recommended topics is updated to improve the accuracy of micro-blog topic recommendation. The experimental results show that the proposed algorithm can improve the accuracy and efficiency of micro-blog topic recommendation effectively.

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1. Introduction

In recent years, the status of emerging data platform is growing, more and more people are willing to focus on the current social hot topics through the network. Micro-blog, as one of the emerging data platforms, has been used by more and more people since it was launched. The number of micro-blog topics is growing exponentially at the same time. These topics are related to the time, hotspot, classification and many other dimensions. In the era of information explosion, the different dimensions of user interest and micro-blog topic also have become an important reference index for micro-blog topic recommendation. Therefore, the dimensions of user interest and micro-blog topic have been analyzed by many researchers for micro-blog topic recommendation.

However, how to effectively recommend micro-blog topic to the clustering users has become one of the focuses of current research. The main reason that micro-blog topic recommendation draws so many scholars' attention is that micro-blog topic recommenda-

tion can achieve reorganization of massive information. And the fragment of micro-blog topic can be integrated into a new type of knowledge flow. Because the structure of micro-blog topic's knowledge flow can be continuously updated with the passage of time and the selection by people, the users' selection is difference due to their different interests for micro-blog topic. For example, a hot topic in the past may become a non-hot topic now, so recommended value of this topic is reduced. Similarly, a non-hot topic in the past may also become a hot topic now due to it may be gradually known with passage of time, thus becomes a hot topic worthy of recommendation to users. And some users like hot topics and other users may prefer non-hot topics. The features of micro-blog topic and user selection also brought many challenges to the algorithm of micro-blog topic recommendation.

In order to solve the above problems, the method of micro-blog topic recommendation based on knowledge flow and user selection is proposed in this paper. The core task of this method is clustering user according to the operation for micro-blog. The current micro-blog topics in micro-blog platform are regarded as micro-blog's initial knowledge. The micro-blog which meets the requirements after the screening can be organized as a unique knowledge flow for the user group. After that the user's knowledge flow of the micro-blog topic can be recommended to the user group. Finally,

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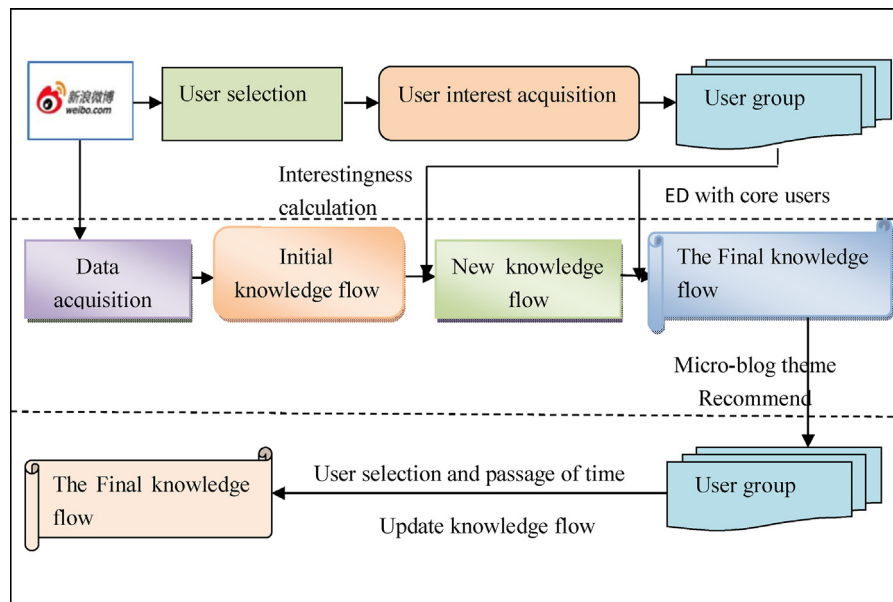


Fig. 1. micro-blog recommendation process based on knowledge flow and user selection.

the knowledge flow will be updated according to the user's selection for the recommended micro-blog topic. For the convenience of description, the part of knowledge flow organization is always adopted a user group for example. There are three steps in the micro-blog topic recommendation based on knowledge flow and user selection, and it is shown in Fig. 1:

- (1) **The acquisition for user interest vector based on user selected micro-blog topic.** First, the crawler programs can be used to obtain users' previous browsing data for micro-blog topics. Second, these browsing data can be analyzed to get each user's interest vector for micro-blog topics. Finally, the *K-means* algorithm is used to cluster the micro-blog users, and get *k* user group sand the core user of each user group. These user groups satisfy the high degree of similarity within the group and the low degree of similarity among groups.
- (2) **The organization for micro-blog topic based on knowledge flow.** There are two times of selection for micro-blog in the organization of knowledge flow in this paper to ensure that the micro-blog topic in the knowledge flow is worth recommending. The current micro-blog topics in micro-blog platform are regarded as micro-blog's initial knowledge, and the interestingness of these micro-blog topics can be calculated. If the interestingness is less than the threshold set in advance, then the micro-blog topic will be removed from the initial knowledge flow. The interest vectors of all micro-blog topics in the knowledge flow can be calculated, and the Euclidean Distance(ED)between the micro-blog interest vector and the core users in the user group can also be calculated. If the ED is greater than the threshold set in advance, then the micro-blog topic can be deleted.
- (3) **The implementation of micro-blog topic recommendation and knowledge flow update algorithm.** The micro-blog topic with the largest similarity will be to the front according to the similarity between the micro-blog interest vector and the core user interest vector. The micro-blog topics will be lined up in a row recommended to the user, and then user makes select whether to browse the micro-blog topic or not. At the same time, the interestingness and interest vector of micro-blog topic can be calculated again based on user selections on the recommended micro-blog topics (including micro-blog topic browse

time, browse frequency and browsing times). And then, the micro-blog topic in the knowledge flow is selected to update the knowledge flow.

The rest of the paper is organized as follows: In Section 2, we give a brief review of related works about micro-blog topic recommendation. Section 3 introduces the basic concepts. Section 4 presents the acquisition for user interest vector based on user selected micro-blog topic. Section 5 introduces the organization for micro-blog topic based on knowledge flow. Section 6 presents the implementation of micro-blog topic recommendation and knowledge flow update algorithm. We give the experimental results and some analyses in Section 7. Finally, conclusions are made in the Section 8.

2. Related works

In this section, this paper will explain the relevant research on recommender systems and knowledge flow. The specific researches are as follows.

2.1. Recommend system

Koren Y, Liang et al. proposed a clustering algorithm based on improved collaborative filtering recommendation Mohammed [1,2]. Ma et al. aimed to investigate a joint framework to combine tag correlation and user social relation for microblog recommendation. Their approach identifies users' interests via their personal tags and social relations[3]. Matrix factorization is also an important technique in recommender systems. Jamali M, Zhang et al. studied the application of matrix factorization in recommender systems [4,5]. Many researchers have done a lot of research on Personalized Recommendation. Jianjun, Kazienko P, Shaymaa Khater et al. conducted the research on the personalized recommendation system [6–8]. Li et al. proposed a model that personalized recommendation of news articles as a contextual bandit problem [9]. Adomavicius G et al. proposed two new approaches a similarity-based approach and an aggregation-function-based approach to incorporating and leveraging multi-criteria rating information in recommender systems [10]. Chen et al. studied personalized recommendation system from different aspects [11–14].

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