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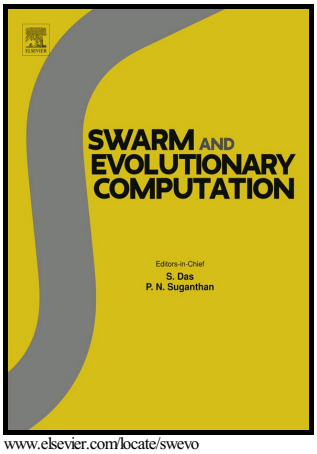

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PII: S2210-6502(16)30564-8
DOI: http://dx.doi.org/10.1016/j.swevo.2017.05.008
Reference: SWEVO278

To appear in: *Swarm and Evolutionary Computation*

Received date: 24 December 2016
Revised date: 18 April 2017
Accepted date: 21 May 2017

Cite this article as: Jianrui Chen, Uliji, Hua Wang and Zaizai Yan, Evolutionary heterogeneous clustering for rating prediction based on user collaborativ filtering, *Swarm and Evolutionary Computation* http://dx.doi.org/10.1016/j.swevo.2017.05.008

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Swarm and Evolutionary Computation 00 (2017) 1–12

Evolutionary heterogeneous clustering for rating prediction based on user collaborative filtering

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Abstract

Recommender systems play an important role in our life, which would help users to find what they are interested in. Collaborative filtering is the most widely used and successful method for personalized recommendation. In this paper, a novel heterogeneous evolutionary clustering is presented. The goal of our algorithm is to gather users with similar interest into the same cluster and to help users find items that fit their personal tastes best. The suggestions from friends with similar interest may be adopted with high probability. Firstly, items and users are regarded as heterogeneous individuals in the network. According to the constructed network model, states of individuals evolve over time. Individuals with higher scores would cluster into together and individuals with lower scores would get away. After many iterations, states of items and users would be stable. In light of stable states of heterogeneous individuals, they are clustered into several groups. Secondly, user-based collaborative filtering are adopted in each cluster. Similarities between individuals only in same cluster are computed not for all individuals in system. The target rating is calculated according to user-based collaborative filtering in its cluster. Diverse simulations show the efficiency of our proposed methods. Moreover, the presented method gains better prediction results than two existing preferable algorithms.

Keywords: Collaborative filtering, Evolutionary clustering, Prediction rating, Recommender systems.

1. Introduction

In recent years, online social networks such as Facebook, Twitter, Taobao, Google have closely connected with our daily life. They provide us with abundant online contents, which make it very time-consuming to find our needed information. This is often referred as the information overload problem. And in order to solve it, much attention has been paid to design efficient recommendation algorithms [1]-[2]. For example, there are many recommendation methods: collaborative filtering [3], content-based [4], knowledge-based [5], social network-based recommender systems [6], fuzzy recommender systems [7]-[8], context awareness-based recommender systems[9]-[10], group recommender systems [11], matrix factors techniques [12]-[13]. These algorithms have turned out to be effective and detailed description is given in [14].

Filtering collaborative algorithms with clustering techniques have been verified its superiority by many references. In [15],[16], Gong et al. proposed a multi-objective recommendation model to recommender systems. And in their paper, a clustering technique is employed to improve the computational efficiency. Sarwar et al. presented and

[0]This research was supported through National Natural Science Foundation of China (No. 71561020, 61503203, 11326239, 11261034); Natural Science Foundation of Inner Mongolia (2015MS0103).

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