A fuzzy co-clustering approach for hybrid recommender systems

Authors

Rana Forsati1, Hanieh Mohammadi Doustdar2, Mehmoush Shamshard1, Andisheh Keikha1, Mohammad Reza Meybodi3

1NLP Research Lab, Faculty of Electrical and Computer Engineering, Shahid Beheshti University, G.C., Tehran, Iran
2Department of Computer Engineering, Islamic Azad University, Gavzir Branch, Gavzir, Iran
3Department of Computer Engineering, Amirkabir University of Technology, Tehran, Iran

Abstract

Many efforts have been done to tackle the problem of information abundance in the World Wide Web. Growth in the number of web users and the necessity of making the information available on the web, make web recommender systems very critical and popular. Recommender systems use the knowledge obtained through the analysis of users' navigational behavior, to customize a web site to the needs of each particular user or set of users. Most of the existing recommender systems use either content-based or collaborative filtering approach. It is difficult to decide which one of these approaches is the most effective one to be used, as each of them has both strengths and weaknesses. Therefore, a combination of these approaches can overcome the limitations and increase the effectiveness of the system. This paper introduces a new hybrid recommender system by exploiting a combination of collaborative filtering and content-based approaches in a way that resolves the drawbacks of each approach and makes a great improvement over a variety of recommendations in comparison to each individual approach. We introduce a new fuzzy clustering approach based on genetic algorithm and create a two-layer graph. After applying this clustering algorithm to both layers of the graph, we compute the similarity between web pages and users, and propose recommendations using the content-based, collaborative and hybrid approaches. A detailed comparison on all the mentioned approaches shows that the hybrid approach recommends the web pages which haven't been yet viewed by any user, more accurately and precisely than other approaches. Therefore, the evaluation of the results reveals that the novel proposed hybrid approach achieves more accurate predictions and more appropriate recommendations than each individual approach.

Keywords

Content-based approach, collaborative filtering approach, hybrid approach, fuzzy clustering

Fulltext Preview (Small, Large)
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Dana Farrahi*, Hossain Mohammad Domajni†, Mehroor Shehzadi‡ and Mohammad Reza Moayed§

†‡Department of Computer Engineering, Institute of Medical Research, Shahid Beheshti University, Tehran, Iran
§Department of Computer Engineering, Harbin Institute of Technology, Harbin, China

Abstract: Many online items have been seen as a result of the growth of social media and the increasing of the number of users. In this paper, we aim to improve the process of providing items by utilizing available user data. We use a hybrid recommendation system which takes both collaborative filtering and content-based filtering into consideration. First, we cluster users and items separately, and then we form clusters that can be regarded as communities of users or communities of items using fuzzy logic. Finally, a weighted average method is applied in both phases of the graph, we use the similarity between user ratings and users, and user-item recommendations are generated. Hybrid recommendation is able to effectively provide satisfactory recommendations for users and items. Moreover, the integration of the two main factors in the proposed hybrid approach increases accuracy. The results of the experiment confirm the effectiveness of the proposed approach.

Keywords: Content-based approach; collaborative filtering approach; hybrid approach; fuzzy clustering