Buyagain Grocery Recommender Algorithm for Online Shopping of Grocery and Gourmet Foods

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ABSTRACT
Online shopping of grocery and gourmet products differ from other shopping activities due to its routine nature of buy-consume-buy. The existing recommendation algorithms of e-commerce websites are suitable only to render recommendation for products of one time purchase. So, in order to identify and recommend the products that users are likely to buy again and again, a novel recommender algorithm is proposed based on linguistic decision analysis model. The proposed buyagain recommender algorithm finds the semantic value of the user comments and computes the semantic value along with the user rating to render recommendation to the user. The efficiency of the buyagain recommender algorithm is evaluated using the grocery and gourmet dataset of amazon e-commerce websites. The end result proves that the algorithm accurately recommends the product that the user likes to purchase once again.

KEYWORDS
Grocery and Gourmet Foods, Grocery Recommendation System, Linguistic Based Analysis, Linguistic Decision Analysis, Repetitive Purchase, Review, Semantics Based Recommendation

1. INTRODUCTION
The need to retrieve the specific and interested information from the mammoth amount of information paved the way to the evolution of recommendation systems. In the digitalized world, recommendation system assists and helps the users in finding the right information or right product at the precise time. Advantageousness nature of recommendation system made many web based applications ranging from small personal web app to huge e-commerce websites to construct their own personified recommendation system. Existing recommendation algorithms correlate the user ratings on items or compute the user or item related information to render personified recommendations. This kind of traditional recommendation algorithms works well with the one time purchases whereas grocery shopping is a repeated and frequented purchase activity. For example, if a user purchases a movie or a book he/she is not going to buy the same product again instead the user will search for a new one whereas in grocery purchase user need to buy the same product again and again at frequent

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intervals. Because grocery and gourmet food shopping remain as a necessity and it is blended with the everyday activity of a people. Also the presence of ecommerce giants in the field of grocery and gourmet foods indicates the hidden business value in the shopping market of the grocery business (Dastin, 2017) (Guebert, 2017). Even though the traditional recommendation algorithm assists the user with new recommendations it fails when a user wanted to purchase the same item again (Li, Dias, Jarman, El-Deredy, & Lisboa, 2009). This kind of recommendation scenario especially in the field of grocery and gourmet foods created a significance necessity to develop a futuristic recommendation system to recommend groceries. Therefore, in this work a futuristic recommendation system for groceries is proposed based on the linguistic decision analysis to assist the user in grocery shopping. The proposed buyagain recommendation algorithm, analyses the user comments based on linguistic rules to find the probability of the user to buy the same product again. Initially the semantic value of the user comment is calculated by summing up the significant value and polarity value of the user comment. After the estimation of the semantic value, aggregation value for the item is calculated by computing the semantic value along with the user rating on item. Finally, by mapping the aggregation value to the fuzzy membership function the recommendations are rendered to the user. The paper is constructed as follows: section two details the existing work of grocery recommendation system. In section three the proposed recommendation algorithm is detailed and in section four the proposed algorithm is evaluated using an amazon real world datasets on grocery and gourmet food shopping. Section five concludes the paper with references.

2. SIMILAR WORKS

Initially people asked the suggestions of neighbours, friends and people they trust while buying products or items. The evolution of ecommerce industry created significant necessity to develop a filtering mechanism to enhance the shopping experience of the user (Adomavicius & Tuzhilin, 2005). The need for the advanced filtering technique paved the way to invent the recommendation systems. Recommendation system computes the backdrop information like user transactional history, user ratings, demographical information and the user searching query to generate recommendations to the user. Most of the existing recommendation systems are based on the familiar collaborative filtering algorithm (Resnick, Iacovou, Suchak, Bergstrom, & Riedl, 1994) (Herlocker, Konstan, Borchers, & Riedl, 1999). Collaborative filtering algorithm generates recommendations by aggregating the relationship between the user and item on the basis on similarity correlation (Sarwar, Karypis, Konstan, & Riedl, Item-based collaborative filtering recommendation algorithms, 2001) (Sarwar, Konstan, Borchers, Herlocker, Miller, & Riedl, 1998). Currently many hybrid recommendation algorithm based on collaborative filtering algorithm are developed to cater the growing needs of information filtering (Su & Khoshgoftaar, 2009) (Sarwar, Karypis, Konstan, & Riedl, Analysis of recommendation algorithms for e-commerce, 2000) (Sharon & Dhinesh, 2016). Though many hybrid algorithms came into existence, recommendation system in the field of grocery and gourmet remains as one of the less explored research area. Also, the existing recommendation techniques fails to render useful recommendations in the grocery domain since the traditional recommender algorithm generally recommends products to the user that can be purchased once. Whereas the recommendation scenario in grocery and gourmet foods domain not only need new products but also requires generating recommendation of user interested products that user purchased already. Gary Mortimer and others in their work proved that the repurchase activity, user trust on the system and user based analysis plays major role in online grocery purchase (Mortimer, Fazal e Hasan, Andrews, & Martin, 2016) (Van Droogendriek & Van Hove, 2017). Ankit and others also argue that in future online grocery is going to be one among the biggest ecommerce businesses. They conclude that trust, satisfaction and loyalty play a major role in the online grocery market (Kesharwani, Sreeram, & Desai, 2017). So in order to support user in repurchasing the liked products a new recommendation algorithm based on linguistic analysis is proposed in this work.
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