Role of Recommender System for Selling Products in Online Shopping

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Abstract:

The popularity of online shopping is growing rapidly in modern virtual market. Generally, customers take decision to purchase goods based on their basic need and relative need. Shopkeepers play an important role to influence the customers in real market. Recommendation engine is nothing but a good and automated shopkeeper. In this paper, we propose a model of dynamic recommendation system (DRS) for online market. Our proposed technique provides an intelligent solution model to overcome the problems of customers' rating and their feedback by integrating market basket analysis, frequent item mining, bestselling items and customer personalization.

Keywords: e-commerce, Electronic Commerce, online shopping, Recommender System, Item-Based filtering Collaborative filtering, Demographic Analysis.

I. Introduction:

The rapid growth of the internet usage and the emerging popularity of ecommerce has caused the collection of data to outpace the analysis necessary to extract useful information. This data further plays an important role in brand development and effective advertisement. Recommender systems were developed to help close the gap between information collection and analysis. A recommender system can help by recommending products based on the preferences of consumers on other platforms. These recommendations are automatically generated with help of algorithms and taking help of data science.

Electronic Commerce is well known by e-commerce, which is a type of business model that enables an organization to sell their products electronically using web and this process is known as

online selling or online shopping [1]. Few of most popular online shopping sites are Amazon, Flipkart, eBay etc., every site has its unique recommendation system. Algorithms used for recommender system will find similarities between the products using user shopping history.

II. RECOMMENDATION SYSTEM AND TECHNIQUES:

Recommendation systems are the most important factor in online sales and services applications. They utilize data mining techniques and tools to predict preference of user by utilizing their previous shopping data and selecting products among the available items for the users [2]. This is useful for forcing consumer to buy the product or at least attract the attention of consumer towards particular product. A recommendation system obtains the interest and preference of consumer and performs recommendations accordingly; therefore, it is used in every ecommerce application. Recommender Systems have the high potential to help and improve the quality of the decisions those consumers make while searching for and selecting products in online shopping.

Recommendation systems are one of the approaches applied for the ecommerce applications, which is based on providing possible items of interest to a user. This is also useful to reduce the stock of unsold products. Recommender System recognize recommendations autonomously for individual users based on data of their previous search, shopping, profiles, rating and reviews given to item.
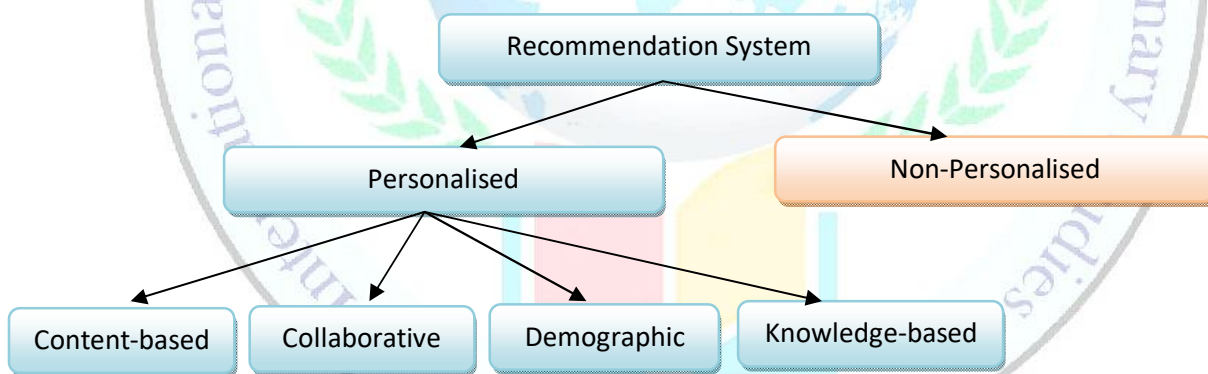

Fig. 1 Types of Recommender System

There are two main types of recommender systems; personalised and non-personalised.

1. Personalized Recommendation:

Personalized recommendation system allows the software or application to perform users analysis of user profile and generate customization. This also performs the recommendation in any product in any format that is relevant to each user. This process is based on the user's implicit and explicit behaviors.

Personalized recommender system is further devided into content based filtering, collaborative filtering, Demographic, Knowledge based and hybrid.[3]

1.1 Content-based recommendation method:

This is most impactful recommendation generated through existing data. The Content-based recommendation method is based on the information about item content (Product Information), Sales Information and ratings (Reviews of product) provided by users. This technique combines these ratings to data in user profile and user's interests. The recommendation engine then can search items with the preferred in the past. The recommendations of a content-based system are based on individual information of user and ignore contributions from other users.
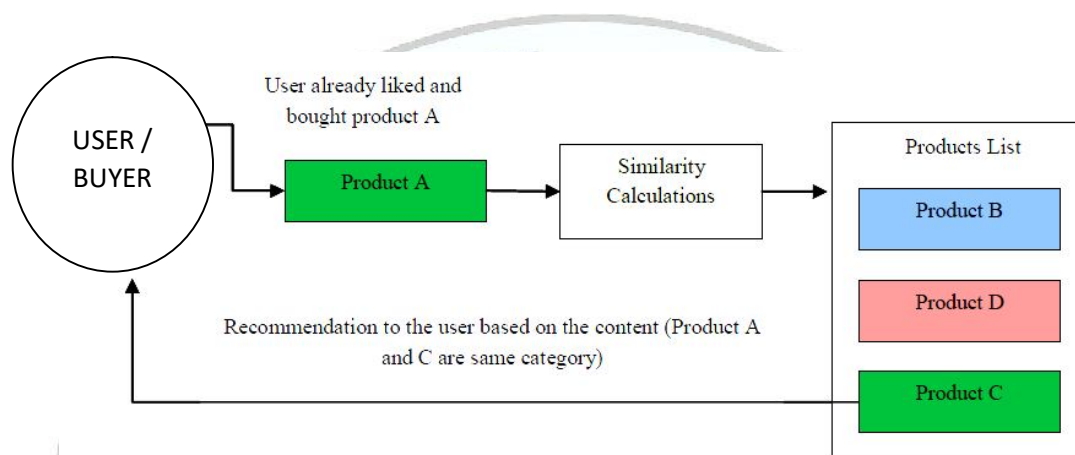

Fig. 2.0 Content-Based Recommendation

This type of recommendation is very useful when there are newly arrived or non-popular items on the selling list. However, the content analysis is necessary to determining the features of the products. The technique depends not only on the quality of the item but also on the homogeneity of the stock. So, the products can be categorized easily. Once category and features of products are analysed, system recommends products that matches with consumer search. Another drawback of this technique is, the similarity computation is limited to the item features.

1.2 Collaborative Filtering:

In collaborative filtering data from multiple users is used for analysis. Collaborative filtering technique is based on user's history in the form of rating given by the user and different items purchased together [4]. In individual, combination of products is considered and can be recommended as title "FREQUENTLY BROUGHT TOGETHER". It can be accomplished by making relation between the users or between items. Collaborative filtering is categorized into three types: user-based, item-based and model-based.
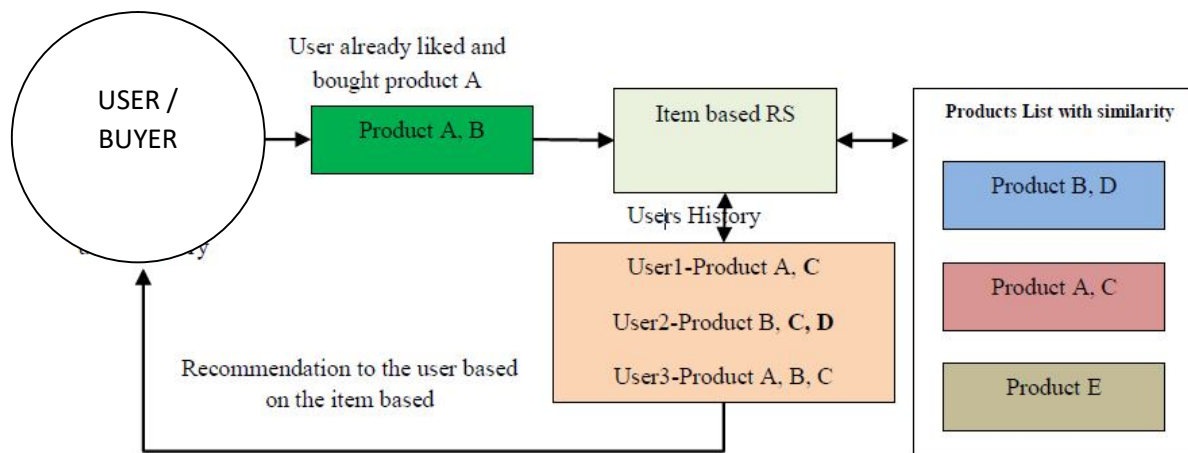
Fig. 3 Collaborative Filtering

In collaborative filtering based recommendation system, prior knowledge about the product descriptions and features is not required. Instead it is based on ratings given by consumers after buying the product. Different ecommerce sites can use this approach for new recommendations of products. In other words, we can say this approach is to generate new sell to existing buyer. Collaborative filtering techniques are able to perform recommendations to the individual based on preferences of others in relation with individual's product selection. Even if the technique is good, the quality of the new recommendations depends on the size of the previous rating dataset. Two data sets are used in collaborative filtering; one is based on users and their selection and second is based on items and their selection. Thus, items and users are used in this approach.

1.3 Demographic Filtering:

In demographic recommendation, information from user profile is considered for recommending products. The demographic types of users include user information like gender, age or age group, languages known, abilities/disabilities, ethnicity, mobility, employment status, home ownership and even geological location. The system recommends items according to the demographic similarities of the users. The demographic recommendation system is not fall on the user item ratings and it gives suggestions before the user rated any product. It doesn't require item features and as like collaborative.

1.4 Knowledge-Based Filtering:

Knowledge based recommendation system is based on the explicit knowledge about items, item classification, manufacturer, service provider, user interest and recommendation standard (which item should be recommend in which feature) [6]. It is an alternative approach to the collaborative filtering and content-based filtering.

1.5 Hybrid approach:

Hybrid approach is a combination of few or all above types of recommender systems [5].

2. Non-Personalized Recommendation:

Non-personalized recommendation system recommend items to consumers based on what other consumers have said about the product in an average. In other words, recommendation is based on other user's opinion. That is, the recommendations are independent of the customer, so all customers get the same recommendation. [12]

The Recommender systems are based on both personalized and non-personalized; however, analyzing and suggesting products need some historical information's and features of the item. It shortens customers' product searching time in online shopping, which improves the business online. In order to serve customers instantly and efficiently, it is essential to recognize each customer's unique and particular needs and recommend a personalized shopping list based on their interest and preferences. Finding effective recommendation system is also a major challenge.[12]

III. PROPOSED SYSTEM:

The proposed an algorithm for a new recommendation system based on the two Recommender Systems; one is collaborative and second is demographic analysis. It can be considered under hybrid recommendation and its purpose to provide effective product recommendation for online shopping.

In Item-based collaborative filtering, a technique of finding similar items for a given item from a list of items is used. This technique uses the method of finding similar of items to the item selected. This searching is based on features of items. In this step, we prepare list of similar products. (PSL)

By using demographic filtering technique, we can prepare set of similar users or customers. This grouping is based on profile information of each user. As we are developing this algorithm for online shopping, we are using word Customers rather than users. In this step, we prepare a list of customers (CL) who purchased particular item.

In our proposed algorithm, we are not considering feedbacks or reviews but we are using information of items purchased. The main concept used for developing this algorithm is similar customers prefers similar products for their shopping.

For each product we get customer set (CL) and then we can recommend other products in list of similar products (PSL) to other customers. This algorithm will recommend products to customers and will be effective in selling products in online shopping.

Algorithm: Proposed Recommendation System:

Input: Item and customer dataset

Output: Product suggestion

Steps:

1. Start

2. PL=Read Product List.

3. For each item in PL

    A. Prepare a set of similar product PSL.

    B. For each item PI in PSL

        a. Find Customers CL who purchased PI.

        b. For each customer C in CL

            i. Find Similar Customers CL2 from Customers Data

            ii. Recommend PSL to each customer in CL2.

4. End.

Limitations of this algorithm is that it doesn't consider product review of customer after buying the products. This algorithm is faster in action as it doesn't wait for review or ratings of products. Our algorithms also doent cnsider available stock of products.

CONCLUSION:

Recommender systems are useful for promotion of products or brands in online shopping. Several recommender systems can be implemented simultaneously for recommending products to customers. Through the proposed algorithms, the customers can be assured with a better suggestions for buying products, it is not the only algorithm that can be used for promotion of products. Limitations of the algorithm can be eliminated by altering factors and developing different algorithms and hence provide further scope for researchers and developers.

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