SURVEY PAPER ON DYNAMIC RECOMMENDATION SYSTEM FOR E-COMMERCE

Vaishali Bajpai
Research Scholar
IES IPS Academy
Indore, India

Yagyapal Yadav
Assistant Professor
IES IPS Academy
Indore, India

Abstract: Recommender system is a strategy in e-commerce, which recommends items based on the user's interest. It has the capability to predict whether a particular user would prefer an item or not based on the user's profile. Recommender systems are useful for both e-commerce service provider and users. So it should be required for a recommendation system to provide most preferable items to the user's interest. This paper presents a dynamic recommendation system to provide recommendations on the user's interest. In this dynamic recommendation system first of all the web usage information is utilized to find the user's behavior and then similar user behavior score is computed. In the second phase, product information is collected on the basis of current search information about the user through which sentiment score and social media popularity score are computed. On the other side coefficient matrix is used to calculate user's purchasing power. These three factors- similar score behavior, sentiment score and popularity score are used to calculate the combined weight for the particular product. Then a coefficient matrix and the computed weights are used to calculate the possible recommendation of the product for the user.

Keywords: Recommendation system; similar score behavior; sentiment score; popularity score; weight computation

1. INTRODUCTION

A recommendation system is a decision maker strategy for e-commerce environments. It predicts a particular e-commerce user and provides the recommendations to the user .which makes easy to purchasing items on e-commerce sites. It reduces transaction cost in an online shopping environment. It has also proved to improve the decision making process and quality [1].

E-commerce recommendation systems are one kind of recommender systems, which can automatically recommend items that are more interesting to a particular user based on the user's current web navigation behavior. A recommender system is a software solution for personalized service in an e - commerce environment. Based on the customer preferences, it helps to find the products they would like to purchase by providing recommendations and it is particularly useful in e-commerce services that offer millions of items for sale. E-commerce recommender system usage user's web navigational behavior, past experiences and the same kind of user's behaviors which enhance the performance of recommendation system and it would provide good quality of recommendations to the user on their interest.

E-commerce recommendation system is mainly based on web usage mining where user's preferences and behavior are analyzed and predicting by web usage mining. Analysis and prediction is done by web log files. Customers click stream data can act as a very rich source of information. Click stream indicates the user's path through a website. Web log files store and maintain all click stream data. This data can be very helpful in providing the effective recommendation. Good quality recommendation systems will not only help in satisfying customer's preferences for a product but also in improving sales and attracting new consumers. Indigent quality of recommendation, results in

false negative peculiar errors and false positive peculiar errors. False negative peculiar errors: these are the items not recommended even though the customer likes it. False positive peculiar errors: those items are recommended which even though the customer dislikes it. In an E-commerce domain the most important error that need to be handled and circumvented are false positive errors, which can result in unsatisfied customers in minimize their possibility to revisit the site once again [2].

A. Types of Web Page Recommendation System

A recommendation system can be developed in a number of techniques. According to behavior of recommendation system can be classified into following categories.

a) Content-Based Method

Content-based recommendation method recommends the products which are similar to the searched products. There are several methods of finding the similarity of an product to a set of products. In particular, keyword analyzing techniques are applied to find recommendations [3].

b) Collaborative Method

Collaborative methods rely on the total preference and rating of all users instead of a single user's preference and rating. An example of collaborative recommender systems is the book and CD recommendation system at amazon.com [4]. Collaborative recommendation relies on the ratings of similar users. Therefore the similar users have to be found in order to generate recommendations.

c) Hybrid Method

Hybrid recommendation aims to avoid certain limitations of filtering methods by combining two or more filtering methods together. The hybrid method is a combination of two algorithms i.e. Content-based and collaborative-based algorithms. Which is used to make effective recommendation systems? Several techniques are used to combine content-based and collaborative based algorithm. These are:

✓ Separately implementing content-based and collaborative algorithms and combining the prediction result.

✓ Adding some content-based characteristics to the collaborative algorithm.

✓ Adding some collaborative algorithm characteristics to the content-based algorithm.

✓ Incorporating both algorithms and building a general framework.

B. User Behavior Analysis

E-commerce provides the opportunity of browsing endless items, comparing the prices of an item with different items, creating a wish list and better services based on their individual interests.

As a consequence, e-commerce business analysts require to knowing and understanding the customer's behaviour when they navigate through the website, as well as trying to identifying the interest of customers to provide best services and recommendations. Getting this behavioral knowledge will allow e-commerce websites to deliver a more personalized service to customers, retaining customers and increasing benefits. E-commerce websites provide customers with a wide variety of navigational options and actions: users can freely move through different product categories. A user may follow multiple navigational paths to visit a specific product, or use different navigational paths and try different mechanisms to buy products, all this user's activities are maintained in the web server logs. Web server logs store and maintain the sequence of web events in an ordered form of each user, commonly it is known as click-streams. The valuable information about user's behavior is hidden in web server log files. This information is discovered and analyzed. This analysis is used to improve website contents, structure and to provide a good personalized recommendation by understanding the user's behavior.

Data mining techniques are useful for discovering patterns in web log files. Its main goal is to discover usage patterns trying to explain the user's interests [5].

C. Sentiment Analysis

Today social media is becoming a popular and powerful platform for sharing thoughts, views and opinions of everyone and also it is a way of communication. It provides the facility to peoples to know more about other people's thoughts. Social media provides information and opinions towards the subjects or items which helps in decision making to people who would want to know the others' opinion before taking a decision, while corporate would like to monitor the pulse of people in a social media. Customers are attracted by the popularity of items on Social Media.

In sentiment analysis, social media sites such as Facebook, Twitter, Instagram etc. Helps to customers as well as to e-commerce business vendors. E-commerce website recommends the most popular items on social media by sentiment analysis. Sentiment analysis is based on calculating popularity score of an item and this popularity score are based on many factors such as likes, shares on social media. Items with higher popularity scores are recommended to customers [6][7].

2. PREVOIUS WORKS ON RECOMMENDATION SYSTEM

F. O. Isinkaye et al. [1] discussed the two conventional recommendation techniques such as content based and collaborative techniques. Several types of hybridization strategies are used to enhance the performance of two conventional recommendation techniques. Recommendation models are generated by using innumerable learning algorithms. The performance and quality of recommendation algorithms are evaluated by evaluation metrics. **S. Sivapalan et al. [8]** described recommendation approaches based on association rules, collaborative filtering, content-based filtering and hybrid filtering. Recommender system based on association rules is generated recommendations on the basis of previous transactions the user is already interested in. Collaborative methods rely on the total preference and rating of all users instead of a single user's preference and rating. In the content-based recommendation method, items are recommended which is a similar kind of searched items.

C. Pan and W. Li [9] proposed a thematic similarity measurement by using topic model techniques into modified item-based recommendation approach. This technique is made for topic analysis of research papers. This recommendation approach reduced the cold start problem in the research paper recommendation system. The result showed that more relevant research papers are recommended by this approach. **M. Aprilianti et al. [10]** Proposed a weighted parallel hybrid recommendation method for e-commerce in Indonesia. The data set was derived from one of the largest e-commerce company in Indonesia. The experiments used three sampling techniques, namely bootstrapping validation, timing series and systematic sampling. The best result of these experiments yields F1-measure of 9.99%.

P. Lopes and B. Roy [2] proposed the action based relational recommendation system. This recommendation system made for all registered or unregistered visitors of the website. It made use of lexical patterns to generate recommendations and compared the results of the proposed system with the user's-based technique and product-based technique which showed that the proposed system minimized the limitations of the traditional recommendation system and provides good quality accuracy.

3. PROPOSED WORK

In this proposed system first of all the web usages information is utilized to find the user's behavior. In figure 1, the user behavior analysis phase is analyzed the user's history and past navigational patterns. Therefore the similar behavior of others is computed by finding the patterns matched to the total available users in a web application that is a kind of ratio between total users in the application and the number of user's behavior are matched with the particular user. That provides a behavior score of the particular user.
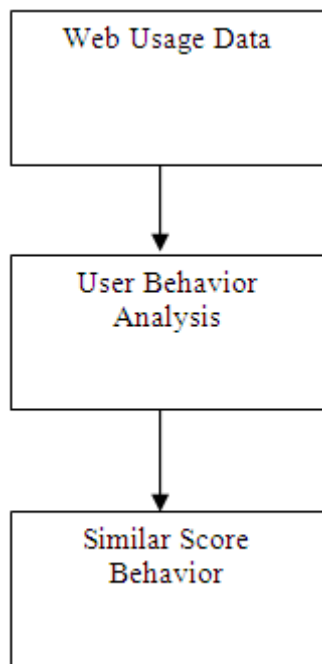
Figure 1.

In figure 2, product information is collected on the basis of current search information about the user which includes two factor analysis i.e., Product review on site and social media popularity, In the first factor analysis, the available product reviews on the site which is evaluated on the basis of positive and negative reviews about the product. That is a ratio of positive reviews of product and total reviews of the product. Which is defined as the sentiment score. In the second factor, how many times the product is liked and shared on the site is calculated as the social media popularity score.
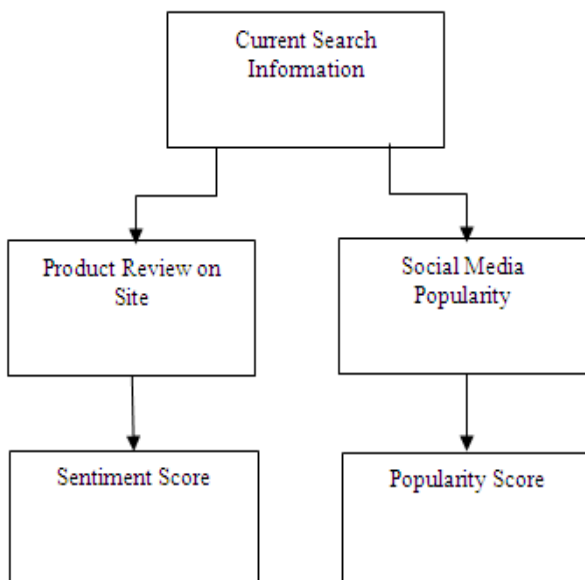

Figure 2.

On the other hand the user's purchasing power needs to calculate. Therefore, the user's previous searched products are evaluated. In this part the previously performed search of the data is obtained with their price range (low-high). Similarly the previous purchased items for with their actual price are used to calculate the coefficient matrix.

In figure 3, these three factors- similar score behavior, sentiment score and popularity score are used to calculate the combined weight for the particular product. Then a coefficient matrix and the computed weights are used to calculate the possible recommendation of the product for the user.
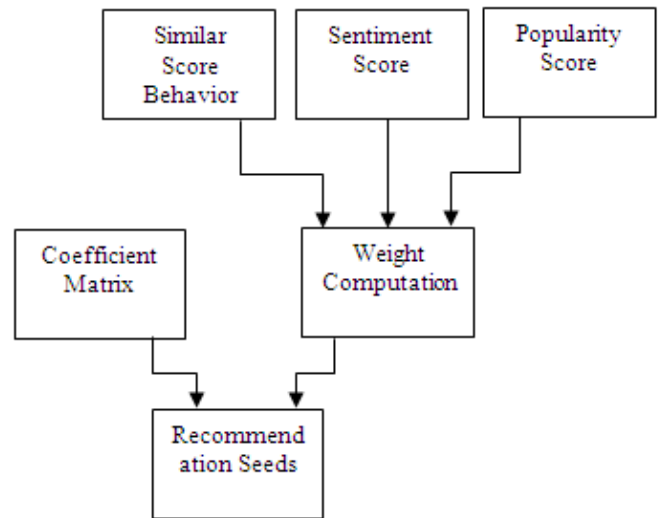

Figure 3.

4. CONCLUSION

In this research work we focus on providing good quality product recommendations to all the users of an e-commerce site. Recommender system is a part of machine learning, which automatically learns from the experience rather than the predefined data. The rapid expansion and rising popularity of E-commerce has forced the existing recommendation system to handle large number of customers and to provide them with high quality of the recommendation. Several kinds of recommendation systems such as content based, collaborative and hybrid methods were proposed over the last decades. We focused on issues faced by recommendation system and proposed methodology that makes use of web usage mining, user's current search information, social media popularity, sentiment score and previous search information.

Hence our proposed methodology is going to enhance the performance of recommendation system using weight-based techniques.

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