

## USER FEEDBACK BASED EVALUATION OF A REPUTATION PRODUCT RECOMMENDATION SYSTEM

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**Abstract** - In today's Web service industry which grows at a fast pace, the use of recommendations systems is widespread and appreciated. Amazon, Flip kart, and Alibaba make use of these recommendation systems and users also depend on these systems. However, when the recommendation is not honest, it leads to dissatisfaction among users. Recommendation systems for web services suggest users to choose the best available service from a wide range of services. The chances of recommendation of an incorrect service are greatly reduced. The service which must be recommended to a specific user is determined by the reputation of a particular service. To choose the best service, the use of feedback rating is recommended. The reputation of a web service in service computing is a calculation based on the ratings for feedback, which are provided by service users. The malicious ratings which are currently available, as well as the myriad preferences related to the different service users, account for the rating bias, which could be either positive or negative. Users can be assisted by recommendation systems to get access to the right items from a large base of items which are available. Recommender systems enable suggestions for items through the use of Collaborative filtering mechanisms which are based on the items' historical data which have been rated by the users. A new collaborative approach which is termed as collaborative filtering is the focus of this paper for items, which in this case, are books, and the system is capable of providing recommendations and is accompanied by detection of rating for malicious feedback and preventive measures. The prevention and detection system has certain

goals and the primary goal is to detect the feedback rating which is malicious in nature, followed by the avoidance or adjustment of this feedback rating, which is malicious. Feedback ratings which are malicious are detected by the system through the use of a method which is known as the cumulative sum method and can reduce the way the user feedback preferences are effected through the use of the Pearson correlation coefficient. A number of experiments implement the method which has been proposed here. Results from experiments demonstrate that the method which has been proposed can be effectively used for the enhancement of the reliability of the selected service. The presence of vulnerability attached to the feedback rating present in the system that is used for recommending web services which are reputed is based on the rating for feedback which is available from users which are attached to each web service. The detection, reduction, and prevention of such vulnerability is possible through the use of the Cumulative Sum Control Chart Item-based Collaborative filtering techniques, and Pearson Correlation Coefficient.

**Keywords:** Product, Recommendation, User Feedback, Rating, Reputation Cumulative Sum Control Chart, Pearson Correlation Coefficient, and Item-based Collaborative filtering techniques.

## 1. INTRODUCTION

To buy products which turn out to be good, people search for those products. This is because a large number of products are produced on a global scale. Word-of-mouth is the best way to decide on the best product. To make buy decisions, customers rely on the views of other people. This has given rise to the emergence of the new system which is also known as the recommender System (RS). The system helps people get products which closely align with their interest. To choose the right products, people perform multiple search operations. Customers can choose the product of their option from the many available products through the assistance of Recommender systems. There are a number of attentions from which RS can find the right items which are relevant. This means that there is high commercial value attached to it. Websites with a high degree of popularity like Facebook, Netflix, Movie Lens, and Amazon make use of this [1]. Personal recommendations are available to users through this. The benefits available to companies can be increased when the adoption of these systems is carried out by firms. Online websites are the means through which their popularity can be explained by companies. The analysis of databases of customer interactions with the web is carried

out by these systems, which results in the production of recommendations which are useful. Purchase information is a form of data which is available and indicates the items which have been purchased by the customer. It also indicates user ratings and the customer behavior related to purchase. Thus, the recommender system can assist E-commerce sites to get more customers and realize benefits. This means that the customers will receive advantages and disadvantages in different ways [2]. Having more options to buy is one of the main advantages available to the customer. There are disadvantages attached to the system too as there are many options, which make it difficult for the customer to make a choice of a single product by considering the different criteria. An example of this criteria is related to the shop which can be trusted, the availability of good customer service, and the best price offer [3]. The absence of a one-stop place for searching comprehensive information related to buying and selling which is available online is the main problem. Information which is related to the buying and selling of goods online includes a list of online shops, products, and a recommendation list related to the choice of shop and product. The concept of rating is used by the system to rely on it in its entirety. One of the problems developed was the

problem related to the acquisition of product rating which could be helpful in acquiring true ratings. Rating can be explicit or implicit, which is the primary input supplied to the RS [4]. The development of many techniques has taken place, which could be helpful in giving recommendations. To understand users and items, the above approaches were equipped with extensions, and the pursuit of rating which were attached to multiple criteria was employed. The use of graph-based approaches was also available. Item popularity approach and standard ranking approach are some of the ranking techniques which have been developed [5]. The development of many more ranking approaches has also taken place, including Item Average Rating, Reverse Predicted Rating value, Item Reduce Likeability, and Item Absolute Likeability. Products are divided based on category through the use of the Cross-Check approach. The difficulty here is that the users might not be able to find out about the category to which the products belong. The aim is to produce a product ranking which can provide useful recommendations to the users. The most relevant pages are presented to users in a quick manner, through search engines. To overcome an aspect of improvement of the search experience, which is a problem of the

previous system, all near-duplicate documents which are presented in the results for the user are removed. E-Commerce environment applications including recommendation and personalization find the information very helpful. This paper focuses on giving online access to registered and unregistered users for the recommendations. The proposed system enables users with product views if the user was registered. When users want to provide reviews for a specific system, the relevant product must be purchased, or else the system does not allow reviews to be provided for that particular product. To recommend the relevant products to a specific user, the collaborative filtering method can be employed for the calculation of ratings and reviews.

## 2. Related Work

Build a system with preferences for high rating and which is based on recommendation [13]. In this system, the WEKA data mining tool is used to do a classification and the calculation of the similarity index is done through the use of the Correlation Coefficient, Euclidean distance-based similarity, and Cosine-based similarity [12].

A movie recommendation system called MOVREC was introduced which enabled the selection of choices by the user from a set of attributes which were given, and then a recommendation for a movie list was made which was based on the cumulative weights of the attributes and the K-Means algorithm was used. An efficient technique was proposed based on Hierarchical clustering [14]. Information that was specific to the user was grouped into a cluster through the use of an algorithm which was known as the Chameleon Hierarchical clustering algorithm. To predict the rating that a particular item achieves, a voting system is used. Hence, the mean Absolute Error produced is lower. A combinatorial approach which combined weighted similarity measure which was based on genetic algorithm and clustering by fuzzy C means, produces optimal similarity measures and metrics [15]. To solve the problem of similarity through the improvement of the similarity calculation

method, the personal recommendation algorithm was introduced [11]. The similarity fuzzy clustering of the user is enabled by the algorithm. The incorporation of hybrid clustering can be applied to the entire database to solve the problem of collaborative filtering for the soothing of data [10]. Users who have similarities in their characteristics can be amassed in a cluster based on the message data related to web visiting. A hybrid system for recommendation was proposed, which was based on collaborative filtering and content, and through the use of context to provide recommendations for movies which are better, and for which user feedback through the use of a simple GUI formed the basis [5]. A hybrid method which was effective was presented, which is the Content-based and collaborative filtering technique, which uses demographic attributes. This technique was used to book recommendations through the use of Ontology, for the purpose of user

profiling, which resulted in an increase in the efficiency of the system [8]. A hybrid system for which prediction was combined through the use of item-based collaborative filtering was used, along with user clustering which was demographic based. This proposed system used item similarity and weighted scheme and the computation of user clusters was done offline. Lower MAE was achieved whose coverage was higher than the collaborative filtering algorithm which is traditional in nature [7]. An approach which is hybrid in nature and combines the recommendation which is based on collaborative filtering and content is proposed [4]. User intimacy is also one of the concepts in use. A model is applied to the social networking services. [9] A recommender system which was hybrid in nature for use in restaurants was introduced. The system which was referred to as REJA was collaborative in nature, based on knowledge and intended to avoid the problem

of cold start. A new facility is introduced by the system for the users of the system and this contains geographic information, which is referred by the Google Maps related to the recommended restaurants. The composite relation between the output, input, and underlying semantic relations are considered [2]. The clustering of vectors happens through the use of the refined fuzzy C-means algorithm. To narrow the scope of neighbors, an enhancement was made in the refined fuzzy C-Means algorithm. This solves the data sparseness problem to some extent. A default scheme for voting was proposed through the use of the cloud model, representing the global preferences of the user, which are computed from the past ratings of the user for the purposes of ameliorating the problem of sparsity, to introduce accuracy in preferences and for a reduction in the sparsity of data [18]. The level of consumption of the user is considered through the use of mining for association

rules, which formalize the relationship between goods, ensuring that it is competitive, through the use of the Bayesian probability, which is based on time, and which formalizes the relationship between commodities, which is complimentary. This is through the matches which occur between the two commodities and the user preferences. The price preferences are matched to item sets for the purpose of evaluation by the user. An improved collaborative filtering approach was proposed [1]. The recommendation algorithms which are cluster based and depend on collaborative filtering was proposed in the research. This improved the scalability which was inherent in the filtering algorithms which were collaborative in nature and reduced the data sets sparse related to the recommended system [1]. Another research paper suggests a number of enhancements which are major in the realm of Hadoop, precisely in the processing,

placement, and storage domains . The way in which the scalability and fault tolerance of the system is achieved is also explained.

### **3. Proposed Work**

#### **3.1 Overview:**

The data set related to the product is collected by the project. Then the data sets are trained depending on the products. The datasets are categorized during the training which is related to the details of the products. When the training is complete, the dataset is uploaded to the database. The shopping server contains the details registered by the user. After successful login, the users can come to the page served by the shopping server. The product can be searched by the user by providing a query such as the brand and type of the product, its price range and category. The product list represents the user on the basis of the user query. The product appearance and the interests of the user are considered while enabling the user to give a rating. When a product is purchased by the user, the count of product quantity will be added to the cart. When a product is purchased by the user, only then a comment can be given by the user, or else it will not be possible to give a comment. The count of the selling product is also stored in the database.

The database also stores the selling count and rating. A product recommendation is made to the user based on the highest rating count and the selling count. If the actual feedback ratings are provided by the majority of the users, then a computation is made for the service reputation, for which actual feedback ratings form the basis. The service reputation is computed based on the simple averaging method, which is based on the actual or negative feedback ratings of the user. When the actual feedback is used as the basis of computation of the service reputation, then a comparison is made among the computed and ideal reputation value, so as to include or exclude it in composition. The feedback ratings which are available from users who are trustworthy are considered in this phase, for the assessment of the reputation.

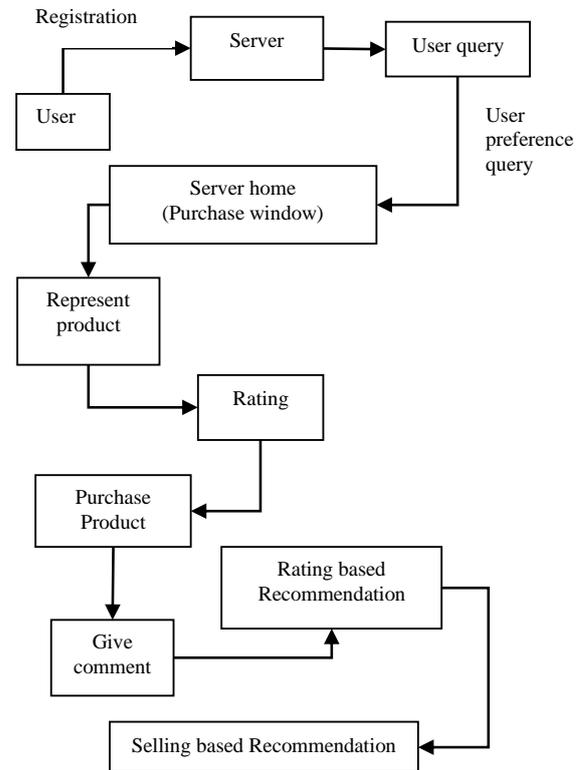


Figure 1 : Overall Architecture

**3.2 System Recommended by Reputation is Based on User Feedback:**

When actual feedback ratings are provided by the majority of the users, then the computation of the service reputation happens through the use of actual ratings for feedback. To compute the service reputation, the simple averaging method is used, for which the negative or actual user feedback ratings form the basis. When the actual feedback ratings are used to compute the service reputation, a comparison is performed between the reputation’s computed value and the actual value, to decide whether include or exclude it in the competition. During this phase, feedback ratings which are obtained from trustworthy users are taken into consideration for the assessment of reputation.

**3.3 The Collaborative Filtering Process:**

The collaborative filtering algorithm suggests new items, which is one of its goals. It also predicts the utility of a specific item for a specific user, which is based on the previous likings of the user, and also opinions of individuals who are like-minded. A typical CF scenario contains a list of  $m$  users  $U =$

$\{u_1, u_2, u_3 \dots, u_m\}$  along with a list of  $n$  items,  $I = \{i_1, i_2, i_3 \dots, i_n\}$ . The user  $u_i$  is equipped with an item list,  $Iu_i$  and this list is associated with the opinions which have been expressed by a user. A user can give opinions explicitly in the form of a *rating score* which falls within a numerical scale and it is possible to derive it from purchase records implicitly, through the analysis of time logs, or by the mining process hyperlinks for the web. It must be noted that  $I u_i \subseteq I$  and  $Iu_i$  can be a null set. A distinguished user  $u_a \in U$  exists, which is also known as the *active user* and has the task of collaborative filtering algorithm for finding an item which has a likeness to one of the two forms.

**3.3.1 Prediction**

Prediction takes the form of a numerical value  $P_{a,j}$ , which expresses the likeliness which has been predicted for the item  $i j \in I_{u,a}$  for the active user  $u_a$ . The value which has been predicted is on the same scale which is similar to the values for opinion which have been provided by  $u_a$ . For example, from 1 to 5.

**3.3.2 Recommendation**

Recommendation is a list of  $N$  items,  $I_r \subset I$ , that are liked by the active user. The recommended list is supposed to be based on the items which have not been purchased by the user who is active ( $I_r \cap I_{u,a} = \Phi$ ). *Top-N recommendation* is another name given to the interface related to CF algorithms.

**3.4 Item- Based Collaborative Filtering**

A different method which is predictable and related to filtering algorithms, which was proposed recently, is the basis of item relations, rather than user relations, and is a form of typical Collaborative Filtering. The process of Item-based Collaborative Clarifying is used to identify an item group, which has been rated by the dynamic user. This item group calculates their likeliness to the goal item and later the  $k$  most similar items are chosen  $\{i_1, i_2, i_3 \dots, i_k\}$ , which are based on the parallel similarities  $\{s_{i1}, s_{i2}, s_{i3} \dots, s_{ik}\}$ . The calculations are performed through the use of a weighted average related to the dynamic scores of the user for the associated items. Representation is the first step related to this new approach. This is related to the classic Collaborative Filtering Procedure which is used to represent the data in an ordered manner.

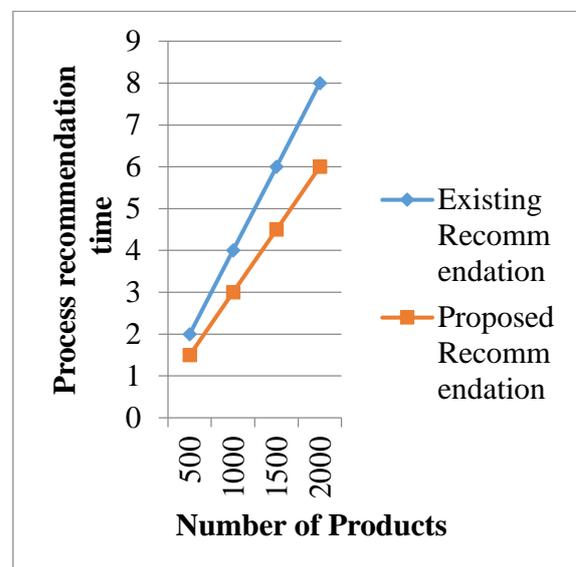
**3.5 Pearson’s Correlation Coefficient**

A measurement of the similarity between two items  $i$  and  $j$  is carried out through the computation of the *Pearson-r* correlation  $corr_{i,j}$ . This makes the computation of the correlation exact. For this purpose, the isolation of the co-rated cases which were rated as  $i$  and  $j$  by the user must be carried out. The users with the ratings  $i$  and  $j$  are depicted by  $U$  and their correlation similarity is given.

$$sim(i, j) = \frac{\sum_{u \in U} (R_{u,i} - R_i)(R_{u,j} - R_j)}{\sqrt{\sum_{u \in U} (R_{u,i} - R_i)^2} \sqrt{\sum_{u \in U} (R_{u,j} - R_j)^2}}$$

$R_{u,i}$  represent the user rating  $u$  on the item  $i$  and  $R_i$  is the average rating given to the  $i$ -th item.

**4. RESULT AND DISCUSSION:**



**Figure 2: Recommend Processing Result**

In this figure 2 show recommend processing result of comparison between proposed and existing system recommend based on number of products and recommend time. It shows proposed system is better than existing system.

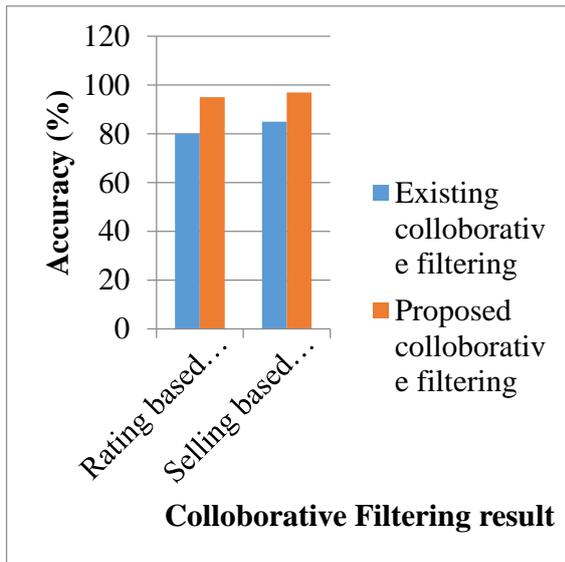


Figure 3. Collaborative Filtering Result

In this figure 3 shows Collaborative filtering result of comparison between proposed and existing Collaborative filter based on about the product Rating and Selling. Then evaluate the results better for proposed results.

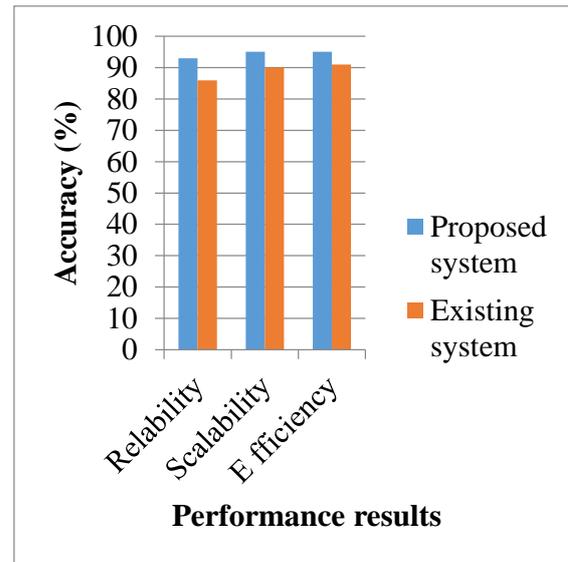


Figure 6: Overall Performance Result

In figure 6 shows an Overall performance result of comparison between proposed and existing performance using parameters are reliability, scalability and efficiency. Then evaluate the results better for proposed results.



Figure 4: User Feedback Results

In this figure 5, Shows a result is recommended quality product. Then using parameter is user feedback. Here, compare between Normal user feedback and purchased user feedback comments. Finally, show the results better than normal user feedback.

5. CONCLUSION

The important features of recommender systems are stability and reputation. This is an important property related to Recommender systems. The reputation and security can be improved through the system proposed by us with the help of user registration and by restricting the user when it comes to the comments area. The system diversity can also be improved when the quality requirements and user preferences are taken into consideration for the generation of the results. Thus, our proposed system will help improve the product reputation and the stability of the system which has been recommended.

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