AN ENHANCED RECOMMNEDATION IN E-COMMERCE INDUSTRY

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ABSTRACT

A recommender system's main goal is to support user with online product or service and maintain the customer relationship management. Recommendation systems are very much used in today's fast growing E-Commerce industry. E-commerce giants such as Amazon, Alibaba, Flipkart, etc. are using these recommendation systems and users are very much dependent on it. But dishonest recommendation or rating lead a user unsatisfactory product or Service. In the field of Recommendation process, reputation and quality of a product is usually calculated using feedback ratings provided by users. However, the existing of malicious ratings users often lead to a bias towards positive or negative ratings. If user gives bad rating or review on good product, it spoils the product reputation. At the same time the recommendation of products is based on user's comments after purchasing. So user gets recommendation of products only on short period of products usage and quality. This may lead to recommend poor quality product as better product based on initial user feedback comments.   To avoid this issue on recommendation system, this project propose new online recommendation system for restricting activities of malicious users and recommend products based on users initial and after usage comment process. In this proposed system collaborative filtering method is used for recommending the products to user based on rating and review. Here main aim of this system is to recommend products based on initial and after usage quality with analysis user's feedback on intial and after usage comment system. By this way the products are recommended to user with accurate ratings and reviews.

INTRODUCTION

Recommendations play a significant role in every human life. People choose their ideas based on other's recommendations since they trust the recommendations more. For giving recommendations there emerged a system called Recommender system [1]. Recommender systems play a important role in E-Marketing. Many companies adopt recommender systems to increase in their sales in the market. Many ranking approaches have emerged to rank the top product recommendation to give to user [2]. Ratings calculated can be an explicit or implicit rating. Popular sites play as a place where customers can find all kinds of items. They do so because recommendations given by other customers have been published after they have used the product. Those customers will have experience about the product. From the customers their view of how is the product usage has been collected [3]. This is used in recommendations. Recommender systems are type of information filtering system that predicts results based on ranking, rating or preference that a user would give to an item. Recommender systems are very common now-a-days and used in variety of applications. Recommender systems are great alternative to traditional search algorithm as these systems take into consideration various other factors like user history, ratings, rankings etc. apart from just [4] . The aim of recommender system is to provide users with personalized online product or service recommendations to handle the increasing online information overload problem and improve customer relationship management. Customer also can rate the product. From their views, people who were searching products (called customers) can be recommended with the recommendations about which products they can use [5]. Those customers can have view on all reviews and can be able to decide about using the product or not. In our proposed system we suggest product recommender

system for online product users for finding quality and good reputation products. In many recommender system recommend the product is based on user reviews. Here the important problem is some fake user gives bad reviews to products to spoil the reputations of product and also users get most recommendation based on the products initial feedback. This gives problem to product seller and new users for identify the best and quality product. Because of this issues good product value goes down and some bad product is recommended to new users. To overcome this issue our system restrict the un purchased users to provide the reviews and create pre and post comment options to exactly identify usage based sentiment analysis. Here collaborative filtering is used to provide products result to user with correct review and ratings. Clustering technique is applied for finding sentiment analysis of each product based on users pre and post comments [6].

RELATED WORK

Recommender systems are used extensively now-a-days for various web-sites such as for providing products suggestions based on customers' purchase history and searched product keywords. Current recommendation system approaches lack of a high degree of stability. Diversification of prediction is also important feature of recommender system. Having displayed same set of results every time may increase lack of trust in recommendation systems.In this research, their focus is on stability of different recommender system approaches and providing diversity in results [7]. They will focus on different recommender system approaches, methods provided to improve the stability and approaches in increasing diversity of recommender system.In this system, they have improved stability of the recommender system by using iterative smoothing and bagging algorithm provided. They have also improved diversity in the prediction by implementing the diversity ranking algorithm provided. This system consist of different modules [8]. User will search the product, the product search is queried in database which is either stored locally or available on internet. They have applied stability algorithm to searched result and diversity algorithm to provide unique result. QoS available on product and User preferences from profile & user history will be used for improving stability and diversification. Customers interest usually changes periodically. Recommender system helps users to process huge data and find the information or items of their interest. It has been used in communities where items like movies, music, books, news, etc. are suggested to users. A recommender system is a system to help customers to find what they want easily and help them to discover products they like but are not looking for [9]. One significant characteristic of data in specific domain like movie challenges research in recommender systems those user preferences naturally changes over time. Traditional collaborative filtering (CF) method does not consider the sequence of customer's rating which shows the change of customer preference periodically.This system proposed a novel recommender system that overcomes the limitation of CF by combining collaborative filtering and sequential pattern mining with time interval which reflects user's preference changes over a period of time. In recent times, there's been a huge increase in preference for online trading over the traditional approaches. This sudden increase can be attributed to the ease of use, without giving any regard to distance and time and at the same time online trade reduces the cost of operations significantly. Due to the availability of Internet, people can search for all the information they need and buy whatever they want on the web. In the age of E-Commerce, it is difficult to provide support for customers to find the most valuable products that match their heterogeneous needs [10]. Traditional approaches adopt pre-defined formats to describe the customer requirements, leading to inaccurate recommendations. In this project, they propose a recommendation system using sequential pattern association

rule mining and the item clustering to produce the recommendations. The recommendation will be based just not only on the basis of customers browsing history, but also the system will take into consideration the preferences, shopping behavior and similarity of interest between users to provide recommendations within similar category as well as cross category of products. Thus this proposed model of recommendation system will provide personalized recommendations on the basis of customer preferences and product-to-product recommendations on the basis of similarity with other customer's interest and product associations. In this way, this system is efficient and effective as it takes into account customers present and past preferences providing suitable recommendations. That is made even better by recommending based on product aspect ranking [11]. There are many customer reviews available on Internet. Customer reviews contain rich and valuable knowledge for product manufacturers as well as users. Previous works improve the usability of numerous customer reviews and also have the ranked aspects of each product. However, previous works does not mention any possibilities to recommend products depending on the comparison between customer reviews and the customer interest [12]. To address this problem, recommendation system based on product aspect ranking is explored to recommend products depending on the comparison between the extracted information from consumer reviews and their interest. That is, to extract the product information and product aspects from consumer review, then comparing the extracted information and consumer interests. The resultant information can be used to recommend the product.So, Recommendation system based on product aspect ranking works effectively and they focus on interests of consumers and effectively use the consumer reviews [13].

EXISTING SYSTEM

Web service (WS) recommendation systems can help service users to locate the right product from the large number of available products in E-commerce site. Reputation of products is a widely-employed metric that determines whether the product should be recommended to a user. The product reputation score is usually calculated using feedback ratings provided by users [14]. In existing system it suggested product to user based on rating and review that provided by user who may not have purchase the product. In this process this system does not check whether user purchased product or not. And also one drawback in recommender system is providing suggestion based on initial quality of product. It recommends products based on reviews without valid verification. Here the problem is some user provides bad reviews to good product and good reviews to bad products. Without purchasing product provides rating and reviews to product also main drawback in recommendation system [15].

PROPOSED APPROACH

The search engine's goal is to help user with the most relevant pages. The problem of the previous systems are less well explored by removing duplicate documents in the result produced to user in order to improve their search experience. This information seems to be very helpful in an E-commerce environment for several applications such as personalization and recommendation [16]. This project focuses on providing real time recommendation to online users who can be either registered or unregistered. In proposed system it allows users to view all products if he/she is registered person. If users would like to provide reviews for particular system they must have purchased that particular product. Otherwise the proposed system won't allow providing reviews to product. At the same time it provides recommendation based on the users initial and after usage

comments. With initial and after usage comments the proposed system provides sentiment analysis for each product. Collaborative filtering method is used to calculate reviews and rating of particular product to recommend products to user [17].

Customers have been recommended products only based on their previous history these many days which is not that much efficient as it is not wide. So, here in this project the customer is recommended by most positively reviewed product and rated product and sold product by which the user can get to know the high quality products. For this process initially the products to be sold are linked with a rating and comment option. There are more than 100 other categories such as books, health, music, software and etc, which can be used and compared in the future [18]. This is first module of this project. Dataset collection is initial process for recommender system. Here product related dataset is collected for uploading into system for user views. Each review in the dataset contains information: review/UserName, product/price, review/time, product/productId, review/summary, review/helpfulness, review/userId, product/title, review/score and review/text. There are four fields we can use in the dataset. They are review/score, review/helpfulness, product/price and review/text. However, most of the reviews show 'unknown' for the _led of product/price. Then for recommendation system, there are two things useful in dataset. Once uploaded dataset into system user can view product details and search product based on user needs.

Collaborative Filtering Recommendation System With Opinion Mining:

In previous researches, they have done opinion mining on user reviews. And the collaborative filtering is applied to the mined data. But the disadvantage here is, the customer would have commented about the product as soon as they purchased it. Hence in this project after usage comments is also taken into consideration.

Opinion mining can also be said as Sentiment mining. It is a type of natural language processing for monitoring the opinion of public about a particular product. Collaborative filtering is a method of making automatic predictions about the interests of a user by collecting preferences from many users. The underlying assumption of the collaborative filtering approach is that if a person A has the same opinion as a person B on an issue, A is more likely to have B's opinion on a different issue than that of a randomly chosen person.

In general, collaborative filtering is the process of filtering for information or patterns using techniques involving collaboration among multiple agents, data sources, etc. Applications of collaborative filtering typically involve very large data sets. Collaborative filtering methods have been applied to many different kinds of data including: sensing and monitoring data, such as in mineral exploration, environmental sensing over large areas or multiple sensors; financial data, such as financial service institutions that integrate many financial sources; or in electronic commerce and web applications where the focus is on user data, etc. The remainder of this discussion focuses on collaborative filtering for user data, although some of the methods and approaches may apply to the other major applications as well.

Finding Opinion Mining By Naive Bayes Method:

A product review is a textual review of a customer, who describes the characteristics (e.g. advantages and disadvantages) of a product. A product rating on the other hand represents the customer's opinion on a specified scale. A popular rating scheme in online shops is the star-rating, where more stars indicate better

ratings. In this module opinions of each product is identified based on user's initial comment and after usage comments. These comments collected are processed by Naive bayse algorithm and NLP process. It categorizes user's comments to positive and negative based on comments type.

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

Navie Bayes algorithm is the most rated algorithm in text classification. Hence it is used in Sentiment analysis to differ positive and negative customer sentiment. Navie Bayes classifier and collaborative filtering together builds a recommendation system that predicts whether the user will like the product or not.

Naive Bayes algorithm is Bayes' theorem or alternatively known as Bayes' rule or Bayes' law. It gives us a method to calculate the conditional probability, i.e., the probability of an event based on previous knowledge available on the events. More formally, Bayes' Theorem is stated as the following equation:

The components of the above statement are:

• P(A/B) : Probability (conditional probability) of occurrence of event A given the event B is true

• P(A) and P(B) : Probabilities of the occurrence of event A and B respectively

• P(B/A) : Probability of the occurrence of event B given the event A is true

The terminology in the Bayesian method of probability (more commonly used) is as follows:

• A is called the proposition and B is called the evidence.

• P(A) is called the prior probability of proposition and P(B) is called the prior probability of evidence.

• P(A/B) is called the posterior.

• P(B/A) is the likelihood.

NLP stands for Natural Language Processing which is a component of Artificial Intelligence. It has the ability to understand the human language as it is spoken. Sentiment analysis is the primary usage for NLP. Using the sentiment analysis a owner can assess comments on social media to see people opinion about their product.

Ranking And Recommend Products With Popularity Based Ranking Algorithm

This is the final module of this proposed system. In this module all the product rating and selling details are collected from products and process the details for ranking the products based on rating and selling wise. For finding ranking of product this system use Popularity based Ranking algorithm. It analyze each product rating and selling count information to rank products to end users. These rating and selling based recommendation helps to user to choose the best product and identify the product related on user money.

The popularity Ranking is based on the recency , quality and quantity of reviews that a product receives from customers. Recency is where recent comments are given priority than older reviews as they exactly describe the current quality of product. Quantity means the number of reviews. As the number of reviews increase the quality of the product can be easily predicted.

RANKING ALGORITHM

Step 1: Collect all product rating details
Step 2: Initialize PR=0, PRA=0;
Step 3: For each product P_i to n (Find all products rating information)
Step4: If PR=0 then (if Rating is Zero)
Step5: end if
Step6: if PR=[1,2,3,4,5] (Rating count of each product)
Step7: Calculate & Categories products based on rating counts
Step8: Add products into LIST based on Rating
Step9: end if
Step10: end for
Step11: For each LIST L_k to n
Step12: List all products related with LIST group
Step 13: Rank all products

CONCLUSION

The proposed system will help the users by providing the best recommendations based on rating, review, initial comment and after usage comment. And the best thing about this is it analyses both initial comment and after usage comment and categorizes into positive and negative comments which will support user to get a clear idea about the quality of the product.

FUTURE ENHANCEMENT

The system can be enhanced by blocking the products which has 2.5 rating which reflects the poor quality of the product constantly for a period of time.

REFERENCES

[1] Kim JG, Lee SW and Choi DU. Relevance analysis online advertisement and e-commerce sales. J Korea Entertain Ind Assoc 2016; 10(2): 27–35.

[2] Jeong SM and Park SR. A study on the effect of the facilitating factors of B2C e-commerce on the online shopping and the overseas direct purchase. Int Commer Inf Rev 2016; 18(2): 27–51.

[3] Haiyun Lu, "Recommendations Based on Purchase Patterns" International Journal of Machine Learning and Computing, Vol.4, No. 6, December 2014

[4] C. Desrosiers and G. Karypis, "A comprehensive survey of neighborhood-based recommendation methods," Recommender Systems Handbook, Springer, Berlin, pp. 107-114, 2011.

[5] Liu, J., Location-Aware and Personalized Recommendation Collaborative Filtering for Web Service, IEEE transactions, May 2015

[6] Diversifying Web Service Recommendation Results via Exploring Service Usage History by Guosheng Kang, IEEE transactions, 2015

[7] Sagar Sontakke, Prof. Pratibha Chavan, "A Survey on Stability and Diversity of Recommender Systems", 2015.

[8] Ancy. J. S,Nisha. J. R (2015) , "Recommendation System Based On Product Aspect Ranking" , International Journal of Innovative Research in Computer and Communication Engineering,Vol. 3, Issue 8, August.

[9] K. Bhargavi. An Effective Study on Data Science Approach to Cybercrime Underground Economy Data. Journal of Engineering, Computing and Architecture.2020;p.148.

[10] [21] M. Kiran Kumar , S. Jessica Saritha. AN EFFICIENT APPROACH TO QUERY REFORMULATION IN WEB SEARCH, International Journal of Research in Engineering and Technology. 2015;p.172

[11] K BALAKRISHNA,M NAGA SESHUDU,A SANDEEP. Providing Privacy for Numeric Range SQL Queries Using Two-Cloud Architecture. International Journal of Scientific Research and Review. 2018;p.39

[12] K BALA KRISHNA, M NAGASESHUDU. An Effective Way of Processing Big Data by Using Hierarchically Distributed Data Matrix. International Journal of Research.2019;p.1628

[13] P.Padma, Vadapalli Gopi,. Detection of Cyber anomaly Using Fuzzy Neural networks. Journal of Engineering Sciences.2020;p.48.

[14] Kiran Kumar, M., Kranthi Kumar, S., Kalpana, E., Srikanth, D., & Saikumar, K. (2022). A Novel Implementation of Linux Based Android Platform for Client and Server. In A Fusion of Artificial Intelligence and Internet of Things for Emerging Cyber Systems (pp. 151-170). Springer, Cham.

[15] Kumar, M. Kiran, and Pankaj Kawad Kar. "A Study on Privacy Preserving in Big Data Mining Using Fuzzy Logic Approach." Turkish Journal of Computer and Mathematics Education (TURCOMAT) 11.3 (2020): 2108-2116.

[16] M. Kiran Kumar and Dr. Pankaj Kawad Kar. "Implementation of Novel Association Rule Hiding Algorithm Using FLA with Privacy Preserving in Big Data Mining". Design Engineering (2023): 15852-15862

[17] K. APARNA, G. MURALI. ANNOTATING SEARCH RESULTS FROM WEB DATABASE USING IN-TEXT PREFIX/SUFFIX ANNOTATOR, International Journal of Research in Engineering and Technology. 2015;p.16.

[18] M. Yarvis, N. Kushalnagar, H. Singh, A. Rangarajan, Y. Liu, and S. Singh, ``Exploiting heterogeneity in sensor networks,'' in Proc. IEEE INFOCOM, Miami, FL, USA, Mar. 2005, pp. 878-890.