INNOVATIVE MECHANISM FOR PRODUCT RECOMMENDATION BASED ON USERS’ SEQUENTIAL PATTERNS IN ONLINE SOCIAL NETWORKS

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Abstract- Online social networks are pulling in an ever increasing number of individuals in today's Internet, where the clients can utilize the social network utilizing different social networking destinations. In this paper an attempt has been made to discuss various recommendation techniques and provides mechanism to recommend products to different users based on their interests. The proposed mechanism has been assessed using weka tool. This paper is divided into six sections. Section-I introduces the social networks and social networking sites such as Amazon, Flipcart, Shopclues and Myntra, section-II provides recommendation techniques with their pros and cons , section-III presents the related work on recommended and non recommended , and section-IV presents proposed framework ,section V provides results and analysis of proposed work.

Keywords- Social Networks; Recommendation; Collaborative filtering; Content based recommendation and Weka.

1. INTRODUCTION
Social Network is that type of network in which numbers of individual nodes (people) is connected. This connection is known as Link or Edge. Social Network can be shown in the form either directed or undirected Graph. When we talk about Social Network, people might get confused between Social Network and Social Site. But in real sense social sites are the part of social network. It is integrated into Social Network. Social Network is such a vast space over an internet [1]. It is a way to communicate with others. People share their interest with others. Some examples of online social networking sites used for product marketing are Amazon, Flipkart, Ebay etc. Over an internet, every single person is capable of making millions of friends. Sharing of interest can be in the form of picture, audio, video, text etc [2].

1.1 Need of Social Network:
In the recent days, the need of social network is as same as need of eating every day. Every day we learn something. It is a best way to utilize spare time. Various communities can be created. Everyone’s opinion is always welcome in social network. From career aspect, social network is needed. It is widely used in recruiting employees. It is needed because social network is not limited network. It can expend itself. Communication can be possible in many forms like text, audio, video, graphics etc. It is the way to meet new people all over the world. It helps in advertisement [3].

1.2 Applications of Social Network:
Marketing: Biggest job of social network is marketing. It helps to promote new products, shoes, bags etc in the market.
Career: Social Network is a best way to recruit employees. Jobs in different field are published over social sites. Business: Social Network helps to enhance business over internet. Now a day, most of the companies does business online.
Education: Social Network plays an important role in the education. Educational content are also available over internet which is used by the social network. Tutorials are given to the students in smart class [4].

2. RECOMMENDATION SYSTEM
Recommendation is done by user’s interest. As we say, biggest job of social network is marketing. In marketing, it is very necessary to focus which product should be recommended. So that buyer will influence other people to purchase that product. If we talk about meeting new people over social sites, then it will be necessary which person should be recommended [5]. So we can say that recommendations are of two types:

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Friend Recommendation: In Social Networking Sites, various people meet new unknown persons over internet. So that it will be very important that new person should not be harmful. Friend Recommendation tries to recommend right person. It is used to give friend suggestion. Product Recommendation: It is used in marketing. A product is recommended on the basis of some parameter. It helps to enhance the business and the popularity of product. Most of the products are recommended on the basis of rating, user interest, and number of views etc [6].

2.1 Types of Recommendation System
We have various recommendation techniques, but mainly two recommendation systems are used in product recommendation which are described as below; Content-Based Recommendation: This recommendation system based on limited framework. In this profile picture of product is displays with specification regarding the product. A user can see the product in any networking site. It contains textual data and one profile picture. Description of product is below to the profile picture [7].
Advantages:
It gives abstracted description of data. New product can be added easily. It gives a quick review of product in few seconds.
It contains only textual data. It has restricted frame in which every new product has to fit. Collaborative Filtering Recommendation: It is most common technique used in product recommendation. This recommendation technique is work on rating. Every product used by user is under some rating. It helps to identify similar user on rating the similar item. On the basis of rating, it is decided whether product should be recommended or not [8].
Advantages:
This technique does not work on restricted framework. It helps to identify new user. Widely used by product recommendation. Rating works as a feedback of product used by users. It finds difficulty to recommend new user.

3. RELATED WORK
Online social networking measures against different issues of society which were encountering with vast number of user group in kind of positive or negative impact was talked about by Yadav et al. [9] in 2016. They review the disclosures of various experts and endeavor to duplicate their revelations both to the extent data volume and supposition examination. In 2016, Hasan et al. [10] displayed another closeness alongside the idea of super likeness, normal similitude and super difference. At the season of forecast for a user, right off the bat they group from all users the individuals who are super comparable, normal comparable or super unique; also by utilizing their own particular closeness measurements alongside the expressed approach we foresee the rating. Subsequent to anticipating all things they pick the best N recommendation for the users that he/she may like that thing or not. They have enhanced their execution over conventional closeness measurements to some adequate sum. So also in 2016, Yang et al. [11] proposed an idle social trust network model to enhance the recommendation execution. The inactive social trust originates from the coupling trust and the co-reference trust and also the comparative interests between users. In light of the idle confide in data, another social trust network can be manufactured and after that be utilized to anticipate the objective user’s taste. The exploratory outcomes exhibit that their approach can objectively gather the trust connections amongst users and profoundly enhance the recommendation execution. In addition in 2016, Cao et al. [12] proposed multi-arrange show for turn around coordinations network of country E-trade under B2C mode was developed with the thought of both economy cost and consumer loyalty. A two-stage heuristic algorithm settling GA was intended to check the possibility of the model with a contextual analysis of 3C items in Anhui region. Also in 2016, Santos et al. [13] displayed a trial contemplate on a Fuzzy System to gauge the level of significance of surveys with the execution of this work with a similar reason, however utilizing as computational knowledge method an Artificial Neural Network (ANN).
In view of above Zhao et al. [14] in 2016 investigation an interesting issue of prescribing items from internet business websites to users at social networking destinations who don’t have chronicled buy records, i.e., in “cool begin” circumstances. We called this issue cross-site frosty begin item recommendation. They proposed to utilize the connected users crosswise over social networking locales and online business websites (users who have social networking accounts and have made buys on internet business websites) as an extension to outline’s social networking highlights to another component portrayal for item recommendation. In light of collaborative filtering comparably in 2016 Wei et al. [15] proposed a powerful missing date expectation algorithm for collaborative filtering. The punishment work was utilized to lighten the impact caused by likeness over estimation and decrease the deviation between the figured esteem and the real esteem, and enhance the exactness of the algorithm. Essentially in 2016 Xian et al. [16] a dormant social trust network demonstrate was created to enhance the recommendation execution. The inactive social trust comprises of the coupling trust and the co-reference trust and in addition the put stock in view of the comparable interests of users. The coupling trust alludes to the trust relationship that two users share various normal dependable neighbors. The co-reference trust was the trust relationship that two users are trusted by numerous normal neighbors. Also, the trust in light of the comparable interests implies that there are trust connections between users with comparable rating practices on things. By utilizing the over three kinds of trusts, an idle social trust network can be constructed.
4. PROPOSED WORK
In this paper work, we proposed a mechanism to recommend products in online social network. Here first real data set is collected from different shopping websites and fed into classifier. Now apply classifiers to extract features like number of visits, reviews of a product and interest of customer. Now assign some rating of product on the basis of its rating and on the basis of this rating, distinguish products whether they are recommended or not to the user.

FLOW CHART:

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START

FETCH PRODUCT DATA

EXTRACT ATTRIBUTES
(Number of visitors, review, interest of customer)

ASSIGNMENT RATING
(Based on Extracted Attributes)

RECOMMENDED
NOT RECOMMENDED

END
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Figure 1: Proposed framework

RANDOM FOREST CLASSIFIER: This classifier is used to classify the real dataset into two classes i.e. recommended and not recommended. These two classes are shown in the form of threshold curve. A random forest algorithm is proposed to show the recommended and non-recommended threshold curve.

Random Forest Algorithm:
START.
Initialize parameters:
Set m: number of randomly selected products.
Set k: total products.
Set d: node.
Set n: number of trees.
Select “m” no. of product from total “k” products randomly, where m<<k.
Among “m” no. of products, calculate the node “d” using best split point.
Calculate best split point based on users interests.
Divide the node into child nodes using best divide method.
Repeat 1 to 3 steps until first number of nodes has been reached.
Build forest by repeating steps 1 to 4 for “n” number times to create “n” number of trees.
END.

5. RESULTS
WEKA: Weka tool is used for analyzing proposed mechanism with real dataset. Weka is used for data mining and analyzing data.
CLASSIFIER: Classifier act as a filter. It is used to classify dataset into different classes.
Metrics Used:
A). Confusion matrix: A confusion matrix contains four outcomes usually called them as TP (true positive), FP (false positive), TN (true negative), and FN (false negative).
B). Recall: it is used to calculate actual positive values.
Recall = TP / actual positives
C). Precision (Positive predictive value): it describes total number of correct predicted value in perspective of total number of predicted values
Precision = TP / predicted Positive
F-measure = Precision + Recall

FIG. 2 Threshold curve of Recommendation

FIG. 3 Threshold curve of Non-Recommendation

Figure 2 and Figure 3 depicts ROC curves of Random Forest classifier in point of view of false positive rate and true positive rate. These curves created by plotting the false positive rate (FPR) in perspective of x-axis against the true positive rate (TPR) in perspective of y-axis at various thresholds cut points.

6. CONCLUSION
Online product marketing is vast area in the field of Online Social Networking. Two recommendation techniques i.e. content-based recommendation and collaborative filtering recommendation are competing in the area of product recommendation. In content-based recommendation technique, the problem of restricted framework arises while in collaborative filtering technique main drawback is finding the difficulty in new user for recommended the product. In this paper provides a content based recommendation mechanism based on Random forest classifier. The classifier is used to classify real dataset into two
classes recommended and non-recommended. In future try to propose a enhanced content based mechanism to recommend products in more accurate manner with the consumption of less execution time.

7. REFERENCES


