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## Implementation of Product Recommendation System on the Basis of Micro-Blogging Information

S.P.Raut<sup>1</sup>, S. S. Dhande<sup>2</sup>, S. N. Sawalkar<sup>3</sup>

PG Scholar, Dept. of Information Technology, Sipna COET, Amravati, Maharashtra, India<sup>1</sup>

Associate Professor, Dept. of Information Technology, Sipna COET, Amravati, Maharashtra, India<sup>2</sup>

Assistant Professor, Dept. of Information Technology, Sipna COET, Amravati, Maharashtra, India<sup>3</sup>

**ABSTRACT:** In recent years, most of the e-commerce websites have social login in which users can sign on the websites with the help of their social networking username and password i.e. their Social account. Users can also post their newly purchased products on their micro-blog. This micro-blog linked to the e-commerce product web page. And product is recommended on the premise of micro-blogging information that means product is recommended from e-commerce websites to social networking sites users in “micro-blogging” ways. For this, users are connected to social networking sites and e-commerce websites that is users’ are associated with each other. The ‘Cold-Start’ situation of users is a valuable input resource for recommendation system which helps recommending products from one user to another user. To address the challenge, recommendation system simply did association to link the two different platforms i.e. e-commerce web site and social networking site. Before product recommended to the interested user, we did Text mining on different users’ posts or users’ sentiment related with purchased product.

**KEYWORDS:** e-commerce, social media, product recommender, micro-blog, text mining algorithm

### I. INTRODUCTION

E-commerce websites have so many kind of technical aspects which related with the characteristics of social networks, and include real-time status updates and communication of its buyers and sellers and many more. We implemented the use of coupled users across social networking site and e-commerce website [1]. In recent year Social media has been enjoying a great deal of success, with millions of users visiting for social networking site. Social media sites rely principally on their users to create and contribute content to annotate others comments to form online relationships. As social media sites continue to proliferate, and their volumes of content keep growing, it is very easy for our approach to use it with connecting across e-commerce users [16]. Product recommendation systems are a type of effective tool used to solve the problem of time consumption during purchasing any products only through e-commerce. In product recommendation system only the users’ social networking interpersonal communication information is available and this interpersonal information transfer from social networking sites into latent user features which can be effectively more necessary for product recommendation process [1]. We analysed the recommendation process with the help of user sentiments on purchased product which contains various comments. During analysis of user sentiments, we used Text mining on the various comments given by the users and product recommended to the interested user. Increasing the popularity and exponential growth of e-commerce websites and online social websites a compelling demand has been created for efficient recommender systems that guide users toward items of their interests [3][5].

When users are connected over an e-commerce site to social media for the first time, they often agree to share with the e-commerce website basic information such as their demographics and personal interests[9]. We deal with the problem of predicting the purchase behaviours of social media users who have unknown history on an e-commerce website that means cold start situation. And one more term used in proposed system which aims to predicting which



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product categories (e.g., computers, electronics) the user will buy from by using solely information derived from the social network [12].

Main primary feature of implemented system are mentioned below:

- We formulated a solution problem of recommending products from an ecommerce website to social networking site users in “cold-start” position. It means product recommended only those users who do not have historical purchased records.
- Users of ecommerce site are associated with social networking site users by association technique. An instantiate association approach by incorporating user.
- We implemented text mining, which is particularly intended to handle information sets of product recommended process. This text mining is equipped for both positive and negative comments of users and Sentiment analysis filters that comments. Text mining technique features for recommending a product it is more overwhelming methodology in product recommendation.
- We implemented product recommendation system on the cloud. Cloud computing technology offers greater data storage and processing power. This greater data storage technology is very essential in product recommendation system.

## II. RELATED WORK

Honey Jindal, Sandeep Kumar Singh proposed successful business requisition for cold-start problem using online commercial dataset in 2014. Recommendation frameworks would a type of effective tool used to solve the issue about information over-burden through the internet and might naturally recommend items to the target users as stated by observed user’s preference information, purchase behaviour, evaluation behaviour and so on [8].

In 2013, Meng Chen, Cheng Yang, Jiechao Chen, Peng Yi together proposed a system called, “A Method to Solve Cold-Start Problem in Recommendation System based on Social Network Sub-community and Ontology Decision Model”, that presents a method of cold-start problem. Then ontology decision model is built in the basis of sub-community and users’ static information, which makes suggestion for new user dependent upon as much as static ontology majority [11].

Mingsong Mao, Jie Lu, Guangquan Zhang, Jinlong Zhang all together proposed Recommender systems in 2016, that points to recognize applicable things for particular users in vast scale online applications. Addressing the challenge, their recommended system shows different user relationships in a multi-graph and developed a multi-graph ranking model for identify and recommend the nearest neighbour of particular users. They proposed a random walk model for solitary social network propagation to improve unique social data furthermore additionally recommended a multi-graph ranking model that identify the overall closeness between users in multi-relational social networks and then found his/her potentially interested items [2].

Our inspiration comes from sold-start product recommendation using micro-blogging information: Wayne Xin Zhao and Ji-Rong Wen, They linked users across social networking sites and e-commerce websites for product recommendation and find a novel solution for cross-site cold-start product recommendation, which plans on propose results from e-commerce websites to users at social networking sites in “cold-start” circumstances[1]. Our new scheme text mining algorithmic approach that utilized in proposed system that performed text mining over the users comments. This idea comes from Jayashri Khairnar, Mayura Kinikar proposed system which content text mining offers an approach to individuals and corporation information available on the internet analysis is a natural language processing and information extraction task that identifies the user’s perspectives explained in the form of positive, negative or impartial comments and quotes underlying the text [13].

## III. MATHEMATICAL MODE

[1]  $I = \{U, P, ul, u', u, R, s, f, Up, Pc, a, Tm, Tr, Ui, Un\}$

[2] Let  $U$ : set of all the users and  $P$ : set of products

[3] Let  $\{ul\}$  be the set of users who are linked to their micro-blogging accounts.

[4] Let  $u$  be the set of users who have purchasing history and

[5]  $u \in U$



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- [6] Let  $u'$  be the micro-blogging user who is new to e-commerce site
- [7] Let  $Up$  be user post related to product on social site.
- [8] Let  $Pc$  be comments posted by other users on product shared by user  $U$  on post  $Up$ .
- [9] Let  $R$  be the functional relations
- [10] Let  $s$  be condition for success (eligible for recommendation)
- [11] Let  $f$  be the condition for failure (not eligible for recommendation)
- [12] Let  $Tm$  be function to make text mining on comment posted by  $u'$ .
- [13] Let  $Tr$  be the result of  $Tm$  on some comment  $Pc$ .
- [14] Let  $Ui$  means user interested in product purchased by some user  $X$ .
- [15] Let  $Un$  means user not-interested in product purchased by some user  $X$ .

Functions and relations:

[1]  $R: P \times U$ : Purchase record matrix

[2] In a cold start scenario,  $u' \notin U$ , but we have  $u \in U$ .

[3] We have to consider micro-blogging attributes,  $a$  of the new user  $u'$ .

if  $u \rightarrow P$  then # if user  $u$  has purchased product  $P$

if  $u \rightarrow Pc$  then # if user  $u$  posted/shared product with other user's on micro-blogging site.

Product shared

if  $u' \rightarrow Pc$  on  $Up \in U$  then #if user  $u'$  posted comment  $Pc$  on product post by user  $u$

$Tm \rightarrow Pc$  # do text mining on posted comment.

if  $u' \in U$  and  $Tr == Ui$  then

$P \rightarrow u'$  # recommend product to user

## IV. MICRO-BLOGGING ATTRIBUTES

Proposed system solution to micro-blogging feature learning consists of following attributes:

### A) Demographic Attributes

A demographic profile of a user includes, for eg. Name, Mobile no, E-mail id etc. can be utilized by e-commerce site to give better customized services. We extract users' demographic attributes from their profiles on social media. Demographic attributes have been appeared to be imperative in interpersonal communication, particularly for product recommendation [1].

### B) Text Attributes

Users' micro-blogs often writes regularly mirror their suppositions and interests towards particular themes. Text attributes include Topic distribution, Word embeddings. In topic distribution, we aggregate all the micro-blogging information submitted by user. While the word embedding represents feature of the word and similar words are close in the latent space [1].

### C) Network Attributes

In the online web-based social networking space, it is frequently observed that users associated with each other are probably going to share similar interests. Accordingly, we can parse out latent user groups by the user's patterns expecting that users in the same group share similar buy preferences [1]. Similar interest seen through comments given by users.

## V. IMPLEMENTATION

The concept of recommendation is not new but in use from many years, the difference is due to more number of users asking for recommendations among thousands to millions of choices. Recommending Product is a key test in recommendation framework as new users are constantly present in which social network are utilized to enhance the recommendation exactness for new users[15]. Micro-blog of social network highlights user view and changing into a dispersed component representation in text mining approach, which fuses the educated circulated include representations for product recommendation. What's more, this assistance user to recommending product from e-commerce sites to Social networking sites who don't have verifiable buy records. Social Networks and micro-blogs

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becoming the trends of this decade now, numerous amount of feedback on products has been collected outside of domain-specific in social networking platform [10][14].

Working of proposed architecture shown in fig.No.1 Users are associated crosswise over social networking sites and e-commerce websites. User's who have social networking accounts and have made buys products on e-commerce website, give feedback related to purchase product on their micro-blog at social networking site [1]. Micro-blogs can be considered as a particular type of blog where the posted content typically is much smaller. Micro-logs are also focused on sharing information [16].

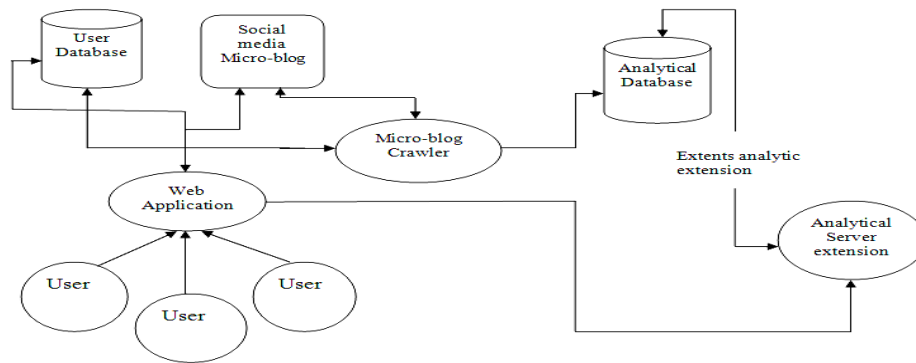


Fig.No.1: Working of proposed architecture

Overall working of implemented system given in fig.no.1. This system helps other individuals in user's friend-list to recommending any product on e-commerce. E-commerce site users' are associated with social networking site users' and e-commerce websites. Numbers of user are login over this e-commerce site by using their social account. User gives their feedback about purchased product with the help of their comments. System gives notifications to interested user in product on their timeline. Products are recommended from e-commerce websites to users at social networking sites to those who do not have historical purchase records and have positive view related to particular product.

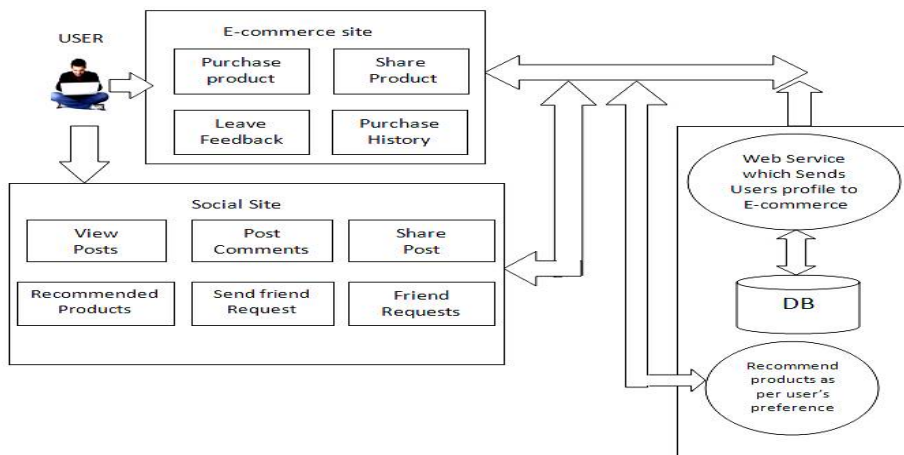


Fig.No.2: Working of System

Proposed product recommendation system implemented by using cloud technology. Firstly, approach of recommendation system includes the necessity of association of users over two different platforms. Association assists in retrieval by creating links between similar network users i.e. e-commerce users and social networking users [6]. In client side of our prototype, we generated IP address through which we build online product recommendation system

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by connecting two networking sites i.e. e-commerce site and social site. User data, Item data and user-items combined in recommendation system which is most probably used in recommendation process, see fig.no.2. In online recommendation system, users can purchase products on e-commerce site gives feedback of purchased product on social site. Other users give their views regarding with purchase product. All the views are gone through text mining process. Positive comments of users are filter for recommendation system and product recommended to the interested users.

In recommendation process, system gives relationship of customer views on Social networking site and products on e-commerce site. Every recommendation system takes after a particular procedure keeping in mind the end goal to deliver products recommendation. Recommendation process shown in fig.no.3

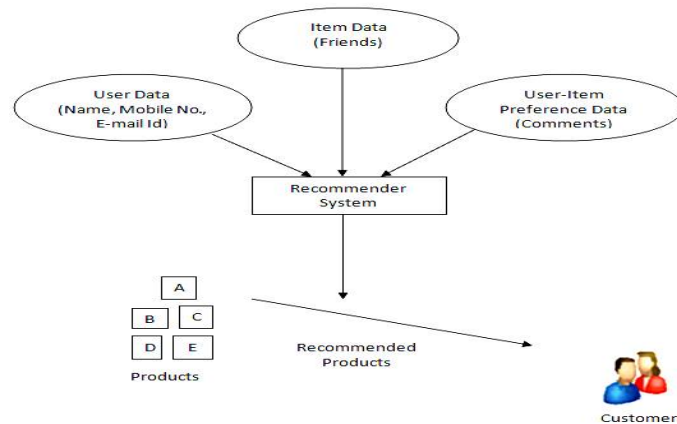


Fig.No.3: Recommendation process

The recommendation methodologies can be characterized in light of the data sources they utilize. The principle sources are the user information, things information and user evaluations. Product is the most generally utilized in the part of the product recommendation system. This information is anything but difficult to get as products are for the most part given a wide range of information [4]. Customers' consistency can be pick-up by recommender engines which is extremely important business in web based e-commerce. Since the product recommender system makes it simpler and quicker to discover new products, views of customers will return all the more frequently. The more the user uses a site and buys things, the more the product recommender system find out about the user and the better the suggestions gets. And popularity of product also increases. Recommendation is completely in light of social network which is connected with web based e-commerce sites [15].

## VI. TEXT MINING PROCESS

Text mining is about looking for patterns in text. With text mining, however, the information to be extracted is clearly and explicitly stated in the text. Text mining is an outgrowth of this "real text" mindset. The phrase "text mining" is generally used to denote any system that analyses large quantities of natural language text and detects although only probably correct information. fig. no.4 shows flow of Text mining process.

In implemented system we used topical word dictionary based text mining. Firstly, Text mining process starts with a text collection. Text mining tool would retrieve a particular text and pre-process the text word wise. Then whole text would go through a text analysis phase. Text analysis is semantic analysis to derive high quality information from text. Text analysis techniques are available for classified the sentiments of the users and finally text evaluated [7].

Text is the most common vehicle for the formal exchange of information. The field of text mining generally arrangements for texts whose function is the correspondence from factual data alternately opinions, and the inspiration to attempting with extract data from such text naturally is forcing regardless of achievement is the best fraction [7]. Text mining is the most helpful technique to find out whether views given by the user is interested to-word the product or

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not. We performed text mining on users' comments arrives on purchased product. After Text mining positive as well as negative comments are sort out and by performing sentiment analysis, product recommended to the interested user.

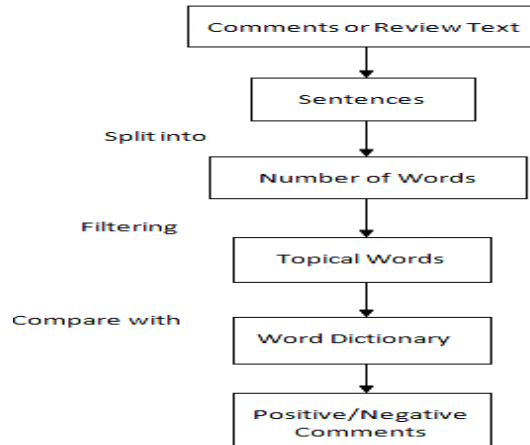


Fig.No.4: Text mining process flow

## VII. EXPERIMENTAL RESULT

In this section, we introduce our user study social media, text mining & sentiment analysis, experimental design that shows result of the system:

### A) Social Media

With Social media and Micro-blog a large amount of feedback on different points has been gathered outside of space particular Social Media stage. The most applicable reviews are from by associating users crosswise over social network, they just concentrate on brand or classification level buy inclination in view of a prepared classifier, which can't be specifically connected to site for product recommendation task [10]. By collecting data of social users and the relationship among the users, including social node, the users' association, interaction between the users and the impact between the users helps in recommendation scenario.

### B) Text mining & Sentimental Analysis

Sentiment Analysis (SA) is the computational study of user's opinions, attitudes and emotions toward products. In general, Text mining (TM) helps to collect information about the positive and negative aspects of a particular topic. Finally, the positive and highly scored opinions obtained about a particular product are recommended to the user. Sentiment analysis is the treatment of opinions, sentiments and subjectivity of text. Sentiment analysis is a Natural Language Processing and Information Extraction task that aims to obtain users' feelings expressed in positive or negative comments, questions and requests, by analysing a large numbers of documents [13]. We analysis the sentiment with different comments arrives on products in social networking site that contain positive comments as well as negative comments.

### C) Experimental Design

We conducted a user study for the implemented system to evaluate three performance metrics:

- E-commerce data: Our task required data large dataset of e-commerce which mostly contain many online transaction records with numerous of users on various products. Transaction record consists of a user ID, a product ID and have made purchased in e-commerce.
- Micro-blogging Information: We used micro-blogging information for recommending product over the social networking site. We have retrieved so many posts from various active users within a half year time span in social networking site.
- User linkage: We have found that e-commerce users sometimes shared their purchase record on their micro-blogs via a system-generated short IP address, this system totally implemented on cloud which links to the

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corresponding product entry on e-commerce. By following the IP address, we can obtain the e-commerce account of the social user.

## D) Graphical Analysis

In our implementation, we used two parameters for graphical analysis. First is the product recommendation of our system and second is popularity. In analysis, we used product recommendation in recommending system and popularity of product which is fully depends upon the number of product purchased by the user. The more the user uses a site and buys things, the more the product recommended to users, automatically popularity of the products increases. In graphical analysis, following fig.no.5 displays X-axis which shows the product recommendation and Y-axis shows popularity of product.

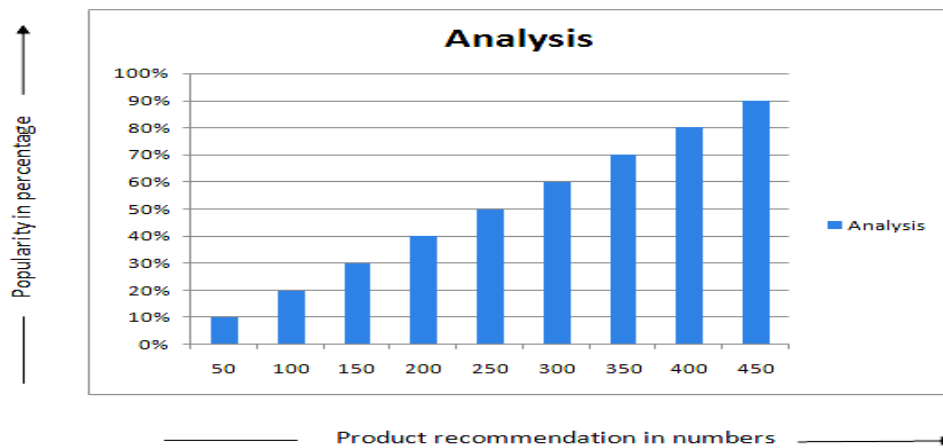


Fig.No.5: Graphical analysis

## VIII. CONCLUSION

In Implemented system, we have studied 'cold-start' situation and product recommendation system on the basis of micro-blogging information. Our main goal is that recommending the product on social networking site through e-commerce site. By taking advantage of the cloud technology, we implement our system on cloud. By combing the feature of social networking user profile across e-commerce sites, it is easier way over the e-commerce websites which maps user's attributes extracted from social networking sites into feature representations learnt from e-commerce websites. Finally, this implemented system concludes saying that all the sentiment analysis and text mining tasks are very challenging. The results show that our implemented architecture is indeed effective in addressing the recommendation problem over the 'cold-start' situation.

## IX. ACKNOWLEDGMENT

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## BIOGRAPHY



**Miss. Supriya P. Raut** received the B.E. degree in Information and Technology in the year 2015 and pursuing M.E. degree in Information and Technology from Sipna College of Engineering and Technology, Amravati, Maharashtra, India.



**Dr. S. S. Dhande** received her M.E degree in Computer Science & Engineering and also completed Ph.D. She is currently working as Associate Professor in IT Dept. Sipna College of Engineering and Technology, Amravati, Maharashtra, India



**Prof. S. N. SAWALKAR** received his M.E. degree in Computer Science and Engineering, P.G.D.A.C(C-DAC). He is currently working as Assistant Professor in IT Dept. Sipna College of Engineering and Technology, Amravati, Maharashtra, India