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A Survey Paper on Personalised Recommendation System for Commercial Websites

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ABSTRACT

Earlier, the selection of data was done manually. But now, owing to the upcoming needs of various recommender systems the automatic segregation of data, based on information which is available at various social and commercial websites, has become possible. With a very high raise in the popularity and usage of social networks, a large number of people share their views by means of ratings and reviews. The major factors of social network include interpersonal interest and influence brings various challenges to the recommender systems.Collaborative filtering technique which follow a memory-based approaches focus on identifying the similarities between multiple users so that their ratings can be compared for a set of products. But these memory-based approaches have suffered from certain fundamental problems like data difficulty in scalability. These Recommendation systems have been recommending various kinds of products to the users based on their past experiences. User behavior is very much influenced by the latent interests of the users. Basic matrix factorization techniques can be used to discover various latent features behind ratings and reviews to help in making recommendations for cold start users.

Keywords: **Collaborative Filtering; Recommendation Systems; Content Based Approach; Basic Matrix Factorization**

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I. INTRODUCTION

Recommendation Systems basically are systems implemented to make recommendations of data or product to users to meet their individual needs. In commercial websites like Flipkart or Amazon, these systems are used to handle the mass scale of information which is then used to recommend preferred products and products to users. According to a recent survey it has been found that a minimum of 20% of sales in Amazon are the results of recommender systems. Thus, it can be easily concluded that, the use of recommender systems have had a major impact in the growth of business of commercial websites. Collaborative filtering algorithms have been used in the past in various recommendation systems to predict what user's interests are [1].Recommendation systems based on collaborative filtering techniques like correlation have been very popular. These techniques may up to certain level of accuracy but these are computationally expensive and can only be implemented in static off-line environment. The recommendations provided by those systems were more generalised as they did not refer to individuals and their interests.

The two most distinct but related problems are (1) new user and (2) new product problems. A new user with smaller number of recommendations becomes very difficult to be recognized by the recommender systems. In the same way, a new product with smaller number of ratings i.e. products which has been rated by only a small number of users also poses a major problem to the recommendation system while deciding the users to whom if the product is recommended, it actually would be an efficient and personalised recommendation. To have accurate and reliable recommendations, users need to rate sufficient or large amount of products as this is the basic need to achieve desired content-based recommendations. The system won't be able to provide good and appropriate recommendations if the user has rated only a small amount of products as the system do not have enough information to aid in the recommendation process. The recommendations performed by collaborative recommendation systems are based on user preferences, so new products must be rated by a large number of people for efficient recommendation.Mostly recommendation systems are designed based on content-based filtering or collaborative filtering (CF). Content-based

filtering techniques suggests products similar to the ones that each user liked in the past, taking into account the object content analysis that the user has evaluated in the past. On the other hand, based on the assumption that users with similar past behaviours have similar interests, a collaborative filtering system recommends products that are liked by other users with similar interests. Both types of systems have implicit strengths and weaknesses.

Internet has been expanding at a very rapid rate and because of that the information available to the users is also increasing. Conventional shopping techniques have been facing severe challenges. The wide variety of products and the different category of products which are made available to the online customers are much more then what is being offered at a nearby shopping store [8]. Thus, as more kinds of products are available to the users at their homes only, they are more likely to get satisfactory products. But, not every online user finds it easy to process all this information available on the web and make the right kind of purchases. Hence, most e-commerce websites are now implementing these recommendations systems to help their customers understand all the information available and make beneficial purchase decisions.

There are huge numbers of products that are sold over e-commerce websites. The different categories of products may affect the way customers deal with variety of information available and it may affect their decisions about purchasing certain products. The categorisation of these attributes is done on the basis of two attributes which are search and experience. The variation in the results of experienced and searched products may result in a different level of problems in acquiring information related to product when customers make any purchase decisions. In comparison with the search products, the searching cost of these experienced products is comparatively higher due to the problems in analysing these products using this kind of product. Hence, customers look for more kind of recommendations which users can use to make their purchase decisions.

Many factors have been studied and investigated by a number of researchers and these factors may have a very strong influence on the usage of online recommendations by online customers. The present research is focused on trying to achieve trustworthiness, personalization and perceived usefulness and on the efficiency of recommendations.

Phelan et al. [2] had proposed a technique for news recommendation which utilizes the data from twitter for ranking and then recommending various articles from a collection of really simple syndication feeds. And in this case, those users benefit more which have more friends. Chen et al. [3] was interested in three different factors in making a recommendation system: source of content, user interest models, and social voting. It showed that both social voting and relevance of topic were very useful in making recommendations.

II. EXISTING SYSTEM

In the recent past, a wide variety of Recommendation systems based on techniques like Collaborative Filtering Content filtering have been developed which have been discussed below.

2.1 Collaborative Filtering

The technique of collaborative filtering only need the information about interaction of user with various products and it is not dependent on the content information of user or their profiles or the information about products. Because of this, they have wide range of applications and more and more research has been done on this collaborative filtering technique [6].This technique filter out products based on the views of other users. This filtering is done assuming that a customer is more likely to like a product which customers with similar taste and interests liked before. There are various kinds of techniques or approaches used for collaborative filtering which include model and memory based approaches. In the case of model-based method, a model learns how to make recommendations. The different algorithms included in this category involve the graph-based techniques, basic matrix factorization etc. A common set of steps are supposed be followed in memory based approach. Initially, we have to perform selection of a set of users which can be considered as neighbour to a particular user based on the information about the products which have been rated by the user in the past. In the second step, whatever products the neighbours like or prefer are used to make recommendations and this is why these methods are referred to as the memory based user friendly approaches. A different process makes similar product groups by making use of co rating history. This is referred as memory based product oriented collaborative filtering method. But, current collaborative-filtering methods try to make direct use of information about user's interaction with the products. Because of which these current methods often neglect a very significant point that user's behaviour is influenced by a variety of latent features and interests. To that end, a three-layer, user–interests–product, representation scheme has been implemented. Specifically, we interpret an interest as a requirement from the user to products, while for the corresponding product, the interest can be considered as one of its characteristics

One another 3 layer representation scheme i.e. user-interests-products has been implemented. This multiple layer representation technique or method is used so as to enhance the technique of collaborative filtering as this kind of presentation provide a clear explanation of why and how these products have been selected for recommendation. It also provides a much better explanation of interaction between users, user's interests and products

This collaborative filtering technique has been used to provide support to the systems in various ways which includes recommending best products to the users, perform predictions for various products and provide constrained recommendations i.e. recommendations from a specific group of products to the customers.

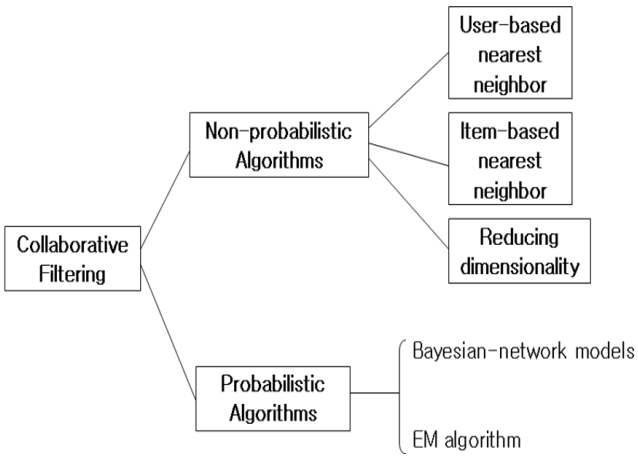

Figure.1 Algorithms of Collaborative Filtering

Algorithm:cluster smoothed collaborative filtering technique-

- Pre-processing: Create user clusters using K-means algorithm.
- Given is a new user U and R which refers to the products/items which have already been rated, a product t1 and Integer K1, then the count of the total amount of nearest neighbours is:

1. Choose s users from G1 groups which are very similar to U.
2. Calculate the similarity sim(U,u1) for every u1 in G1.
3. Select the K number of identical/similar customers as the neighbours.
4. Predict the ratings of any specific product t1 for U by making use of the behaviours of K-nearest neighbours.

2.2 Content based Filtering

This is one more algorithm which performs recommendation. It makes use of information related to the products and the interests of users [7]. It tries to extract the similarities present in the products which are preferred by users in the past and based on it performs new and similar recommendation [4] [5]. Suppose we have to make a recommendation of a movie. To make that recommendation, the different features and characteristics of a movie would be needed which include the type of movie, actor, director of the movie. For example, some people prefer watching action movies whereas others may want to watch horror movies or movies with their favourite actors in it. In order to implement this kind of recommendation Amazon has started a 'favourite' feature which is used to indicate every user's interest on a group of products. In this technique, those products which have been liked in the past are also recommended. For example, our software would make recommendation of those types of movies which were liked by the user in the past like horror movies. But, in order to make a more restricted recommendation the software would need to have a more detailed information about the interests the user, it's interaction with variety of products so that the recommendation is more accurate. The software can implicitly collect response or feedback from users by observing user's behaviour or observing what categories are frequently visited by users or the system can retrieve explicit feedback by collecting ratings and comments provided by the users. One example of such kind of recommendation is a system in which food is recommended by observing what food had been eaten previously.

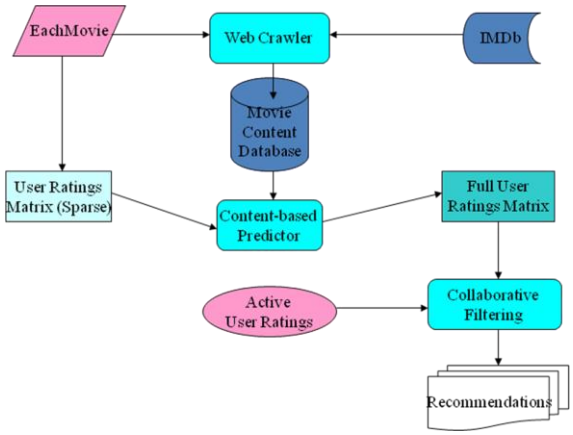

Figure 2. Content and Collaborative Filtering based Recommendation

The above figure illustrates the IMDB ratings provided to the movies. Content-based predictor creates a User Ratings Matrix using the available information. This matrix along with the ratings given by active users to the movies is taken as input for collaborative filtering. Output of this filtering is the set of processes which are recommended to the users.

III.RELATED WORK

In this paper,we have learnt about the existing recommender systems, most of which have been implemented using collaborative filtering technique. However it provides recommendation of those products only people with similar interests preferred in the past and it does not consider the products which were not rated by anyone in the community previously. Thus, we are implementing a new technique which is basic matrix factorization which considers varios social factors so as to overcome the drawbacks of collaborative filtering and thus perform efficient predictions and accurate recommendations.

Basic Matrix Factorization

A number of algorithms based systems are used to perform Recommendations. Collaborative filtering methods which are user-based or product-based are comparatively simple and spontaneous, but matrix factorization techniques are considerably more efficient because they allow us to discover the latent or hidden features underlying the interactions between users and products. Matrix factorization is a mathematical tool which makes us of matrices, and is thus, used in those scenarios where anyone would like to find or retrieve something which is hidden under the data. Matrix factorization, from an application point of view, is widely used to discover latent features underlying the interactions between two different kinds of entities. And one very

obvious application of matrix factorization is to predict ratings in collaborative filtering.

Recommendation systems like MovieLens and Netflix consist of a set of users and products (products for the above recommendation systems refer to the movies). Given situation is that there are users who rated certain movies and now we have to make use of matrix factorization technique to predict how users will rate other unrated movies, so that we can make recommendations of appropriate movies to the users. In this situation, all the data that we have regarding the existing ratings in represented in a matrix.

Suppose we are having 5 users (Us1 to Us5) and 4 movies (M1 to M4), and some of these movies have been rated by multiple users using integers ranging between 1 to 5, then the matrix would look something like this (a hyphen indicates that movie has not yet been rated)(Table 1):

Table 1

	M1	M2	M3	M4
Us1	3	5	-	1
Us2	2	-	3	5
Us3	1	3	2	-
Us4	4	-	-	3
Us5	-	3	2	3

The cause of using Matrix factorization is to solve the problem that there would be some hidden or latent features that determine how one rates the products. For example, two users would give good ratings say 5, to a movie if they like the story of the movie pr if they the songs or the if they like the actors. These users may also rate certain movies as 1 if they don't like anything about the movie. Thus, if we are able to discover these latent or hidden features, then we will be able to predict a rating which a user may give to an product, because the features which are associated with the product would match with the features associated with the user.

IV.CONCLUSION

In this paper, we have studied how Collaborative filtering and content-based filtering works. We have learnt the advantages and disadvantages of these recommendation techniques. These recommendations systems have been providing recommendations which are more generalized instead of providing personalized recommendation. Personalised recommendations are specific to a particular individual and thus are more accurate and useful. It will highly improve the accuracy of prediction and help users in their decision making process. Here, we have also considered how user latent interests can help in providing efficient recommendation.

In the future, we plan to overcome the limitations of the current system and extend it to go beyond the usual recommendations by implementing basic matrix factorization technique in our system to enhance the accuracy of predictions and recommendations.

REFERENCES

[1] Thomas George, Srujana Merugu. A Scalable Collaborative Filtering Framework based on Co-clustering.2005.

[2] O.Phelan, K. McCarthy, and B. Smyth. "Using twitter to recommend realtime topical news." In Proceedings of the third ACM conference onRecommender systems, pp. 385-388. ACM, 2009.

[3] J. Chen, R. Nairn, L. Nelson, M. Bernstein, and E. Chi. "Short and tweet: experiments on recommending content from information streams." In Proceedings of the 28th international conference on Human factors in computing systems, pp. 1185-1194. ACM, 2010.

[4] R. Sinha, and K. Swearingen, Comparing recommendations made by online systems and friends[C]: Dublin, Ireland, 2001.

[5] A. Java, X. Song, T. Finin, and B. Tseng, Why we twitter: understanding microblogging usage and communities. In WebKDD/SNAKDD '07: Proceedings of the 9th WebKDD and 1st SNA-KDD 2007 workshop on Web mining and social network analysis, pages 56–65, NY, USA, 2007. ACM.

[6] Qi Liu, Enhong Chen, Senior Member, IEEE, Hui Xiong, Senior Member, IEEE."Enhancing Collaborative Filtering by User Interest Expansion via Personalized Ranking".2012.

[7] 'Content-Based Filtering Algorithm for Mobile Recipe Application'. Teh Lee Cheng, Umi Kalsom Yusof, Mohd Nor Akmal Khalid School of Computer Sciences Universiti Sains Malaysia USM, 11800 Georgetown, Pulau Pinang, Malaysia.2014.

[8] "A laboratory Experiment for comparing Effectiveness of Three Types of Online Recommendation"Shi Lin; School of Management, Xi'an Jiaotong University, Xi'an 710049, China ; Wang, Kanliang.

