Product Recommendation Systems a Comprehensive Review

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Abstract— In today's environment the idea of establishing business without the use of internet is not possible. More and more users are shifted towards online systems. So companies are also converged toward the online business. Every company in their attempt to establish strong foots required some sort of mechanism which can promote their product. So recommender system comes into existence. The recommender system is the filtering system which will detect the preferences of the users. By looking at the preference of the users companies can decide which product to be launched in the market and which is not. So recommender system is the need of the hour. Recommender systems are used for wide variety of applications which includes movies, music, news, life insurance etc. In this paper we review various technique that are used for recommender system for recommending electronic products.

Keywords— Recommender System, Users, Online System, online business

I. INTRODUCTION

In order to increase the sale of the product or to increase the efficiency in the market recommender system is needed. This system will require large amount of information in order to make correct decision. The information which is provided to the recommender system must be consistent in nature. For the information some sort of information system is required. The recommender system will take the information and formulate the decision in one of the following two ways- either by the use of collaborative filtering or by the use of content filtering. The collaborative filtering is the mechanism of filtering for information among the multi agents, viewpoints, data sources etc. The content filtering on the other hand is the mechanism of using the program in order to filter the information which is going to be used within the system. People now days are more and more concerned with the environment. They are conscious of the fact that the product used by them may harm the environment. So people are inclined toward the safety of the environment. So we propose a recommender system which will promote Electronic Products only. In the proposed system content filtering will be utilized. While considering recommendation system there are two types of terms which are used within the system: Users and items. The users have preferences for the certain items. The preferences are made because of the data items presented to them. In order to describe the terms related to the users and items sparse matrix will be used. The sparse matrix will be the one in which more 0's are contained rather than 1's. However the user preferences are not consistent. The preferences of the users continuously

changes. Because of which recommendation system is created. So that organization selling the product should be in a profit. In order to describe the concept of the sparse matrix representation we will consider the example of the movies preferences listed as:

	SD	NAM1	NAM2	HP6
US1	4		2	3
US2	6	5	2	1
US3	1	4	5	3
US4	2		1	

Here US indicate Users. SD indicate the movie Sanandreas, Nam1 indicates Night at the Museum1, NAM2 indicates Night at the Museum2, HP6 indicates Harry Porter 6. The digit against each will express the preferences of the users. The task of the recommendation system is to predict the value in the blank within the utility matrix. It is not possible for determining the values for every blank within the utility matrix however it is possible to determine some the values of the black present within the utility matrix. This is the main goal of the recommender system. It is also possible for the recommendation system to find the ratings for the products. Which means we can determine which product is most likely to be sold and which product is least likely to be sold? The subset of all the products which has highest rating thus can be determined by using the recommender system. There

exist difference between the online store and physical store hence preferences varies. This difference between the physical store and online store is known as long tail phenomena. It means that a physical store has limited space so they can show only that material which has high ratings or sale. Rest of the products are kept in the storage and shown only if required. Online stores on the other hand can show large number of products. As they have high storage capabilities. In the physical store recommendations are fairly simple since store has aggregate number of users and only those things which are proffered by the users are shown to them. The online store can make everything available to the users and physical stores can make only those things which are preferred.

II. RELATED WORK

The brand awareness is a massive issue which must be considered in the task of promotion. The brands which are popular are likely to be sold. So task of promotion is very important. Promotion of Electronic Products (Barreda, Bilgihan, Nusair, & Okumus, 2015) is considered so that environment remains clean. The promotional work although is convoluted but is accomplished and counselled in the existing work. There are legions which can inspire the promotional process. These will include system quality and information quality(Barreda et al., 2015). The recommender system is commonly used in the area of e-learning. It will be used to evaluate the performance of the students. It is considered that the preferences of the user does not change over the period of time and decision can be taken by looking at the historical data(Baltrunas, 2011). This is true to some extent. However preferences of the user may be influenced by legions of other factors also(Baltrunas, 2011). As an example consider a rainy season in which user will not prefer to go to a beach rather user prefer to go to a museum (Baltrunas, 2011).   The blended learning model is followed in this case. When this happens personal online learning will be enhanced(Hoic-Bozic et al., 2015).   Online community of practices is another application of recommender system. The trust based CoPs is created so that online education can be promoted(Zheng et al., 2015).   The stronger social relations are created by the use of CoPs. The hybrid algorithm will provide more accurate suggestions as compare to content based recommender system(Zheng et al., 2015). By analyzing the background of the recommender systems we conclude that legion of work has been realized in the area of e-learning. Finical work has been done in the area of beget of recommender system to promote Electronic products.

The work of Electronic products promotion is generally done online or offline without the help of social media. The social media will involve FACEBOOK, TWITTER etc. Social media is one of the most commonly used media by the users. With the help of social media large number of users interacts with each other. The social media will act as very good source from promoting Electronic Products. So in the proposed model we will design a recommender system for the social media which will help promote the Electronic products over the Social Media.

III. LIST OF PRODUCTS CONSIDERED FOR EVALUATION

There are number products and number of companies which are considering safety of the planet and proceeding toward preserving the environment. So people more and more converging towards the utilization of Electronic Products. In the proposed system the products which we are considering are electronic products such as LED, Microwave, and Air Conditioner etc. In order to decide whether the product is Electronic or not number of parameters is to be considered.

3.1 Parameters of Electronic Product

There is nothing empirically proven about determining whether the product is Electronic or not. But still we present list of parameters which can be considered in the recommender system to decide whether the product is Electronic or not. When decided than only the product is promoted by the recommender system.

3.1.1 Specific Label

The products in which specific values are mentioned are considered more electronic than the products in which nothing specific mentioned. If product label includes created from 100% natural ingredients than products in which nothing is mentioned.

3.1.2 Bogus Claims

There are number of a company who claims to create and promote Electronic products. Look for the terms like organic or recycled. It is up to the users to identify which product are Electronic by looking for the above said headings.

3.1.3 Ratings

Electronic products generally have ratings associated with them. Air Conditioners rating generally termed through number of stars. The products having highest stars should be recommended.

3.1.4 Eco Friendly

The products which are eco-friendly are mentioned over the product wrapper. The products which specify eco-friendly must be selected for promotion.

3.1.5 Energy Efficiency

The products which consume less power are Electronic in nature. So only those products in which power is not wasted should be selected for Electronic Products Category.

There are number of other parameters which can also be considered in order to decide the

products which must be promoted by the recommender system.

IV. FUZZY SYSTEM

Fuzzy system consists of rules that can be used in order to determine whether the product is Electronic or not. The recommender systems will go to promote the products which satisfy the conditions specified. The data set will be prepared with in the fuzzy system. The Dataset will be compared against the attributes of the new product. The conditions if satisfied than the product are rated as Electronic. The membership functions will be defined in order to determine whether the given product lie in a given range or not. The rules regarding the fuzzy system (Patil & Dhamakale, 2011)will be as described as follows:

4.1 Compare the input variables with the membership functions to determine the values of the Label. This is also known as fuzzification.

4.2 Combine the membership values with the premises values to get the firing strength.

4.3 Determine the result of the conditions specified.

4.4 Aggregate the results so that desired output in terms of Electronic Products can be generated.

The recommender system will use the above rules of fuzzy logic in order to determine whether the product qualified to be Electronic or not.

V. FILTERING MECHANISMS

Recommendation system is a facility used in web applications to guess the user response or taste regarding particular product or thing. Sometimes as we all know we get some advertisements during web surfing in our computer or some mails in our inbox or spam. These all comes from the net surfing that we had done last time from that our recommendation system guesses our taste or response for particular product. Recommendation system uses number of technologies to check the response of users which are as follows;-

Content Based System:- These system check the response of user according to the content he/she search for, from that recommend system easily know the user response. For example if user is searching for sports based news then the system guesses that the user is interested about sports.

Collaborative Filtering System:- These system guesses the response not for a single person but for a group of persons or community. For example if we talk about the taste of boys then he always want to check in news about sports, latest market trends etc.

Model for Recommendation System

In this model the concept of "Long-Tail" with the help of utility matrix. In this model we consider the concept of sparse matrix to implement recommendation system and then by using this matrix we get the response of users for particular things. Online vendors also use this system to check the user response about particular product.

5.1 Applications of Recommendation Systems

Recommendation system used in various applications like product recommendations, movie recommendations, and news articles etc.

The mechanism which is used in the proposed system is content based filtering.

5.2 Content Based filtering

Within the proposed system we will use the content based filtering techniques. In content based filtering the profile of each data item is constructed. The profile will include all the attributes which are associated with the item.

Item profile

Item profile will include all the attributes which are associated with the item and it will be a record or collection of records. In simple cases the profile consist of some characteristics of the item that are easily discovered. E.q consider the features of the movie that might be relevant to a recommendation system.

The content based filtering scheme will check whether the product profile match with the profile of the Electronic products or not. If the profile do match than it will be considered as Electronic product and added to the recommender system for promotion. In order to verify the product the characteristics which are considered are stars, ratings, eco system, power consumption etc. The concept of threshold is also used in this case. The threshold value will be the minimum value if not exceeded than the product will not be considered as Electronic. Every attribute will have threshold value associated with it. In order to be Electronic every attribute present within the product must exceed the threshold value.

Feature Extraction

This will be very important feature which is associated with the Recommender system. Extracting information from the product description may not be a easy task. There have been number of attempts to obtain information about features of items by inviting users to tag the items by entering words or phrases that describe the item. Thus, one picture with the lot of Red might be tagged.

If it is observed that a user retrieves or bookmarks many pages with the certain set of tags than we can recommend other pages with the same tags. The problem with tagging as an approach to feature discovery is that the process only works if users are willing to take the trouble to create the tags and there are enough tags that occasional erroneous ones will not biased the system too much.

Goal of Content Based Filtering

The goal of content based filtering is to create a item profile. The item profile will consist of feature value pair. There exist user profiles which will indicate the preferences of the users. The utility matrix will be prepared in this case. The utility matrix will indicate preferences in form of a matrix. The features could be of different types. Some of the features can be represented in the form of 0s and 1s. '0' will indicate that the product does not have a particular feature and '1' will indicate that a feature is present within the product.

However some products cannot be represented as such. There is another class of features that is not readily represented by Boolean vectors. Those features those are numerical. For instance, we might take the average rating for movies to be a feature, and this average is a real number. It does not make sense to have one component for each of the possible average ratings and doing so would cause us to lose the structure implicit in number. That is, to ratings that are close but not identical should be considered more similar than widely differing ratings. Likewise numerical features of products such as screen size or disk capacity for PCs should be considered similar if there values do not differ greatly.

VI. CONCLUSION AND FUTURE WORK

In this paper we review various recommender systems which will going to promote Electronic products. Various parameters are considered in this case for input. The parameters which we have considered are Eco, Organic, Stars, Power and Recycled. Although the performance of the recommender system is good and it will detect the Electronic Products which can be promoted using Recommender system but still there could be more accuracy which can be used in order to detect the Electronic products.

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