REAL ESTATE BASED RECOMMENDATION SYSTEM

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Abstract - This paper outlines how the User Oriented Recommendation System For Real Estate Project will address current online real estate platform which has became a major priority for buyers & sellers. The website will be more of user friendly allowing customers to search their dream flat emphasizing user's needs and priority based recommendation thus making it easy for user to search flat along with proper location analysis. This project primarily based on the concept of Recommender system thus having collaborative filtering and clustering as its major concept used for providing proper personalized suggestions to target user

.Keywords- Collaborative filtering; Recommender System; memory based; model based recommendation; Items; rating;

I. INTRODUCTION

Mumbai which is the economical and financial core of India has been inviting huge population from other parts of the country for employment opportunities and other migration reasons. Hence an online real estate platform has became a major priority for buyers as well as sellers as buyers are expecting all basic facilities they need to find perfect living and locality for them which preferably helps them in saving their time to enquire about that particular area where the flat resides.

There are numerous websites providing real estate facilities to users but a user who wants to buy a flat in that particular area can find it difficult to get detailed information about that area .It would be troublesome to do location analysis for that area for the user. If the user is a student or family migrating to Mumbai , they need to find all necessary information needed about the flat they are going to purchase or rent. Hence to serve all this purpose, it is necessary for the website user interface to be more user prone or user priority based .Hence User Oriented Recommendation System For Real Estate project will be covering all such features to cover up the limitations. The objective of this project was to create user friendly real estate website where user can search for their dream home.(Recommendations are given based on the parameters filled by the user), ensure that people get their flat not according to their preferred amenities but also which is locally safe by providing crime percentage and make customer locally aware of the surroundings where they are going to buy the flat by providing information about the type based locality. Hence the major concept which is being used in the following project is collaborative filtering which serves a vital purpose and base of recommender system. This paper surveys detail information of the concept of collaborative filtering.

Recommender system consists of the user and item sets. Now the next part includes the ratings of items which is done by each user. Recommender system can either perform the function of the prediction of a rating of a particular user on an item which is not rated say 'x' or it can recommend few items for a particular user depending upon the current ratings. The main problem arises when we need to recommend something to the user, at that time we have to be very sure that the recommendation is relevant. Hence due to this CF systems functions by collection of users feedback in the form of ratings for items in a given domain and utilize similarities and differences among profiles of several users in determining how to recommend an item.

Recommender systems have proved to be beneficial in today's growing ecommerce industry. Because of its user friendly concept, it has become very useful for the users to search for their requirements very easily and reduces the time and effort of searching the items right from the scratch. Hence more number of users are attracted to the ecommerce websites which encourages use of collaborative filtering due to its advantage of providing personalized suggestions thus predicting user's likes.

II. CONCEPT OF RECOMMENDER SYSTEM

A. Collaborative Filtering Technique[2]

Recommender systems have proved to be beneficial in the world of ecommerce as well as other websites. Hence we

have chosen this technique as the part of our project so that it can be proved fruitful for the users providing them with their match interest i.e. listing of very much likely or topmost recommendation similar to what they are searching. Here we are going to help users by recommending a list of properties most likely to its interest based on demographics of the users. Hence proper analyzing of data has to be done to find the matching flat interests for the user.

Collaborative filtering is a very popular recommendation concept used by many websites these days. We always come over the quote 'People who bought this also bought this (other item).For example: People who bought mobile also bought 'black phone cover. This is what is called recommendation which is therefore based on collaborative filtering. There are different types of ratings. It can be in the form of ratings which perhaps can be numbers or more precisely rankings say from 1 to 10 or alphabets. It can be stars like more the number of stars, the more the product or movie or flat locality is good. If we take a basic example of Flipkart, after purchasing products from the website, when we get the delivery for the same but the process does not completes here. We receive message for flipkart that the product is delivered attached with the link which takes it to its website. After clicking on the link, it takes us to the ratings page where we can rate our experience with the site. This can be in the form of 'I am happy' or 'Satisfied' or 'Not Satisfied.' Hence we can rate accordingly which in case will turn out into average ratings for flipkart or that particular third party shop from where product was booked. This rating will thus benefit the other users for selecting their choice and trust.

Here we are going to help users by recommending a list of properties most likely to its interest based on demographics of the users. The aim of CF algorithm is to suggest properties or to predict utility of a certain property for a particular user based on the inputs given by user and as well opinions of other similar like minded users. A form is provided to each user with given parameters which has to be filled by the user according to its priorities or likings, Hence the basic concept or work of collaborative recommender is that if the users tend to have a common liking or priority for some items before, it will tend to have the same interest thereafter.[2]

Data-extraction for recommendation: As based on user requirements property list are extracted from database. The data extraction instrument included a series of priority based questions which includes parameters as-family status, amenities required, crime rate, budget etc.

CF algorithm generally has 2 types which come out to be Memory-based and Model- based:

[1]As illustrated in below figure, the third user needs a product recommendation. By using user- based method, it is searched the similarity to other users. By observing the figure, the first user is known equally like the second and third items. Thus the other product which are liked by first user are liked by third user as well. While in the item-based method, the third user who previously known fond of the third item, this

item will be found its similarity to other items that is: the item that is always preferred together with the third.
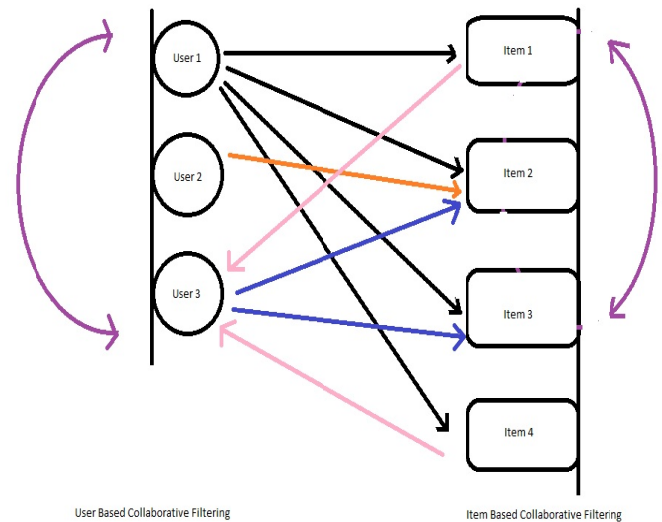

Figure 1. Collaborative filtering methods

It can be seen that the first item will be recommended to the third user.

The computing time of user-based method will increase if the number of user grows more and more. Vice versa, the computing time of item-based method will increase when the number of products increases. Therefore selection of these two methods should be adapted to existing conditions [1].

B. Memory Based Collaborative Filtering Algorithms[2]
Memory-based algorithm is called as user based algorithm. It uses the user-item database so that in order to create predictions. These systems employ techniques which are statistical to find a set of users or more precisely we can say neighbors who agree with the main user like different items can be rated similarly or they are buying similar item sets. Now as the user neighborhood is created, it is necessary to group the neighbors ratings or priorities for which different algorithms are used so that proper predictions can be determined or recommendation list with the nearest possible matching interests can be displayed to the target user. This is user-based collaborative filtering. User-based method makes recommendations with the following procedure:

- First the users give their ratings according to their experience for that particular entity
- Now the system corresponds and coordinates the ratings so that determination of which user's ratings will be the most similar to other can be done.
- Now depending upon ratings of similar users recommender system will predict ratings of new products for the active user. If these new items are found to be favored, the system recommends them to the user.[5]

C. Model Based Collaborative Filtering [2]

It has been observed that Memory based recommendation system are not scalable, efficient or faster as we need them especially for the recommendation which depends upon very large datasets. Hence Model-based system technique are used. Here first the calculation of similarities between the products is done which can be done by using the method of cosine similarity .Now suppose the user has not rated a particular product. So this prediction of unrated product can be done based on the calculated similarities.[9] This category has algorithms that takes a path that visualize the CF method as calculating the expected value, given their ratings on other properties.

D. Knowledge-Based Recommender System[6][7][8]

Knowledge-based recommender systems are used especially for the recommendations based on specified user requirements and their priorities. Instead of historical rating or ratings or buying data, external knowledge and constraints are used to create the recommendation. There has been an expansion in real estate. Usually, companies build their own websites to advertise their product which becomes difficult for the user to find the ideal product for him. Therefore a real estate recommendation system is required to get everything in one place and to search ideal property without getting lost. Recommendation system a type of information filtering technique used to predict user preferences. This helps user to make decision. Database may have huge information so here the RS helps filtering information based on user needs. Real estate recommendation system is implemented using Case-Based Reasoning Approach which helps user to buy or rent properties. Here this proposed system provides a list of properties while searching thus helping user to find property which would satisfy the user.

Examples include items such as real estate, tourism requests, or expensive luxury goods which are not used very often. As ratings are not available for the recommendation process it is difficult to give recommendations of the item at hand and also consumer preferences evolve over time. For example, car model may evolve significantly over years, as a result the preferences may also show change. Properties have certain attributes associated with it and user may be interested only with certain attributes which are associated with that property here user based recommendation system is used. For example, property may have basic amenities nearby, budget, area and interior options, and user interests may be regulated by a very specific combination of these options. Thus, in these cases it is hard to associate sufficient ratings with the large number of combinations at hand. Such cases are addressed with knowledge-based recommender systems, where ratings are not used for recommendations purpose. Rather, the recommendation process is performed based on the similarities between customer requirements and priorities. This process is use with the knowledge based and constraints which contain data about attributes preferences and similarity to use during the retrieval process. The specification of

requirements constraint and their preferences results in best recommendation for user in the recommendation process. Knowledge-based systems allow the users to specify constraints and their priorities. [6][7][8]

Fig 2. Example for Case based recommendation

E. Case-Based Recommender System [6][7][8]

The above example displays the initial user interface for Case based recommendation. In case-based recommender systems specific cases are specified by the user according to priorities. Also metrics are defined based on the item attributes and their priorities to retrieve recommendations to such cases. The similarity metrics form the domain knowledge that is used in such systems.

The returned results are used as new cases with some interactive modifications by the user. For example, when a user sees certain returned result, which is almost similar to their interest, they might re-issue certain query according to their interest, but with certain attributes changed to the user's liking. This process is use to guide user towards the interested items .The system provides user to change their specified requirements. In case-based systems, examples are used as targets to guide the search with certain combination with similarity metrics. Here users iteratively modify some attributes in a preferred search of each iteration.[6][7][8]

F.Example of Movie Recommender System [4]

When user enters the recommendation system he gets some options. User can either search a particular movie or a list of new movies or recommendation page. On recommendation page user has to select some input values, Based on that filtering is done, such that we get an array of movies. These movies are such that one of its attributes matches the input value. Sorting is done based on ratings. If number of movies is less than 20 then its fine, if number of movies exceed 20 then pre-filter is applied to get the top 20. Then attribute values is matched to its respective weight to get

the total weight of movie. This is then used by k-means algorithm for grouping of movies.

III.   CONCLUSION

Recommender System has proven to be very fruitful for the ecommerce industry in terms of proving proper recommendation thus providing users a path to get its requirement fulfilled properly .This paper surveys details information about recommender system and thus the concept of collaborative filtering.

The survey discusses about collaborative filtering in detail and tells how effective it can be in recommending flats according to user priority so that it can benefit user to search for flats more quickly and efficiently.

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