Collaborative and Content based Recommendation for Game Recommender System

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Abstract— Recommender systems improve the access to relevant information and products by giving suggestions to the user based on user’s previous rating to the product or like and dislike of user towards the information. Many existing recommendation system use collaborative filtering approach that give recommendation based on other users preferences. On the other side we have content based method which gives recommendation based on user’s previous history or past profile. Game Recommender System aims to provide accurate results of recommendation to the user by both the available approaches. The system maintains user profile with certain ratings given to the games and based on that recommendation results are displayed to the user. The system has great advantage as it has personalized recommendation with social filtering methods to accurately recommend games to the user, so user can enjoy games that matches their interest and helps user to remove confusion as to which game they should play with plenty of games available in the market.

Key words: Recommendation; Collaborative Filtering Approach; Content Based Recommendation

I. INTRODUCTION

Information on internet keeps growing day-to-day and due to this lot of data is being generated which leads to lot of information. All this information kept growing which leads to problem of information overload. Due to information overload users find it difficult to access the information they are looking for. Recommender system helps user to sort out information or filter the information they are looking for over the internet. This filtering of information is done by using opinions of group of users to help individuals belonging to that particular group to more effectively identify the area of interest from the set of choices. In collaborative filtering approach the system maintains the preference of individual users and finds other users whose known preferences matches with other users and recommend games that other users have enjoyed. Content based approach on the other hand allows the system to uniquely categorize each user without having to match their interest with someone else’s. Games are recommended based on the characteristics of game itself rather than choices of other users. There are various approaches to provide personalized recommendation. Combination of different approaches will always exist and will be the reason of new approach.

II. LITERATURE SURVEY

Recommendation system is an important mean of information filtering and a potential method to solve the information overload problem. Accurate results of the recommendation are based on the database the system maintains and also the profile of the user. Recommendation can create a serious business if it works accurately and also can help users over the internet to easily find the information they were hunting for. Inaccurate database may result in less accurate recommendation.

A. Approaches for Recommendation:

Generally there are two approaches for recommendation, Content based filtering approach and Collaborative filtering approach. Also combination of these two approaches can be used for recommendation.

B. Collaborative Filtering Approach:

Collaborative recommendation is probably the most familiar, most widely implemented and most mature of the technologies. Collaborative recommender systems aggregate ratings or recommendations of objects, recognize commonalities between users on the basis of their ratings, and generate new recommendations based on inter-user comparisons. The greatest strength of collaborative techniques is that they are completely independent of any machine-readable representation of the objects being recommended, and work well for complex objects such as movies and games. The critical task in collaborative filtering approach is to find similar preferences users with active users, that is, find similar users with same choices.

C. Item To Item Based Collaborative Filtering Algorithm:

This feature called as item to item Collaborating feature is similar to the impulse items in a supermarket checkout line, but our impulse items are targeted to each customer. Rather than matching the user to similar customers, item-to-item collaborative filtering matches each of the user’s purchased and rated items to similar items, then combines those similar items into a recommendation list. Below are the general steps of item based approach.

1) Step 1: Registered users create their user profile, where a login and password is created by user.
2) Step 2: Active user rates the different games which is known by the user and then the game name, rating gets added in the database.
3) Step 3: Next matching of similar games are carried out based on
   - Games rated by active user and those rated games which are already rated by other user are taken into consideration.
   - Other users’ games which are not rated by active user that passed as an argument to the generate recommendation functions which considers all the existing user’s games rated and predicts accordingly using inputs from step 2.
4) Step 4: All predicted games are sorted in descending order according to their rating of existing users.
5) Step 5: Final Recommendation are displayed to user based on step 4.
D. Content-Based Filtering Approach:
The Content-based filtering approach has its origins in information retrieval and information filtering. The item recommended by content-based filtering often indicates textual information, such as news webs and documents. And these items usually describe with keywords and its weights. Database fields are queried and used to analyse the textual feature content of items and recommend suitable content based on items characteristics and the user’s preference. The challenge of this approach includes limited content analysis because of limited keywords, overspecialization problems and new user problems. Content-based recommender systems work with profiles of users that are created at the beginning. A profile has information about a user and his taste. Taste is based on how the user rated items. Generally, when creating a profile, recommender systems make a survey, to get initial information about a user in order to avoid the new-user problem. In the recommendation process, the engine compares the items that were already positively rated by the user with the items he didn’t rate and looks for similarities. Those items that are mostly similar to the positively rated ones, will be recommended to the user. There are different algorithms [8][9] of measuring similarities among items in data base and those in user’s profile. Better described items lead to more accurate recommendations.

E. Content-Based Filtering Algorithm:
1) Step 1: Registered users create their user profile, where a login and password is created by the user.
2) Step 2: Information is stored in the database which is queried to display a list of available games to the user.
3) Step 3: Once the user selects the games displayed to them all the details of the games are retrieved for database
4) Step 4: Now the rating given by the user for the games are considered and average of rating is calculated according to the genre of the game.
5) Step 5: Now all the games from the database are retrieved with threshold value as average of rating taken from users profile and games from database are retrieved.
6) Step 6: Final Recommendations are displayed to user based on step 5.

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<tr>
<th>Algorithm</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>Item based recommendations</td>
<td>A user may receive items that has never been used before but may be of potential interest.</td>
<td>Difficulty to provide recommendations for users having unusual preferences.</td>
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<td></td>
<td>Facilitates the sharing of information and experiences among users having similar views.</td>
<td>Difficulty to classify users with ever changing preferences.</td>
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<tr>
<td>Content based recommendations</td>
<td>A user can receive proper recommendations without help from other users.</td>
<td>Certain kinds of items like multimedia are difficult to analyze.</td>
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<td></td>
<td>It is possible to look into the problems of multiple users by monitoring the ever changing and evolving user profiles.</td>
<td>User receives items similar to past experiences.</td>
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Table 1:

III. PROPOSED SYSTEM
Recommender system of games helps users to get through games they may enjoy with little efforts. The system comprises of both the approach so that user may get social filtering and also personalized recommendation of the games.

A. Challenges:
1) Maintain database of users profile and also game database for recommendation.
2) Getting feedback or input of games and their rating from the active users.
3) Recommending games accurately to the user based on certain parameters and approaches.

B. Proposed Solution:
1) Let the user to create and account on the website so appropriate information about the user will be collected and stored into the database.
2) Provide users with certain set of games for their interest or input of game they have played.
3) Apply collaborative and content based filtering approach on the profile build by the active user.
4) Displaying the recommended games to the active users.
C. Flow of System:

1) Block 1: Registration of User
To build the profile of the user, the active user must create an account on the website. With the account necessary information about the user can be collected as Age and Name of the user which will be parameter for recommendation also the genre of game the user play will also be collected.

2) Block 2: Building User Profile
After registration the user will be provided with the slider gallery of the games. The slider gallery contains the list of the game the system maintains for certain input from the user. The slider gallery is dynamic in nature every time it display new set of games to the user so better profile building can be done of the user. The user will rate the game he had played earlier and based on that users profile will be get build. All these ratings will be stored in the database with user’s name and also the game name user rated will get stored in the database.

3) Block 3: Content and Collaborative Approach On Database
Details of the game which users have rated will be retrieved and content based approach will be applied. In this approach first the games which user rated will be classified as genre and then average rating is calculated for every particular genre of the game user rated and this average value is will be used as a threshold value and all the games rated above that value and which match the characteristics of the game user rated are retrieved. In collaborative approach the users profile is analysed and the diff users profile will also be taken into consideration. If other users have given rating to the same game the active user has rated the all the games the other users have rated or liked will be retrieved from the database.

4) Block 4: Displaying Results to the User
Processed and retrieved results from the database are displayed to the user in an interactive manner. The personalized recommendation and also game which other similar user have liked or rated are displayed to the user.

IV. IMPLEMENTATION
As both the approaches have some disadvantage so we have taken both the approaches into the consideration. So personalized as well as social recommendation of the games can be displayed to the user. PHP is used for processing and displaying contents to the user. Both algorithms are implemented in PHP as Php is fast and used for complex processing and also its robustness and effective processing helps to implement these algorithms easily. MySQL Server is used in backend to collect the necessary information about the users via registration form and also for maintaining user’s profile. All information about the game and their characteristics are also stored in the MySQL database. For getting the game or input from the users for appropriate recommendation a slider gallery is provided to the user and also session for that user is maintained. The user just need to go through slider and rate games he has played earlier or he like the most. Also the slider gallery is dynamic in nature as every time generates new set of game for the user so accurate and more effective recommendation for the active or particular user is generated and displayed to them. To make website more attractive we have given easy navigation to the user where can browse to all games and also added some extra feature like top 10 games and most searched games on the website. These feature also can give idea to the user of what games are most searched and this can also be a small part of recommendation to the user. Also description of the all the games are maintained so as to give quick reviews to the user about the game. All the database of the game is maintained with the help of an API names import.io. This API helps to generate data by using web crawling through the websites over internet and it also helps or support to download that generates data in an excel file from which it can be easily be imported to MySQL.
V. CONCLUSION

In this paper two algorithms on Item based and Content based Collaborative filtering techniques were successfully implemented on MySQL/PHP. System developed with these techniques resulted in predictions which were useful to a naive user who can just look upon the results and approve of the recommendations. User interface of the system is kept good as appearance in games matters most. Both the approaches have advantage and disadvantages hence both the approaches have been implemented and the results depend on the users need. The output of this implementation can be further used for hybrid recommendations which are a combination of the above results.

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