Recommendation system using hybrid collaborative filtering methods for community searching

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Abstract. Community is a group that has the possibility to connect to each other or between members of other groups. However, nowadays many people difficult to get information about the communities that are around them. Recommendation system can help people to find the right community. This paper proposes a recommendation system to help people find appropriate communities using Hybrid Collaborative Filtering methods. This system can help people to search for the suitable community based on their location and category. It can also provide recommendations based on their interests and criteria.

Keywords—Hybrid Collaborative Filtering, recommender System, Community

1. Introduction

The community is a group that has the possibility to connect to each other or between members of other groups [2]. Many things can be discussed in a community that can increase people's knowledge according to their interests [1]. The lack of information of community around them makes it difficult for people to find the appropriate communities. It will be easier if there is a system that will bring people together with their communities. By identifying its content, interests, or goals, system can be recommended community to individual [5].

Based on these problems, this paper proposes a Recommendation System for Community Based on Android Mobile application. This system is using Hybrid Collaborative Filtering methods. Hybrid method is combining several methods found in the recommendation system, one of which is Collaborative Filtering to produce community recommendations that are in line with individual criteria. The method also aims to overcome the shortcomings of each approach, so as to produce the best recommendation [6].

2. Literature Review

2.1. Recommendation System

Recommendation system is a system which produces individual recommendations as outputs or system that has the effect of guiding users in a personal way to select interesting and useful objects among the multitude of possible multi-criteria [4]. The recommendation system is a system that suggests useful information or suspects what the customer will do to achieve its objectives, such as selecting a particular product. So that customers could choose the product more effectively in determining the product they want [3].
2.2. Hybrid Recommender System
In general, the Hybrid Recommendation System combines more than one recommendation system approach, addressing the shortcomings of each approach, resulting in a good recommendation [6]. Here are several ways that can be done as a merging:

2.2.1 Linear Combination (Linear Combination).
This merge combines the predicted (rating) results of the content based and collaborative methods. This merger is done by ranking or rating.

2.2.2 Sequential Combination.
This merge is performing calculations on one method (eg. content-based) then the results are combined with other methods (eg. collaborative).

2.2.3 Incorporation Item-based Clustering Hybrid Method (ICHM).
This merge integrates item information and user ratings to calculate the items likeness. Item-based clustering Hybrid Method (ICHM) is a method that incorporates hybrid recommender systems in order to improve the prediction accuracy of the collaborative filtering approaches.

2.3. Collaborative Filtering
Collaborative filtering is one of the algorithms used to compile the recommendation system and has been proven to provide excellent results [10] [11]. The product rating is the most important element of this algorithm, the rating is derived from the majority of customers in which the customer explicitly deliberates the product. The system provides a return to the customer by processing the data, as an illustration of the zero to five scale, it is indicating the least favored assessment to the most favorable according to the customer's point of view, this data allows for the statistic calculation of results indicate which product given a high rating by the customer [7].

2.4. User Based Collaborative Filtering (UCF)
The basic principle of user-based collaborative filtering is to provide recommendations based on the opinions of other users who share the same likes with the user [8]. There are many techniques used to find predictive value for active users (Pa,i), starting from a simple way by summing up all ratings from other users who have the same tastes as active users (Ua) and then divided by the number of users. Other users who have similar tastes to (Ua) are called neighbors. To search for these neighbors many ways are offered, some are using K-nearest neighbor (KNN) techniques, some are looking for them manually by looking for slices of all list items that are already rated by active users (La, i) with all the list items already rated by other users (Lu, i) one by one. The most important thing to consider in looking for neighbors is that the candidate neighbors must have at least some null variables from the (Lu, i) with (La, i) slices so that the proximity measurements can be measured [9].

3. Methodology
Recommendation System using hybrid collaborative filtering method will read the data entered by the user, like user’s profile, location and interest. Then the system will determine the parameters that will be used to compare it with other member’s data in the database. The system will look for similarities with other members such as common interests. Based on these similarities, the system can provide appropriate community recommendations to the user as shown on Figure 1.
4. Result

4.1. System Modeling
The modeling of recommendation systems will be using a use case diagram as shown on Figure 2. The system has 2 users, namely viewer and member. Viewers can search for communities and create accounts. Members are able to join communities, get community recommendations, suggest new communities, and edit their profiles. System can provide community recommendations to users based on their location as shown on Figure 3. System will read the location of the user and provide community recommendations based on user’s location.
Figure 2. Use Case Diagram of Recommendation System

Figure 3. The Activity diagram of Community Recommendation based on parameter

Figure 4. The Activity diagram of Community Recommendation based on location
The system can provide community recommendations based on certain parameters determined by the system. These parameters will be compared to existing community members. The system can provide appropriate recommendations to the user as shown in Figure 4.

4.2. System Implementation

The result of implementation system can be seen on Figure 5, 6 and 7. Figure 5 shown Home screen of application. Home screen displays a category icon which when tapped will show the filtered community based on the category, which at the bottom will show the communities that the users have followed.

Figure 6 shown category views. The application displays various categories. If one of the categories clicked then it will display the community and event according to the selected category. Figure 7 shown a navigation image on this system. Near me fragment screen on the map is taken from G-maps. This folder will show community and event in accordance with the location listed.

Community Recommendation from system can be seen on Figure 8 and Figure 9. Figure 8 shows the fields of user interest. This is entered by user when they were registering on the system. This interest can be updated according to the user's wishes. Based on these fields, system will provide recommendations as shown in Figure 9.
5. Conclusions

Based on the research that has been done, it can be concluded that:

1. This system can provide community recommendations that are suitable to the user's interests.
2. The implementation of Hybrid Collaborative Filtering methods in the system makes the system provided accurate recommendations.
3. This system can also provide recommendations based on the location of the user which displayed on the map, making it easier for users to find communities around them.

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