Restaurant recommendation system on Android

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Introduction

Nowadays, we can find many restaurant mobile applications from the internet such as Open Rice. However most of them just provide reviews by customers and we cannot determine whether it is true or not. Even after going through all reviews, we don't have any idea about the delicacies of the restaurants.

Therefore we plan to create a new application which not only provides basic information of the restaurants, but also recommendations. We mainly focus on recommendations rather than customers' reviews. it can directly help users to make decision on which restaurants are most suitable for them. To enhance the credibility, editors are required to provide evidence that they have been to the restaurants, by tracking the editors 'locations.

Design

We build a Recommendation System Application on Android platform which called DL1, The following diagram is the system architecture diagram.
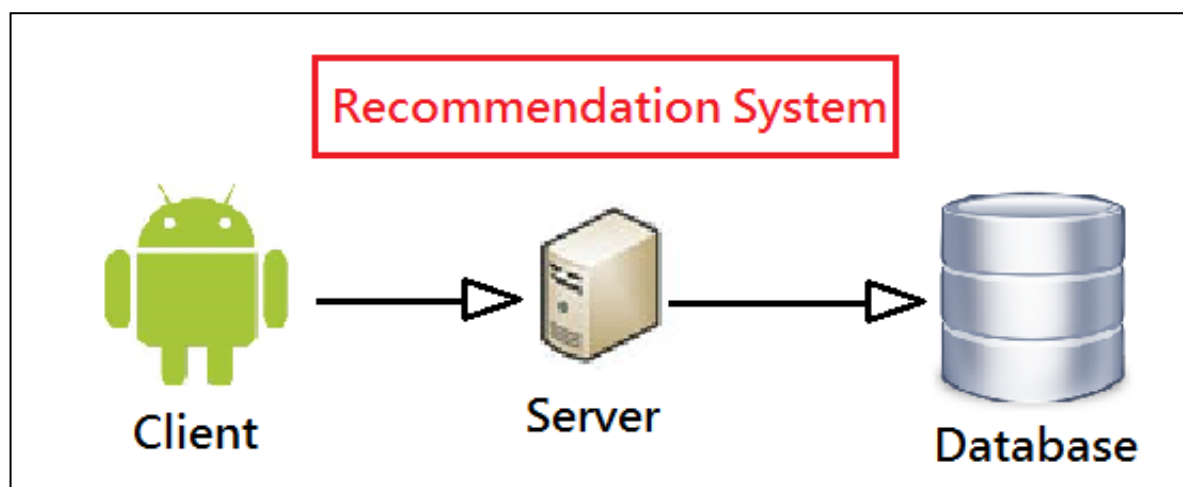
Client side: Provides User Interface to input command or request.
            Global Position System to locate user position.

Server side: Perform data processing.
            Database
            Algorithms: Collaborative Filtering with Time and Location (CF with T and L)
                        Hyperlink-Induced Topic Search (HITS)

Data Flow: A command from the Android Apps to Server.
            Server run algorithm to sort data from the database.
            Expected data return from database to server.
            Server generates result to Android Apps by Internet.

Implementations

Algorithm:

Collaborative Filtering with Time and Location (CFTL), by user currant Time and Location.In the algorithm we will use Bayes' rule frequently, which are:

$$P(x|y) = \frac{P(x \cap y)}{P(y)}$$

$$P(x|y) \propto P(y|x)P(x)$$

The task of the CFTL is to re-calculate the preference ratio and rearrange the HITS preference list then combine with the recommendation of baseline CF.

The principle and formula of CFTL: Goal: given a userID, Current Location (L), Current Time(T) of a user. We want to find out the probability of that user will choose the shop (i).
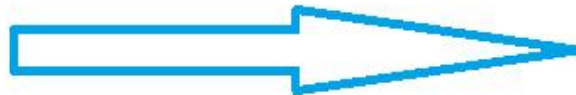
Features:

1. *Random suggestion : Either current location or not*

2. *Top ten restaurants*

3. *Search for special criteria*

4. *Reviews*

5. *Global Positioning System (GPS)*

To run the App:

Login to the system by their user ID

Result of CF with time and location recommendation:

Screen display a restaurant list:
(1) Restaurant Name
(2) Address
(3) Contact

Improvement:

(1) Request new users to enter some background information such as what type of food they like most or what type of food they always eat. Or request them to take priority of all kind of food.

(2) To develop a new algorithm for two type of users. One is the new user. And the other is that the information is not enough to estimate a suggestion. And this algorithm may base on the user information such as ages, occupation, income, home district and working district to produce a recommendation.

(3) To build own review database

We will create a function for users to write reviews after their enjoyment. It can increase the accuracy of the recommendation. It will become more independent.

(4) To check the validation of reviews

1. Concerning the credibility, some users may write review about a restaurant, but they don't even go to. Therefore, we set up a system to check the validation of reviews. GPS system will locate user's position. If GPS system check that user's location is same as the location of the review restaurant, that review is marked as valid. It can increase the credibility of reviews in our own database. And those reviews have higher credit that open rice reviews.

Conclusion

To summarize this project, we decide to study recommendation system because we think the present similar Apps are not good enough and not suitable for people. For example, Open Rice. It just only provides restaurant information to users. But not give some useful suggestions. Hence we want to develop a new recommendation system about restaurant selection. And we design a new algorithm which is CF with Time and location, to try to produce more accuracy information for peoples. Also, the Apps can provide TOP 10 restaurants list and users can sort the list by their own criteria. We believe that people will reduce their time on choosing eatery with an enjoyable and favorite food. Besides we hope our project is a beginning of development about recommendation system and we will continue to study in this aspect.