Web Service Recommendation Using Hybrid Approach

Priyanshi Barod¹, M.S.Bhamare², Ruhi Patankar³

¹,²,³ Department of Computer Engineering, MIT, Pune, India

Abstract—Web Services (WS) are application components which help in integrating various Web based applications. WS are used by almost all web applications. With the help of WS, web applications can provide service on the internet without any restrictions to the operating system or programming language. Today the number of WS on the internet is rising and it is difficult for the user to select a well suited service among a large number of services. In order to overcome this, this study proposes a hybrid filtering based web services recommendation system. In this we used demographic based recommendation system with collaborative based filtering approach. In this data mining is performed on user history and text mining is performed on comments. By combining the results we recommend web services to user.

Keywords—Web service recommendation, Content based filtering, Collaborative filtering, Demographic based recommendation, Hybrid filtering, Improved k-means.

I. INTRODUCTION

The use of the web services technology on the internet has increased widely as it has improved the efficiency and throughput for developers in developing applications. Recommendation system framework is exceptionally well known now days. When a user searches for particular information, it is very difficult to get limited and accurate result because the amount of data to be searched is very huge. Hence the recommender system generates recommendations based on his/her interests and the advantage of a recommender system is to reduce the user’s time for searching the required information by narrowing down the choices that the recommender algorithm predicts the user might be interested in.

Many works have been done on service recommendation based on quality of service. But as numbers of services are used in present, a huge number of data is present; it is very difficult to get all data for all the services. For this reason a new personalized recommender system is proposed and in this the predictions to the user are based on the feedback or the past user experiences. According to optimal result or performance user can select the services.

The structure of this paper is as follows: section 2 gives the introduction to web service recommendation techniques. Section 3 gives literature survey or related work in the field, after that section 4 explained the proposed architecture. Section 5 and 6 are conclusion and acknowledgment respectively. After that references are given which are referred for this work.

II. WEB SERVICE RECOMMENDATION TECHNIQUES

In this section we discuss the web service recommendation techniques that are:

2.1 Content Based Filtering

CBF algorithms are based on the features extracted from the items’content. Content-based algorithms recommend items or products to users, that are most similar to those previously
purchased or consumed. The typical bag of word approach represents items as vectors of features stored into a feature by-item matrix, which is referred to as item-content matrix.

2.2 Collaborative Filtering (CF)

Collaborative filtering recommends new items to a user according to the other users’ experiences over a set of items. The motivation for collaborative filtering comes from the idea that people often get the best recommendations from someone with similar tastes to themselves. Collaborative filtering is a technique used by the recommender systems to make predictions and recommend potential favorite items to a user by finding similar users to that user. But CF also has some limitations like Data Sparsity, Gray Sheep, and Shilling Attacks.

2.3 Demographic based recommendation

This type of system categorizes users or items based on their personal attributes and make recommendation based on demographic categorizations. In other words we can say that in this filtering is performed on the basis of demographic information. And users are classified by their features, and recommendation is given to the class of demographic information.

2.4 Hybrid Filtering

Some authors combine the previous approaches to overcome the limitations of individual and to increase the accuracy of recommendation system.

III. LITERATURE SURVEY

Liwei Liu proposed a semantic content-based recommendation approach that is used to provide effective recommendations in conditions of scarce user feedback by analyzing the context of intended service [1].

Z. Erkin proposed a new cryptographic technique which is simple and efficient, and that generate private recommendations, which does not rely on third parties, and also not requires interaction with peer users [2].

Yan hu proposed an improved time-aware collaborative filtering approach that considers time information into both similarity measurement and QoS prediction [3].

Jianxun Liu proposed method that leverages both locations of users and Web services when selecting similar type of neighbors for the target service or user. The method also considered the personalized influence of them for an enhanced similarity measurement for users and Web services [4].

Billy Yapriady proposed a new system that can be used to improve the performance of music recommenders by using users demographics (age, gender, nationality) and the Pearson correlation coefficient [6].

A ranking oriented hybrid approach that combined the item based collaborative filtering and latent factor model is proposed by Mingming chen [7].

The significant impact of age and gender attributes are analyzed by Joeran Beel [8].
<table>
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<tr>
<th>S.No</th>
<th>Paper Title</th>
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<td>1</td>
<td>Semantic Content Based Recommendation of Software Services using Context</td>
<td>2013, ACM transaction</td>
<td>• Recommendation is based on the semantic description of services and contextual information.</td>
<td>Content Based Recommendation</td>
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<td>2</td>
<td>Privacy Preserving Content Based Recommendation System</td>
<td>2012, ACM</td>
<td>• Encryption is used to maintain customer rating privacy.</td>
<td>Content Based Recommendation</td>
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| 3    | Time Aware and Data Sparsity Tolerant Web Service Recommendation Based on Improved Collaborative Filtering | 2015, IEEE Transaction on Service Computing | • Time information is used to calculate similarity.  
• To solve the data sparsity problem personalized random walk algorithm is designed. | Collaborative Filtering Based Recommendation |
| 4    | Location Aware and Personalized CF for Web Service Recommendation           | 2014, IEEE Transaction on Service Computing | • Location of service and user is also considered for similarity measure.                                                                                                                                | Collaborative Filtering Based Recommendation |
| 5    | Combining Demographic Data with Collaborative Filtering for Authentic Music Recommendation | 2005, Springer-Verlag | • Age, gender and Nationality are considered as demographic attributes and used to improve the performance of recommender.                                                                              | Demographic Data with Collaborative Filtering-based Recommendation |
| 6    | A Hybrid Approach to Web Service Recommendation Based on QoS Aware Rating and Ranking | 2015, ACM            | • Correlation coefficient is used as similarity measure  
• Ranking is used instead of QoS rating.                                                                                                                                                                  | Hybrid Approach                             |
| 7    | The Impact of Demographic and other User Characteristics on evaluating Recommendation systems | 2013, Springer-Verlag | • Impact of Age and Gender for recommendation is considered.                                                                                                                                             | Demographic based Recommendation            |
IV. PROPOSED WORK

Presently we depict our proposed web service recommender system. In this two sorts of databases are kept up. We have developed four types of services to give the real world environment.

These services are:-

**File upload/download**
We can upload the file to specific location and also can download.

**Image processing**
We can process the image which we want to. We can use black and white functionality or gray scale the image online.

**Login (authentication)**
We can authenticate our login credentials using digital signature by using this service.

**Database connectivity**
By using this we can access our mysql console online.

Client can utilize these services furthermore can remark about their experience or which he/she felt about that service. Furthermore can rate about that service. Remarks which are given by clients are kept up in database and by using this we perform text mining. One more database is utilized to keep up the history log of clients. At the point when client comes first time, he/she need to register first. What's more, some attributes like age, salary, occupation of clients are put away in database as history log.

**Recommendation system:** It has essentially two modules as Data mining and Text mining.

In this text mining is performed on remarks and classify the remarks as-positive, negative or impartial. For text mining we give remarks as input and parsing is performed on remarks and after that statement is changed over into tokens. After this procedure, similarity is measured by utilizing bilinear similarity technique and this score is utilized for recommendation system.

On history log( which is put away in second database )data mining is used to discover the clients interest. Clustering strategy is used to group the comparable clients with the goal that we can recommended by. For grouping improved k-means is utilized in which dependency of number of input as cluster is removed. By combining the two methodologies, data mining and text mining top services are prescribed to client.
V. CONCLUSION

Many authors proposed different approaches or different methods for recommendation by considering different attributes. The main goal of web service recommendation is to save the searching time of user by predicting the user interest and suggesting the services to end user according to their requirement. We have proposed a new system that combines users demographic information with collaborative filtering. Comments of users given for the services are also considered to improve the user satisfaction.

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REFERENCES


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