OPEN ACCESS INTERNATIONAL JOURNAL OF SCIENCE & ENGINEERING

RECOMMENDER SYSTEM FOR WEB SERVICES EMPLOYING QoS VALUES AND PHYSICAL LOCATION

Prof .V S Karvande[1], Dinesh D Jagtap[2]

Asst. Professor[1], PG Student[2] Everest College of Engineering and Technology, Aurangabad, Maharashtra, India.

dinesh.jagtapd@gmail.com[1]

Abstract: **Recommendation of Web service is the popular area of research in the field of IT. Collaborative filtering (CF) is one of the popular methods of web service recommendation which is based on a quality of service (QOS) parameters of the service. Web services are nothing but software components which are designed to perform machine to machine communication over the network. The QOS of web service is essential factor which is taken into consideration while selecting the appropriate web service. QoS factors of the web service are nothing but the response time, throughput time and availability of selected web service. Previously a number of studies or methods were conducted for choosing web services and making their recommendation by performing collaborative filtering; here we are going to examine these methods with their advantages and limitations. And also based on this study we are proposing a new technique for web service recommendation which is based on past experience of user regarding QOS of web service and location of selected user.**

Keywords: *Web Service, Service Computing, Collaborative filtering, QoS values, Web service recommendation; QoS prediction; collaborative filtering; privacy preservation*

----------∴∴∴----------

I INTRODUCTION

Web services are nothing but a service offered by one electronic machine to another electronic machine which are communicating through each other via world wide web(WWW).Web is a piece of software which support interoperable interaction between two machines over a network. Due to the increasing demand and acceptance of web services in big organization, the robust and powerful technique is required for recommendation and selection of optimum web service amongst the number of available web services on WWW. For constructing service- oriented applications web services have been widely used by both individual developers and large organizations. While considering the QoS related data of web services, some features of web services are depend upon user and contains similar values for different users (e. g accessibility, cost, reputation etc.)The values of the user independency of QoS properties are normally offered by service providers or third-party registers (for example, UDDI). In another case some QoS features for users are reliant and have dissimilar values for different users (for example, Invocation failure rate, response time, etc.). Web service evaluation at client-side requires real web service calls and it faces the below mentioned drawbacks:

1. First, invocation of real web service enforces costs for service users and it uses the resources of service provider. Some web service calls can also be charged.
2. It can be possible that on many web services which are observed by candidate are marked as suitable web services in the assessment list but it may be possible that it cannot detected and observed by the service user.
3. Finally, all the users are not expert in web service evaluation.

However, without complete evaluation of QoS properties at client-side, correct values of the user relevant QoS properties cannot be obtained. Hence selection of optimal web service and its exact recommendation is not easy to obtain.

II LITERATURE SURVEY

Large organization and individual user requires a particular system which can understand the interests of user and recommend them the best utilizable services. In this case,

Recommender systems can assist users with the most appropriate items as per their requirement; have been considered as one of the best technique

2.1 Collaborative Filtering Methods

Collaborative filtering is nothing but an identification of similar users, related web services and recommend them. Collaborative filtering is generally employed in commercial recommender systems like as Amazon.com and Netflix.

Collaborative Filtering algorithm uses two processes:

Prediction process[3][4] where a numerical value expressing the predicted probability of web services that cannot be upheld certain users. This predicted value is in the same scale as opinion by the same user supplied values.

Recommendation process [3] where a list of N items that the active users like the most is recommended. This interface of collaborative filtering algorithm Top N recommendation [13] is called Collaborative filtering process and is as shown in the following figure 1.

There are two types of collaborative filtering algorithms:

1.Model Based Collaborative Filtering

2.Memory Based Collaborative Filtering

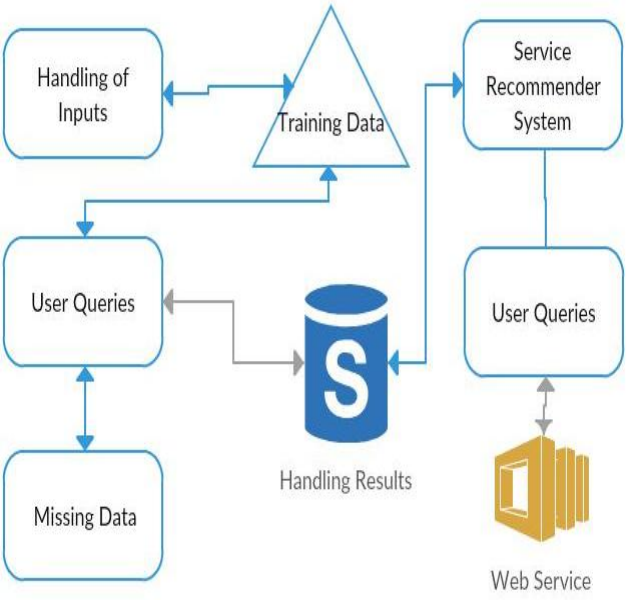

Figure 1. Web service recommendation process

2.1.1 Model-Based Collaborative Filtering

On the basis of ratings of dataset a models is built in this technique. In other words, we take out some useful information from the dataset, and consider that model to make recommendations [5] without using the whole dataset every time. With the help of this approach ones can potentially offers advantage of both speed and scalability. Typical examples include user-based approaches (e.g., UPCC [8]) that leverage the QoS information of similar users for prediction.

2.1.2 Memory Based Collaborative Filtering

In memory-based algorithms approach the collaborative filtering is perform by considering the complete database. As described by Breese et. al [9],It finds the users those who are similar to active user (i.e. the users we want to make predictions for), and it uses their preferences to forecast ratings for the current user. For making predictions memory-based algorithms uses the data (users, services and QoS data)stored in memory. Top-N recommendation is to recommend a number of N top Web services; this will be to a specific user of interest. Analyze Top N recommendation [10] techniques to correlate the user service matrix dissimilar users or services and use them to calculate the recommendations.

III SYSTEM ARCHITECTURE

The explosion of web services on the internet brings new challenges in service discovery and selection. Particularly, the demand for efficient quality of service evaluation is becoming urgently strong. To address this issue, we define a formal privacy preserving formal location-based prediction framework which allows an efficient global optimization scheme and then exploit different baseline estimate components to improve prediction performance.

With respect to the collaborative QoS prediction, the commonly used methods are neighborhood based collaborative filtering and matrix factorization. The advantages of location based CF are simplicity, justifiability and efficiency. By the same token, users of cloud services certainly hope to get reasonable explanation for the QoS predictions provided by a service recommendation system.

The dataset which contains the user data is passed for collaborative filtering. QoS predictions are made from these aggregations, through which recommendations are generated for the active user. For example, there are four users U1, U2, U3, U4 in our system and U1 is requesting for recommendations.

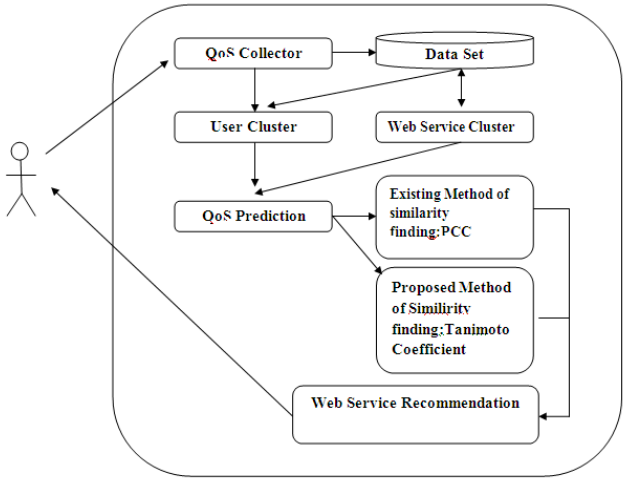

Figure 2: System Architecture

IV FRAMEWORK OF QOS-AWARE WEB SERVICE RECOMMENDATION

In this section, an online service searching scenario to show the research problem of this paper. The basic idea of this approach is that users closely located with each other are more likely to have similar service experience than those who live far away from each other. We employ the idea of user-collaboration in our web service recommender system.

A.Location Information Representation, Acquisition and Processing

This section discusses how to represent, acquire, and process location information of both Web services and service users, which lays a necessary foundation for implementing location- aware Web service recommendation method.

a)Location Representation

We represent a users location as a [IP Address], [Country], [IP No.], [AS], [Latitude], [Longitude]. Typically, a country has many ASs and an AS is within one country only. The Internet is composed of thousands of ASs that inter-connected with each other.

However, users located in the same AS are not always geographically close, and vice versa. Therefore, even if two users are located in the same city, they may seem to be at different ASs. This explains why we have chosen, AS instead of other geographic positions, such as latitude and longitude, to represent a user"s location.

b)Location Information

Acquisition fetch the location information of both Web services and service users can be easily done. Based on the users" IP addresses are already known, to obtain full location in-formation of a user, we only need to identify both the AS and the country in which he is located based on IP address. A number of services and databases are available for this purpose (e.g. the Who is lookup service2). In this work, we accomplished the IP to AS mapping and IP to country mapping using the GeoLite Autonomous System Num

c)Similarity Computation and Similar Neighbor Selection

Here we have defined notations for the convenience of describing our method and algorithms. We implemented a weighted PCC for computing similarity between both users and Web services, which takes personal QoS characteristics into consideration. Finally, author has discussed incorporating locations of both users and Web services into the similar neighbor selection.

d)Similar Neighbor Selection:

This selection is a very important step of CF. In conventional type of user-based CF, the Top-N similar neighbor selection algorithm is used invariably [16]. It selects N users that are most similar to the active user as neighbors. Similarly, the Top-N similar neighbor selection algorithm can be employed to select N Web services that are most similar to the target Web service.

B.User-Based QoS Value Prediction:

Authors presented a user-based location-aware CF method, named as ULACF[16]. Traditional user-based CF[17] methods usually adopted for finding value predictions. This equation, however, may be inaccurate for Web service QoS value prediction. As Web service QoS factors such as response time and throughput, which are objective parameters and their values, vary large. Therefore, predicting QoS values based on the average QoS values perceived by the active user (i.e., r (u)) is flawed. Intuitively, given two users that have the same estimated similarity degree to the target user, the user nearer to the target user should be placed more confidence in QoS prediction than the other.

C.Item-Based QoS Value Prediction:

Author says, an item-based location aware CF method [17][18][19].

V RESULT ANALYSIS

A. Result 1

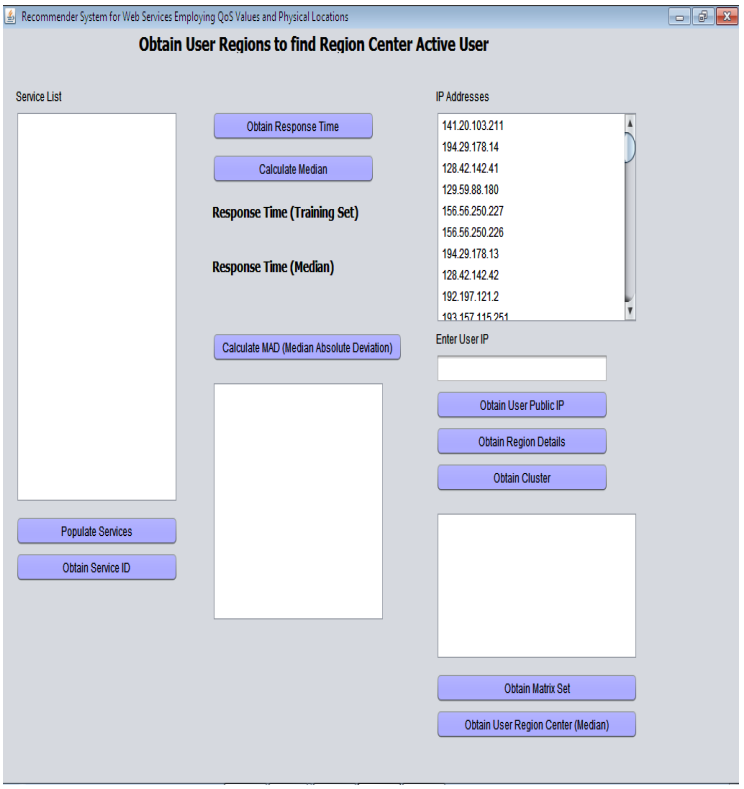

Figure 3: Obtain MAD and User Region Center Form

Figure 1 shows the homepage the implementation which contains the list of all IP addresses specified in the dataset.

Result 2:

Figure 5 shows the form for computing correlation and recommendations for the asked service. Here user has to enter

the service ID of the service for which he/she wants the recommendation.

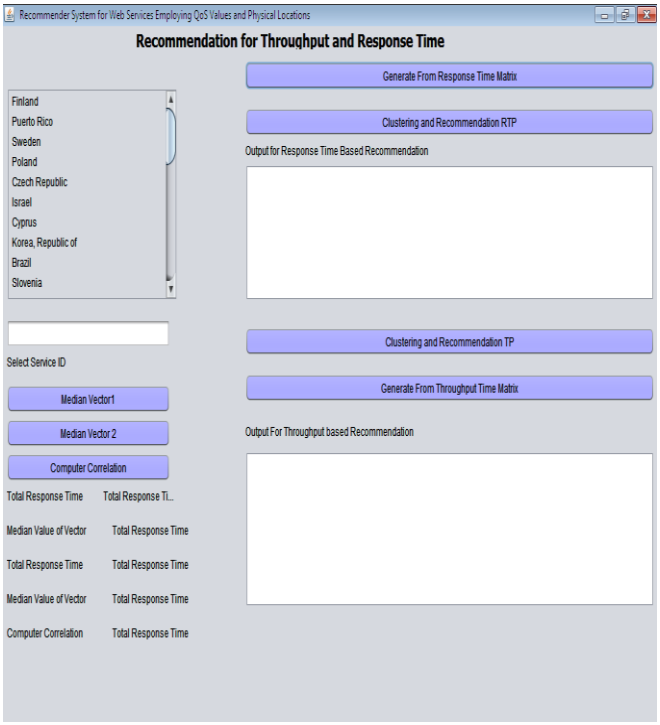

Figure 4: Recommendation Form

B. Performance Analysis

The comparison of prediction time of web service recommendation with previous methods such as IPCC, UPCC, WSRec, LORec and Region-KNN is done in this experiment.

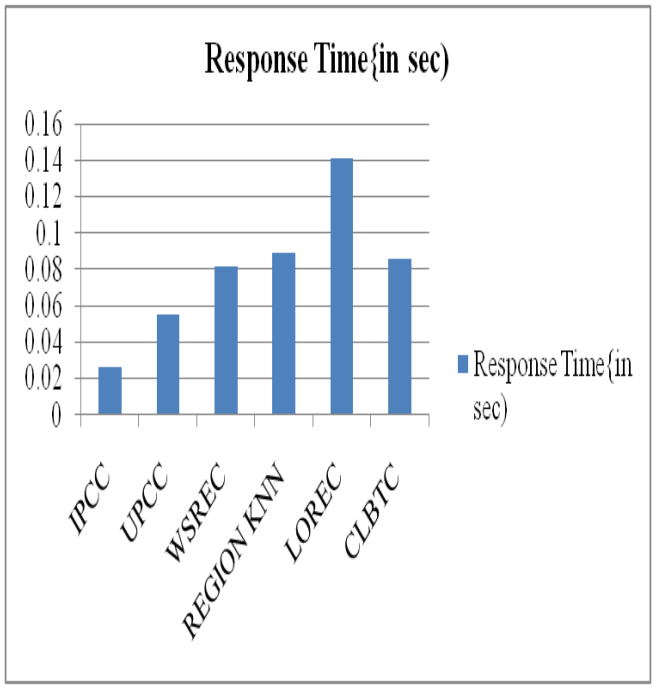

Figure 5: Response Time Comparison of Various Algorithms

The comparison for response time required is shown below in Figure 3 in graphical format. As shown in above figure, the response time of proposed system is compared with different algorithms like IPCC(which employed only item based similarity computation), UPCC(which involved only user based comparisons) and other methods like WSRec, Region-KNN, LoREC.

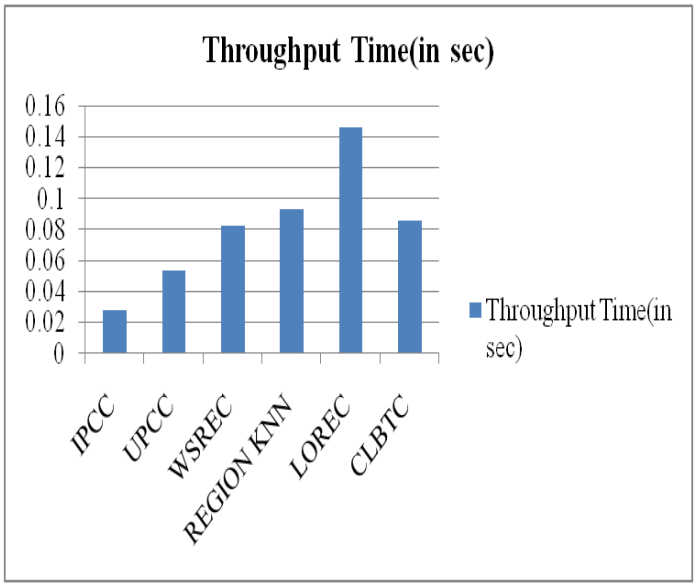

Figure 6: Throughput Time Comparisons of Various Algorithms

As shown in figure 7, we have compared different methods for prediction time of throughput with our proposed techniques. It takes about 0.0855 sec to fetch the most similar items based upon the throughput from the file which contains the computed similarity coefficients of all pairs of services.

VI CONCLUSION

The association of the various QoS properties is important for the achievement of web service recommendation. Due to the increasing demand of Web services and the latency of dynamic service selection and integration, some service providers now provide parallel services. QoS is one of the modified factor to differentiate functionally similar Web services. The basic idea behind this work is to predict web service QoS values and recommend the best web service to active user best on past QoS records of web service. In this work we combine prediction results generated from user region and service region which gives better results than existing techniques. We also noticed that combination result is much better than the result from either one method of prediction from user region or the one generated from service region. Our future work includes the correlation between different QoS properties and detecting the users those who are contain inaccurate QoS information.

REFERENCES

[1] Jianxun Liu, Mingdong Tang, Member, IEEE, Zibin Zheng, Member, IEEE, Xiaoqing (Frank) Liu, Member, IEEE, Saixia Lyu, "*Location-Aware and Personalized*

Collaborative Filtering for Web Service Recommendation", IEEE Transactions on services computing, manuscript Val X , No XX, 2015.

[2]W. Zhang, H. Sun, X. Liu, and X. Guo, "*Temporal QoS-aware web service recommendation via non-negative tensor factorization*," in Proc. of the 23rd International World Wide Web Conference (WWW), 2014, pp. 585–596.

[3] X. Chen, Z. Zheng, Q. Yu, and M. R. Lyu, "*Web service recommendation via exploiting location and QoS information*," IEEE Trans. Parallel Distrib. Syst., vol. 25, no. 7, pp. 1913–1924, 2014.

[4] X. Chen, Z. Zheng, X. Liu, Z. Huang, and H. Sun,,,,,*Personalized QoS-Aware Web Service Recommendation and Visualization*,"" IEEE Trans. Serv. Comput., vol. 6, no. 1, pp. 35-47R1st Quart., 2013.

[5] R. Salakhutdinov and A. Mnih, "*Probabilistic matrix Factorization*," in Proc. of the 21st Annual Conference onNeural Information Processing Systems (NIPS), 2007.

[6] M. Tang, Y. Jiang, J. Liu, X. F. Liu: *Location-Aware Collaborative Filtering for QoS-Based Service Recommendation*. in Proc. 10th International Conference on Web Services, Hawaii, USA, June 2012, pp.202-209

[7] S. Wang, Q. Sun, and F. Yang, ,,,,*Towards Web Service Selection Based on QoS Estimation*,"" Int"l J. Web Grid Serv., vol. 6, no. 4, pp. 424-443, Nov. 2012.

[8] G. Kang, J. Liu, M. Tang, X. F. Liu, K. K. Fletcher. "*Web Service Selection for Resolving Conflicting Service Requests*". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 387-394, 2011.

[9] Breese, J. S., Heckerman, D., Kadie, C. (1998). *Empirical analysis of predictive algorithms for collaborative filtering*,Proceedings of the 14 th Conference on Uncertainty in Artificial Intelligence (UAI 1998), Madison, Wisconsin, USA, July 24-26, 1998, 43-52.

[10]Y. Zhang, Z. Zheng, M. R. Lyu, "*WSExpress: a QoS-aware search engine for Web services*", in Proc. 8th IEEE International Conference on Web Services, Miami, FL, USA, July, 2010, pp.83-90.

[11]M. Alrifai, and T. Risse, "*Combining Global Optimization with Local Selection for Efficient QoS-aware Service Composition*," in Proc. of the International WorldWide Web Conference, Apr. 2009, pp. 881- 890.

[12] X. Su and T. M. Khoshgoftaar, "*A survey of collaborative filtering techniques*," Adv. Artificial Intelligence, vol. 2009, 2009.

[13] Z. Zheng, H. Ma, M.R. Lyu, and I. King. "*WSRec: A Collaborative Filtering Based Web Service Recommendation System*," in Proc. 7th International Conference on Web Services, Los Angeles, CA, USA, pp. 437- 444, 2009.

[14] X. Chen, Z. Zheng, X. Liu, Z. Huang, and H. Sun,,,,,*Personalized QoS-Aware Web Service Recommendation and Visualization*,"" IEEE Trans. Serv. Comput., vol. 6, no. 1, pp. 35-47R1st Quart., 2013.

[15] Shao. L., Zhang, J., Wei, Y., Zhao, J., Xie, B., Mei, H. (2007). *Personalized QoS prediction for web services via collaborative filtering*, Proceedings of the 14th IEEE International Conference on Web Services (ICWS 2007), Salt Lake City, Utah, USA, July 9-13, 2007, 439-446.

[16] T. Yu, Y. Zhang, and K.-J. Lin, "*Efficient algorithms for web services selection with end-to-end QoS constraints*," ACM Transactions on Web, 1(1):6, 2007.

[17] G. Xue, C. Lin, Q. Yang, W. Xi, H. Zeng, Y. Yu, and Z. Chen,,,,,*Scalable Collaborative Filtering Using Cluster-Based Smoothing*,""in Proc. 28th Int"l ACM SIGIR Conf. Res. Dev. Inf. Retrieval,2005, pp. 114-121.

[18]K. Karta, ,,,,*An Investigation on Personalized Collaborative Filtering for Web Service Selection*,"" Honours Programme Thesis, Univ. Western Australia, Brisbane, Old., Australia, 2005.

[19] Z. Zheng, H. Ma, M. R. Lyu, and I. King "*QoS-Aware Web Service Recommendation by Collaborative Filtering*", IEEE Trans. on Services Computing, 2011, vol.4, no.2,pp.140-152.