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# Hybrid Approach for Web Services Protocol for a Recommendation

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# **ABSTRACT:**

There are many ways to make Web Service Recommendations; one widely employed is Collaborative Filtering (CF). This mechanism predicts the missing Quality of Service (QoS) values of web services. There are many methods that are proposed for prediction purposes which are based of CF in the recent years, still there is scope for a lot of improvement. In the present prediction methods, personalized influence of users and services is rarely considered when calculating the similarity between them. Also, certain factors like throughput and response time depend on the locations where both the users and services exist, this is also rarely considered.

In this paper, we propose a location aware personalized CF method for Web service recommendation. This method takes into consideration locations of both users and web services in selecting similar neighbors' for the target user or service. The method will be further enhanced by considering personalized influence of both users and web service while calculating the similarity between them. Experiments on a real world data set conducted by us for evaluation resulted in showing that our method significantly improves the accuracy of prediction and computational efficiency when compared to the previous methods which are CF based.

### **General Terms:**

Recommendation system, IP Address, QoS, Location Aware, Web Services, Lorec.

### **Keywords:**

Collaborative filtering, Service Prediction,

### **INTRODUCTION:**

The present system is a hybrid approach, it uses a few filtering techniques to improve the web service recommendations. Based on the research we did for building this paper and my own personal experiences during the implementation of this system, we have come to realize that both content based recommender system and Collaborative Filtering systems have limitations of their own. Hybrid CF techniques combine both content and filtering and thereby hope to avoid limitations of either approach and improve recommendation performance. The rest of this paper will explain in detail of the system observed and how improvements were made to it. The results of the improvements are also given by explaining the value of enhancements.

# **RELATED WORK:**

Recent research has shown that a hybrid approach is more effective than pure content based or collaboration approaches. Implementation based of hvbrid approaches can be done in several ways, by making content based and collaborative based predictions separately and then combining them to produce recommendations, by adding collaborative based capabilities to a content based system or by building a model that unifies both methods. There are other pure approaches like knowledge based recommendations, where products are suggested based on the inferences of user's needs and tastes. Demographic based approach, where recommendations are done based on the demographic profile of the user. An example of a hybrid approach is the movie streaming site Netflix which uses both collaborative and content based predictions to suggest movies to the user.



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Some of the Hybrid approach techniques are weighted, switching, mixed, feature augmentation, feature combination. cascaded and meta-level. These approaches differ in the way they combine and use the purer approaches. There are several hybrid approach systems built and experimented upon by various specialists worldwide some of them are listed below. [3] Presented an approach which uses functional interest, diversity feature and QoS preference for recommending the top k diversified web services. A ranking algorithm was employed here which ranks the web services based on the diversity feature, their functional relevance which includes historical and potential user interest relevance such as QoS utility, thus identifying the top k web services to recommend [3]. [5] Presented a CF algorithm named RegionKNN designed for recommending web services on a large scale. This approach was different from others as it employs characteristics of QoS by building a region model. Web service recommendation will be computed quickly using this memory based CF algorithm [7]. [8, 9] Proposed a method which uses a time aware CF approach. It uses time information for measuring similarity and predicting QoS. It also employs a random walk algorithm which is used to infer indirect user and service similarities.

# **EXISTING SYSTEM:**

QoS is a set of non functional properties such as reliability, response time and throughput. The importance of QoS while designing many applications which are service oriented has drawn the attention of both the industry and researchers over the years. Typically, a user is presented with a set of web service recommendation according to his functional requirements. Then he selects a web service which has the best QoS performance. In reality though, it is not practical nor is it easy to acquire QoS for all Web service candidates, because they depend highly on both user's and web service's circumstances. This means that a OoS of a Web service will be different for different users. Obtaining QoS of all web service by performing real world evaluations on them is time consuming and resource consuming.

It is not practical to get QoS information for a user by invoking all of the service candidates. Also, some of the properties of QoS like reliability and reputation are not easy to be evaluated as they both need observation for a long time and a large number of invocations. We need more logical approaches to acquire such information. Previous Web services recommendation methods have not taken into account the more peculiar characteristics of QoS while making predictions. Response time and Throughput depends highly on the network conditions, these however were ignored in the previous work.

### **PROPOSED SYSTEM:**

The approach we take to compute QoS similarity between users and services is much more enhanced. By taking into account the personalized deviation of web services OoS and user's OoS experience which are different for different users, we improve the accuracy when comparing similarity between users. Based on the above enhanced similarity measurement, we proposed a location-aware CF-based Web service QoS prediction method for service recommendation. A comprehensive set of experiments have been conducted on a real world data set, the results of which have shown us that the proposed QoS prediction method outperforms the previous methods. We also have taken into account the locations of where both the users and services are present when selecting similar neighbors for both.

### 4.1 User Region Creation:

This is the first phase of the method and here according to the historical records and the location of the users, they will be clustered into different regions. By using the IP addresses of the user, we find their location approximately. This information includes the user's ISP, domain name, city, country, latitude and longitude. Once these clusters are created, the users will be further grouped based on their cities. These small regions will be aggregated into large regions with a bottom up hierarchical clustering method. The two parts of the clustering method are initialization and aggregation.



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In the first part, we take the non sensitive user regions for aggregation and find the similarity between each pair.

### 4.2 Service Region Creation:

There are a large number of services available on the internet. A user would only need a few of them. The web services which have user submitted OoS records would be small, which makes finding similar users difficult, and predicting QoS values from only the user's perspective will not be adequate either. Making clusters of web services will aid LoRec to find similar services. This clustering of web services is done based on their QoS similarity. IP addresses of web services are often hidden as companies may use VPNs. In LoRec, Web services are aggregated with a bottom-up hierarchical clustering algorithm. We use median vector rather than mean vector as the cluster center to minimize the impact of outliers. The similarity between two clusters is defined as the similarity of their centers. At the start each service is considered as a cluster. The pairs of the clusters which are most similar are aggregated by the algorithm until similarities between no to pairs is more than the threshold uw. Each Web service is regarded as a cluster at the outset. The algorithm aggregates the pairs of the most similar clusters until none of the pairs' similarities exceeds threshold µw.

# 4.3 Personalized QoS Prediction:

The third phase of the method. After aggregation of users and services into a number of clusters based on their similarities, we can make predictions of QoS from both user regions and service regions. With the QoS data compressed, making web service prediction by searching neighbors for an active user can be achieved faster than the conventional methods. The three steps are to Predict from user perspective, Predict from service perspective and the generate prediction.

### 4.4 Web Service Recommendation:

Web service recommendation is done by LoRec by using web service QoS prediction in many ways.

When the user searches for services using LoRec, QoS values which are predicted will be shown next to each candidate service. The one with the best predicted value will be highlighted in the results for the user. This will make it easier for the user to choose which service to try. LoRec will select the services which have best predicted QoS and the services which are best performing from the repository and present them to the users so that they can easily find the most satisfactory ones instead of going through each service.



### Fig 1: Flow chart for the proposed system

### **DESIGN AND IMPLEMENTATION:**

The proposed system was designed and implemented using ASP.NET and Visual Studio 2010 IDE for the front end and server side scripting to connect the user interface to the system which provides relevant recommendation services to the different users of the system. The database used is SQL Server Management Studio 2014, which holds the back end data for recommendations to the users. The features of the system are accessible to users through simple interfaces. Figure 1 shows the welcome page that is accessed when the website is logged on to.



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**Figure 1 Login Screen** 

Once the user logs in to the system and inputs the location, a request is sent to the recommendation system. Figure 2 shows the request as received by the Recommendation module.



Figure 2 Request received by Recommendation module



Figure 3 Results displayed after applying clustering on the obtained nearest IPs



Figure 4 displaying the similarity using clustered data

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Figure 5 Recommends services to user

Figure 2 shows the request page of the recommendation module. Figures 3 to 5 shows the experimental results. Figure 3 is the screen that has clustered the results obtained nearer to the user provided location. Figure 4 illustrates the web services with their similarity scores calculated based on the ratings in the throughput matrix by clustered users and services invoked by them. While Figure 5 shows the services that are recommended to the user according to their input and similarity scores.

# **CONCLUSION AND FUTURE WORK:**

It must be believed that applying data mining and text mining to the historical data collected could further enhance the presented system. Data mining could be applied on the user history data which will be collected over a period of time and enhance the QoS system by presenting the most relevant and accurate predictions also by decreasing the data processing time required for filtering. Text mining can be used on comments or statements left by the user historically or by similar users identified for the same service.

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