Hierarchical Approach for Ranking of Semantic Web services

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***Abstract*— Semantic web services are the most revolutionary technology developed for the world wide web .Rapid growth of published web services, raises the problem of discovering the correct web service more and more difficult .Also there exist many web services which provide similar functional characteristics .Therefore a ranking mechanism is needed for locating the desired web service based upon user request. While considering the travel information services, user request may include many functionalities such as ticket reservation, hotel reservation etc. From these user requests, selecting the appropriate web service which satisfy all the user criteria is a crucial task .Many existing ranking approaches are available on web, but the exact matching between the user request and web services is not available. Therefore an approach for ranking and selecting web services based on user request is used here .For this purpose, a hierarchical based approach for ranking of semantic web services is implemented. Ranking of semantic web service is also done based upon the quality of service (Qos) of each web service. Thus a best quality web service is found as a result of user search criteria.**

***Index Terms*— Semantic web service, Quality of service, Ontology, Service selection.**

I. INTRODUCTION (HEADING 1)

Semantic web service is web service in which its functionality is described by using logic based semantic annotations over a well-defined ontology .They facilitate the dynamic discovery of services on the basis of user request .Ontologies are the important component of the Semantic web technology .They will bring structure to the meaningful contents of web pages .Semantic web services will be helpful to those companies that want to compare prices or use alternate services within each transaction. These companies have to describe their service by the concepts defined in ontology.

There are numerous web services on web. And also there exist a large collection of web services, which are offering same category of functionalities. Hence to select an appropriate web service which satisfies clients request from its web service database is a difficult task. That is clients will have a confusion that which one is the best web service .To avoid this problem ranking methods are employed .There are a lot of ranking methods for the ranking purposes.

Nowadays clients are also concerned with the Quality of service guaranteed by various web services .Quality of service parameters is used to characterize the behavior of each web service .Hence Quality of service is an important factor for the competence of web services in same domain.

Consider a scenario, where user request is a

- Cheapest airline ticket from Cochin to Delhi
- Room reservation in a 3 star hotel
- Ordering of food items

Here web service processes the request .It searches for web services which are offering these three requests .Matching between user requests and advertised web services is done .Thus a list of web services offering user request is retrieved .In this system, two ranking methods are considered .First one is Qos Ranking. In this method, Qos of each web service is collected and stored in database .Then based upon the highest Qos among the web services, they are ranked .Fig 1 shows how a cheapest airline ticket is searched among different web services .Similarly other requests are processed. Hence best web service is given to the user, based upon Quality of service.

The second ranking method is hierarchical approach. Here to provide the best outcome service to the user, depending web services are also considered for ranking. In this method, additional web services are considered for ranking. Thus ranking approach occurs not only on the basis of Quality of service but also on the basis of hierarchical approach.

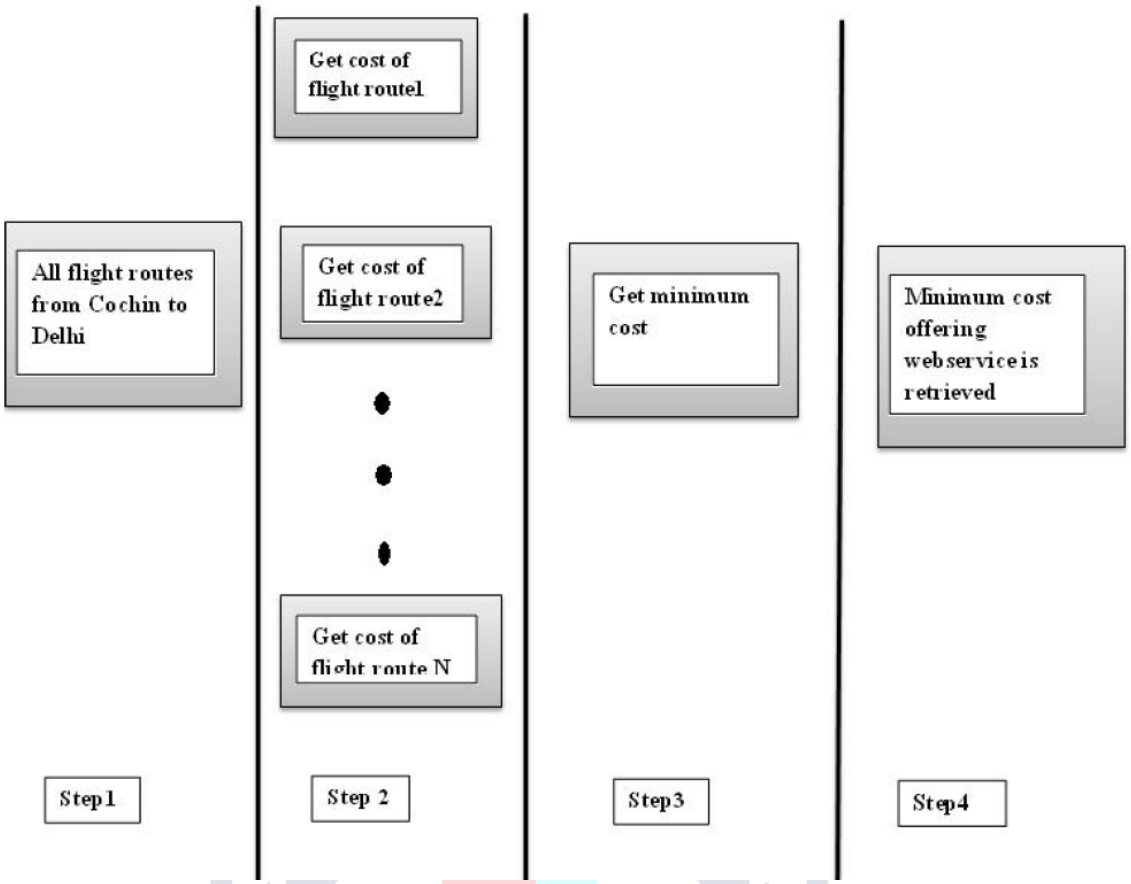


Fig 1 Semantic Web Service Working

Initially various web services are collected from different domain. In the above scenario, multiple requests from the user are processed. Each request satisfies a set of web services. Based upon the Quality of service provided by user, these web services are considered for ranking .Also the system verifies whether these web service uses any other web services. Then that additional web service is also considering for ranking .Thus ranking algorithm is implemented based upon these two criteria Quality of service and hierarchical approach.

II. System Architecture

In this system, the input will be a user request or an admin request. After receiving user request, it is processed using a broker architecture and finally ranked list of web services are displayed as output. Broker architecture consist of different components.. Control unit is handling all other units.

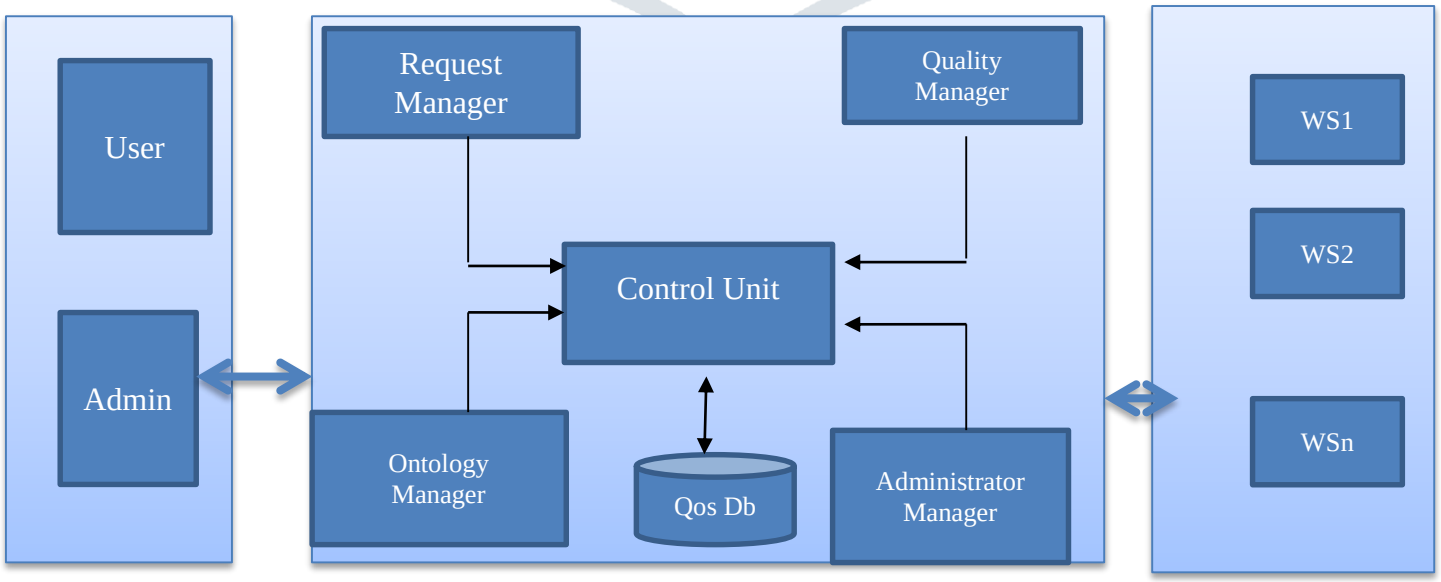


Fig 2 System Architecture

When a user request comes to control unit, it is passed to Request manager. After processing request, it check whether it is a look up request, then web service discovery based on user requirement occurs. A list of web services along with their quality of service is send to ontology manager by Quality manager. Quality manager matches and ranks the web services based upon user functionality.

The admin part of the system, handles mainly four task

- Web service registration
- Ontology management.
- Quality of service of each web service.
- Administration management

A. Web service registration

In Web service registration phase, admin handles the registration of new web services into the database. This part also handles the selection of a specific web service from the database.

B. Ontology Management

This phase handles the ontology concepts of each web service. The web service file which was selected in the previous phase that files corresponding ontology file is displayed here. For each ontology file, its concepts, relationships, properties and keyword count is evaluated

C. Qos management

Each web service file contains Quality of service value. This phase will extract Qos of each web service and store in the database for further evaluation.

D *Administration manager*

Displays the web services which was rated. It will show the web services which have get the feedback from user.

When user enters into the system, user specifies his requests and based upon the request, several web services are displayed. Mainly 3 requirements are defined, user can specify ticket booking, hotel booking and food category, after specifying this, web services are retrieved based on searching criteria .There are several ranking schemes employed which help user to discover its web service easily.

E. Qos ranking

For qos ranking user specify his Qos needs. Then control unit will send list of web services retrieved during previous process to qos database. Matching between users's specified qos and qos in database occurs. Then matching qos values with web services are returned. Then finally Quality manager ranks the web services based upon high Quality. In quality of web service, ranking and matching of web services according to user preference is the main task. For this task ,list of web services along with their Qos that satisfy user priorities are entered into a matrix, such that column specify candidate web services and row indicate their quality features. This matrix is called request matrix R. Matrix R is divided into two based on maximum and minimum Quality feature. Maximum Quality feature is represented by R+ and minimum by R-.This matrix is normalized by Min Max Method. After normalization a weight is applied to the matrix using formula $D= \sum Pi*Wi$ where i is from 0 to n, where Wi is weight Pi is Quality Feature. For matching rate of web services ,similarity is evaluated. Similarity is evaluated between candidate web service Qos features and user request. The value resulted from previous step are decreased by subtracted operator. The bigger value reveals more similarity .Rate of similarity is represented by Dsim value .Dsim value is the main factor for decision making.

F.Hierarchical ranking

In Hierarchical ranking, initially it checks whether the retrieved web services from qos depends on another web services. If it is depending, then that web services will also be considered for ranking. Hence in this approach, for example if web service1 depends on web service 2 and web service3 and then sometimes web service 2 may depend on webservice4 and so on. Hence the system checks the dependency iteratively until no web services are dependable. In this approach ontologies plays an important role.

Here the semantic similarity between each concepts in web services is evaluated. Measure of dependency between each concept is evaluated. Hence concept similarity is calculated.. Hence concept similarity is calculated. Dependency between each concept is done iteratively until depending concepts are not found. The basic idea here is to learn the ranking function hierarchically. Each level of hierarchy learns to rank the score obtained by its immediate lower level layer .This process continues until no dependency between concepts occur. Here also a normalized similarity value is obtained by evaluating similarity between concepts. Highest similarity value web service is displayed first.

G. User feedback

There is also a section for representing each user's ratings. Users can enter their own view about the web service. They can also specify quality of service factors which want improvement. They can enter good as well as bad rating. This phase is mainly to specify whether the customer is satisfied or not.

D. View user feedback

This system also provides a phase to view previous user feedbacks. Hence requestors can get a brief review about a web service each web service performance, its ratings etc. Hence requesters can specify their qos values after getting a clear picture about each web service.

E. User ranking

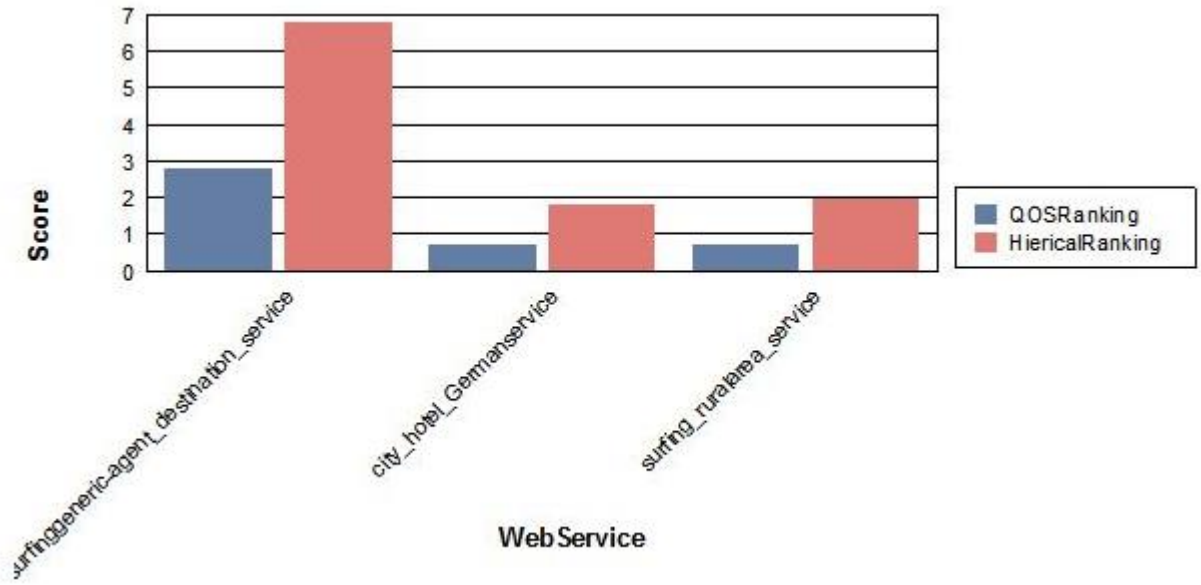
Another ranking method is available in this system called user ranking. In this approach, ratings given to the web service by the users are ranked. Ratings can be given to different parameters of a web service such as performance, availability etc. Therefore ranking here is performed on the basis of different parameters. Parameters with highest rating will be displayed first. Hence the system provides a ranked list of web services with high ratings.

III. SIMULATION AND RESULT

A. Performance table

	Webservice	QOSRanking	HiericalRanking
▶	surfinggeneri...	2.789403	6.789403
	city_hotel_Ge...	0.7456666	1.791667
	surfing_rurala...	0.7015979	1.96
*			

B. Performance graph



Performance table shows the retrieved web services after qos ranking .Similarity score of Qos ranking and hierarchical ranking is shown in table. From the figure ,it is shown that hierarchical ranking has more similarity score than qos ranking. And hence it produces more accurate result compared to qos ranking.

IV. CONCLUSION

Due to the increasing popularity of web services, many service providers are now providing similar services. To select an optimal web service among them is a crucial task. An efficient ranking mechanism is needed to select a web service. Here two ranking algorithms have implemented Hierarchical ranking and Qos ranking. In hierarchical approach, similarity between each web service is evaluated. In Qos Ranking, Qos is the main factor for ranking. A comparison between Qos algorithm and Hierarchical algorithm is also done here. The result show that the system produces a high accuracy in ranking .This ranking algorithm improves the decision making about selection of a particular semantic web services among a collection of web service which offer same functionality. Similarity value between each web service is high in hierarchical ranking algorithm.

V. FUTURESCOPE

As a future work, implementation of this ranking algorithm can also be done in other domains. It is also helpful for users to provide an automatic invocation of web service.

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