Social based Web Service Discovery for Multiple Domains and Recommendation

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Abstract

In the Internet a enormous number of web services are available in the recent years. In the present situation many of the web services are existing as an isolated service, and when the user searches for a particular keyword it will show services which are related to that keyword in the existing services. It is difficult for the user is to get the correct and accurate data from the listed web services. It is very challenging for the user to get or find the most effective web service from registering field. So many challenges are faced by the user and research studies are going on, not only the user unable to find best service which suits their requirement, but also the waiting time is more. Also most often the related data will occur with regard to the keywords rather than the accurate data. By considering all these problems in this research work, an effective way to discover the web services is proposed for the user and an objective way to analyze the most effective web service is also proposed.

For this a methodology to link related web services from the existing large number of web services retrieved from repository based on the particular domain. Effective web services can be determined in a easy way and the web services can be to recommend to the other users. The interlinked web services have a search analogy and it will navigate it to the repository. The user can utilize the required service through this way and the work can be completed easily. The recommendation of web service will be done by taking various parameters which includes the various ratings and the reviews in that service by the users. By doing this way the user can get the exact data from the web. And also, it provides a efficient way to recommend to the other users in his/her social network and makes the users to utilize the best web service accordingly. The quality web service can be provided to all the users based on the semantics of the keyword searched the most effective service will be given by the best ratings.
Keywords

Web Service Discovery, Multiple Domains, Service Accordingly.

Introduction

Now-a-days the web service has become more and more popular as the increment in the large number of web services in our day-to-day life. The programming interfaces and the communication between the two or more applications referred as a web service. Interaction between the two application results is normally used in many applications. There are many types of web services used in the software field. Examples of web services includes JAVA web service, VB web service etc., the web services include three major aspects, namely, service requestor, service provider and service registry. The service requestor generally requests the services. They are called as user requestor. The user will request the services based on their needs and wish. They will request the services by using keyword. The keywords play a major role in order to find the effective web services. The Service provider will provide all the services to the users. The service provider will provide the request services to the service registry, which is nothing but the store house. After getting all the services from the service provider, the requested /needed services are sent by the service registry to the service requestor. All communication process will occur with the help of SOAP message. The SOAP message is used to link between the service requestor and service provider, service provider and service registry, service requestor and service registry. The service registry is nothing but the UDDI repository which stores all the information provided by the service provider.

Recommendation of web services help in choosing the best webservice which handles all the user needs. Nowadays Quality of service for web has progressed toward becoming a key element. QoS is the good parameter in order to evaluate the comparison between the web services. There are diverse parameters for Quality of service, for example, execution, reaction time, openness, security, limit, accessibility, unwavering quality, exactness, throughput etc., The point of the task is to extraction of the information that too basic subject group (CTG) and to rank the outcomes dependent on the client suggestion by applying a few needs to the information lastly the client needs to present the criticisms as rankings, surveys and evaluations. Another way is to define that linking of web services based on user recommendation.
Literature Review

M.C. Jaeger proposed that Web Services are the most effective if the keyword that is searched matches its perfect description of the web service which is given in the service requestor and the various characteristics which are away from the non-functional aspects. For composition, the quality of the web service is the most the important criteria for any Web services. To determine the Quality of a Web service composition, a process is defined such that it aggregates the individual services QoS parameter values. This made us to check whether the Quality requirements are satisfied for the selected set of services for composition.

Based on the composition patterns which are abstract the aggregation is performed by a construction, which will represent the elements of a composition that are structural. The structural element representation can be a sequential one or a loop, or it can be a execution type in parallel. The work is focussed on workflow management environments. It was defined that composition patterns that are derived are the complete compilation of workflow patterns. The result of aggregation schema helps the similar structural elements as created in workflows. The gathering of several Quality measures is discussed[1].

J.S. Breese works on the Collaborative filtering or recommender systems, which uses the collection of user preferences stored in a database to predict the likes of a user depending on the topics or products a user may prefer. By obtaining details it defines many Algorithms to do a specific set of tasks, which also includes variety of methodologies based on correlation coefficients, vector-based similarity calculations, and statistical Bayesian methods. And then it is compared with the accuracy of the predicted results using the different methods within a domain representation. It uses two predominant classes of evaluation metrics. The first one determines the accuracy of an individual’s prediction based on the deviation which is absolutely average. The second one calculates the utility of a ranked list of suggested items. These metrics now give a probability about a user based on the recommendation in an ordered list.[2].

J. Wang defines the Memory-based techniques for collaborative filtering to predict new ratings by averaging (weighted) ratings between them. In general, the availability of an enormous number of ratings from similar users or similar items is very less, because the rating of data is sparsely inherent which narrows down the quality of prediction. In this work it says about the memory-based algorithm called collaborative algorithm which predicts user ratings of an item as ratings which are missed [3].
Y. Zhang discusses with regard to Distributed peer to peer (P2P) applications as they are growing recently. In such applications, all participants are considered as peers and are equal. Both of them function as client and server. A basic problem is, to select the most reliable servers from a list of pool which has candidates which are very vast. In this a framework is designed based Naïve Bayes theory. The system helps the clients to predict the reliability of candidate servers based on usages and feedbacks from peers. The system aims at creating a method which categorizes different types of services with varying quality based on the individual needs. The created system is independent of the applications serves for peer-to-peer applications of different type[4].

Yianwang proposed a new method for service goal clustering in this according to the requested services by the different users the services that belong to the same category or which come under the same term cam be formed as one cluster in which semantic similarity for service goals are measured this method mainly distinguish three types of service goals this will help in getting best results in similarity checking. It also proposed a goal-oriented clustering in which it will collect the textual description form the user and proceed for further process. All the services which are aiming for the same result can be separated as one cluster. This proposed method will not consider the recommended services without the user involvement because it will lead to inappropriate results. Finally, another method is proposed named as hybrid service discovery this helps in finding the proper web services according to the user requests and the terms he chooses [5].

J. Zhu says service-oriented architecture can be used for distributed systems, it helps in service composition and distribution. It is challenging to design personalized Web services which are qualitative and accurate due to the uncertainty of the internet sources and the less amount of quality data is present. This paper, a novel landmark-based QoS prediction framework is designed. And two clustering-based prediction algorithms for Web services, are presented, namely UBC and WSBC. It aims to do the accuracy of Quality-of-service prediction through clustering techniques. Hierarchical clustering is applied on the real time data set. Web service dataset based on QoS is collected, which contains the response-time values of two hundred distributed service users and various other vast Web services. The result comparison shows that the clustering-based approaches perform better than the collaborative filtering [6].
J.E. Haddad describes that the Web Services are the most widely known implementation for service-oriented architectures that has given some challenging research issues. Featuring composition as one of them i.e., the ability to repeat and build a composite Web service as a workflow of other present Web services, which are done by different organizations and offer various functionalities, transactional properties and Quality of Service values. The choosing of a Web service, for every activity of the workflow, will meet the user's requirements, is still a definite challenge. The choosing of one Web service among a set of them that fulfil some functionalities is a difficult task, generally depending on both evaluation of Quality of Service. However, the conventional Quality-aware composition approaches do not bother the transactional constraints during the composition process. In this the problem of choosing and composing Web services not only according to their functional requirements but also to their transactional properties and Quality characteristics. We define a selection algorithm that satisfies user's preferences, expressed as weights over Quality criteria and as risk levels defining semantically the transactional requirements [7].

**Proposed System Design**

In the existing system, owing to the large amount of web services it is hard to find the web service which will be of more efficient and accuracy. When the user searches, related web services are more than the accurate so it is hard to find the user which one to choose and use so it arises a lot of confusion for the user. And he will be unable to decide which will be the best webservice in order to complete hid needs and satisfied, not only it is difficult for him but also, he cannot able to get the accurate search. And also, he cannot decide which will be the efficient service for him also the existing system uses content-based filtering which makes the service will be available in single way. Due to the large amount of data, it’s unable to use the accurate webservice. In order to overcome the above issues, our project illustrates to create a common repository for the web services of particular domain, which makes the user when he search the particular data it will take him into that particular repository and the web service will be recommended to him which works more efficiently based on the various ratings and reviews given by the users which brings the accurate data and deals to use most effective web service and removes all the confusion for the user by making the search more accurate.
The Figure 1 is the architecture flow follows the proposed model. The requestor will ask the services to the provider. All the services will be provided by keywords. This will be done through the search in the tool through ontological wizard. Once the searching is made, in the next step all the service keywords are move one by one in order to make the searching process in a well-formed manner through the common repository. The figure 1 shows the detailed architecture diagram of web services linking. As shown in the figure the repository will be the common gate way for the user in order to search the user with his key word. This will be done by the user when he registers into the site. Once the registration has been completed the user will be logon to the repository with the user name and the password he was created. All the web services will be linked into the repository through their API’s. The linking will be done through the interfaces as shown in the figure and the user registration will be connected to the backend of the modules through the search button. Once the user search with the key word, the search will make to move on to the repository and will be recommend to the user in the recommendation module with that the most effective web service for his search. This will be done as shown in the figure3. In this way the linking process will be done and through the common repository and user recommendation will be done through it. The figure 4 shows the detailed architecture diagram of web services linking.
By using eclipse tool, the repository has created, as the eclipse is open-source tool here the repository will be created by using the APIs of various web services, these will be done as following steps. Initially, all the APIs will be interlinked through the various access tokens in the web. Next the interlinked APIs will be optimised using the optimization algorithm through which the data is optimized for effective use of the web services. In this way same process will be done for all the webservices to interlink in repository as shown in the figure 2.

![API's Interaction Diagram](image)

Figure 2 API'S Interaction

Once the API’s are interlinked and searching happens, the recommendation of the service is made to the user through collaborative filtering algorithm. Collaborative filtering algorithm mainly used for recommendation. The algorithm will mainly work on the prediction of the items or the web pages.

**Collaborative Filtering**

Collaborative Filtering, do not require any other data except the collection of previous or old dataset which has their preference on a set of web services based on their interest. As it is their historic data, it is concluded that users who accepted certain constraints in the past will also accept the same in the future. Users interest is evaluated based on two categories. Explicit Rating, is to evaluate and assign a value for a item using a rating in the scale of 1 to 5, like 5 stars for Pizza. It is the direct method of obtaining users interest based on the item liked by them most. Implicit rating obtains the interest of the users in an indirect manner, based on the page viewed frequently, hits on a page, history of purchase, interest
on music, interest on advertisements, etc., In the research work, collaborative filtering is considered as it the standard algorithm and device for recommendation system. The recommendation will be done as shown in the figure 3.

Figure 3 Recommendation using Collaborative Filtering

Once the user uses the service, he can be able to give the feedback like ratings, reviews to that particular service which will be useful to recommend that service this will be done through page ranking algorithm. The Page Rank algorithm gives the probability distribution, which helps in representing the interest of a person when they click a random link on a page they will be directed to any other page. Ranking of a page can be derived for a set of documents whose size is very large. There is an assumption, based on the research works done earlier that there is even distribution of the documents collected from the early stage of the computation process. The ranking calculation is done through repeated computations called as iteration, to obtain a ranking value which is approximately nearer to the obtained theoretical true value. The below formula will be used in order to evaluate the page ranks.

\[ PR(u) = \sum_{v \in Bu} \frac{PR(v)}{L(v)} \]

Based on the page rankings, the user will be recommended with that particular web service, in this way the recommendation will be done to the users.

Keyword Searching

**Pseudocode**

Input: The data set in repository, The file matched with the k-attribute (k=keyword)

begin
for each set DaS, such that DaS==1;
{
    for the initial round g, such that DaS in g=1;
    {
        K round k* in DaS to g // k is in DaS
        Output== Ac * tp^ tf; // Ac is accuracy &tp, tp confusion
        Matrix terms.
    }
}
end

By following this pseudo code, the searching process happens.

Social Network Based Nearest Neighbour collaborative filtering algorithm is applied in this work. The web services used by different users and their interest are identified. The system finds out the users who have the same sort of interest in using the web services based on its behaviour. Those users are identified to use similar services. The user’s ratings are obtained and their weighted sums are calculated. QoS attributes are used for the rating, includes location, users accessing, IP Address, ranking. Individuals preferences is given importance in this algorithm, so that the accuracy of the predicted values will be satisfiable.

**Results and Discussion**

The linking takes place through the repository by using their APIs, which results in the effective use of the service with less waiting time, it will reduce the related data to an accurate data so that the user can use it effectively. The recommendation will be happening to the user such that based on his history and interests he will utilize the service effectively instead of thinking which will be best.

For each service the ratings and reviews will be given, it will be useful for the service to recommend to the users which results in providing quality web service to the users. The experimental results will show how the linking takes place and the recommendation will be done to the users in order to provide the user with best results by decreasing the execution time. As the web services were interlinked in a common repository the user can be able to get the result with more accurate. The recommendation will be done through ratings and reviews to the user which will results in providing the good web service to the users.

Below shown in Figure 4 is the result screen where the keyword search algorithm works.
Based on the various QoS dimensional values and recommendations, the web services are linked and are shown in the Figure 5.
Table 5.1 shows the accuracy comparison table of the three algorithms. The overall web service discovery result is efficient and performance is good for the social network based nearest neighbour collaborative filtering algorithm. Accuracy has risen by 7%, Precision has raised by 7% and recall has increased by 9%. By analysing it is inferred that the overall accuracy is in the range 85 to 88%.

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<thead>
<tr>
<th>WSDL Files 500</th>
<th>Web Service (SAWSDL) Searching</th>
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<td>Hungarian</td>
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<td>Keyword Searching</td>
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<td>Social Network based nearest neighbour collaborative filtering</td>
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<td>Accuracy</td>
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<td>Precision</td>
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Figure 6 represents the visualization result of the algorithms Hungarian, Keyword Search and social network based nearest neighbour collaborative filtering.

![Figure 6 Visualization Result of Algorithms](image)

Conclusion

This paper presents the web services linking and recommendation. Artificial intelligence helps in improving and developing the recommendation system effectively. The machine learning methods of artificial intelligence mainly the recommendation system improves the accuracy rate of the prediction. Social Network based Nearest Neighbour Collaborative filtering algorithm uses the techniques of artificial intelligence to build a recommender system for web services. The main advantage of using this approach is the saving of
execution time. The relationship is built between each concept in order to locate the well-formed web services. By using this approach, the time consumed is reduced. This is one of the advantages in linking web services and the user can able to extract the accurate data through the recommended quality web service. The related data issue is cleared through the obtaining quality web service through the ratings, reviews from the user. Finally, we can conclude that the linking web services will bring huge difference in present services related to web as by linking all the services and recommendation through the user’s profile.

References


