ISSN: 2349-9141

Available online at http://www.ijirr.com

International Journal of Information Research and Review
Vol. 2, Issue, 05, pp. 678-681, May, 2015

OPEN ACCESS JOURNAL

Full Length Research Paper

GENETIC ALGORITHM ASSISTED QUALITY-AWARE WEB SERVICE RETRIEVAL AND WEB SERVICE COMPOSITION

***Poonam Yadav**

D.A.V. College of Engineering and Technology, Kanina, India

***Corresponding Author**

Received 10th April 2015; Published 31th May 2015

Abstract

Due to the continuous growth of web application, service computing received much attention among the researchers for invoking the services based on the user requirement. The invoking of service details pose new challenging because of the large availability of web services and the demand of quality-enabled services. For accommodating these two challenges, different works are presented in the literature for web service selection and composition. This paper presents web service composition after selecting different service through service selection criteria in accessing their desired services. The proposed module includes service selection model using genetic algorithm and through cost optimization strategy and web service composition. The service selection aims to select the required services by optimizing the cost model without much concentrating on the technical details. The optimization method using genetic algorithm automatically selects the suitable services and its composed form of results with the best user-desired quality. The service selected by the genetic model is then given for web service composition process to compete with each other to generate the best plan.

Keywords: Web, service computing, optimization, genetic algorithm, web service composition.

To cite this paper: *Poonam Yadav. 2015. Genetic algorithm assisted quality-aware web service retrieval and web service composition. International Journal of Information Research and Review.* ***Vol. 2, Issue, 05, pp. 678-681.***

INTRODUCTION

The major benefit of web service composition is the mastering of complexity. The motivation behind the choice of services is the major concern to be taken into consideration when updating a procedure by altering the service bindings. WSDL, UDDI, and SOAP are the main technologies comprise the framework of web services (Ralph *et al.,* 2007; Kaouthar Boumhamdi and Zahi Jarir, 2010; Paulraj and Swamynathan, 2011). There are diverse lines of attacks to generate a web service composition. These methodologies facilitate various organizational components to inter related to their applications and to distribute data in scattered surroundings by means of a grouping of web services. These tactics consist of BPEL4WS, OWL-S, Petri nets, Model checking/Finite state machines, π-calculus, and Web-components (PonHarshavardhan *et al.,* 2011). There are still challenges in the web service composition field that are to be tackled and examined. For instance, there is a general lack of methodology and tools which facilitate the semi-automatic composition and examination of web services by considering their semantic and behavioral characteristics (Jaya Prakash and Vimal Raja, 2010). These are essentially associated to the question how to help non expert users to accomplish goal oriented service composition. A necessary concern is how accessible semantic services can pool resources and make use of domain knowledge and user inputs to assist in attaining semi-automatic service composition for dynamic adaptation to varying business necessities. This paper presents a web service composition framework offering comprehensive query and optimization facilities over Web services. The proposed framework provides a integrated architecture for web service selection and composition. Initially, Users formulate declarative queries at the query level and the query is given to service registry to select the suitable services desired by the users. Here, service selection should compensate the user requirement along with the quality details.

Accordingly, genetic algorithm is used in this framework which selects the service fulfilling both the objectives. The proposed work considers the different quality parameters such as Response time, Availability, Reliability, Cost, Reputation, Encryption, Authentication, Non-repudiation and Confidentiality. The second phase instantiates the service composition of different service select from the optimization model. The basic organization of the paper is given as follows: Section 2 presents the existing work and section 3 proposes the genetic algorithm-aided optimization strategy for web service selection and composition. Section 4 concludes the paper.

Existing Work

Literature presents several algorithms for web service selection and composition (Qi Yu *et al.,* 2010; Zibin Zheng *et al.,* 2013; Meditskos *et al.,* 2010; Zibin Zheng *et al.,* 2011; HongXia Tong *et al.,* 2011; Mansour and Dillon, 2011; Zibin Zheng *et al.,* 2014; El Hadad *et al.,* 2010). One of the recent works presented in (Qi Yu *et al.,* 2010) proposed an integrated service query framework that facilitates users in accessing their desired services. The method included a service query model and a two-phase optimization strategy. The query model defines service communities that are utilized to organize the large and heterogeneous service space. In the second phase, two-phase optimization strategy automatically generates feasible service execution plans and selects the plan with the best user-desired quality using evolutionary algorithm. In order to improve the service selection plan, genetic algorithm is used here instead of evolutionary algorithm to improve the search capability and also, simultaneously select the best plan. Along with, the additional service call, composition of selected plan is also done in this paper.

MATERIALS AND METHODS

Web services

Web service supplies standard means of interactions between software applications running on a variety of platforms or frameworks. It would rather define as the interface which is described on a machine possible format. The web services are commonly considered as the combined XML provided from the web resources. A web service is usually composed of two parts, an XML part and the WSDL (Web Service Definition Language) part and also there are two main entities which give life to the web service.

***Requester Entity*:** This entity mainly includes the request from the user and the processing of the user request in order to make the web service available for the current instance.

***Provider Entity*:** This entity deals with the processing of the request from the user and providing the web service according to the user request. The functions of these two entities are defined on the web service schema. The basic structure of the web service is shown in figure 1.

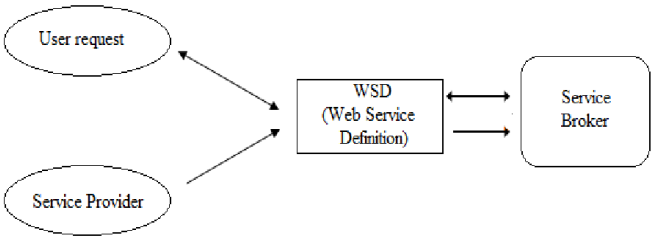

Fig.1. Structure of web service

Here, the WSD is created using the user request and the WSD is given to the service broker, usually used broker is UDDI (Universal Description Discovery and Integration). The service broker give response back to the user by processing the user request according to the directions provided from the service provider.

B. Proposed cost model and genetic algorithm for web service selection

The services published in the service registry are then invoked by the user through the proposed model and genetic algorithm.

Cost model: The aim of the cost model is to aggregate the quality parameters from different operations since a service execution plan consists of multiple operations. Since users may have preferences over how their queries are answered, they may state as element of their profile which and how significant quality parameters are. Here, weights, ranging from 0 to1 are assigned to each quality parameter to reflect the level of importance. The optimization problem is formulated as follows: Given a query, find operations from the Web service space which form a possible service execution plan that maximizes the objective function as per (Qi Yu *et al.,* 2010):

$$F = \sum_{Q \in neg} \left(W_i * \left(\frac{Q_i^{\max} - Q_i}{Q_i^{\max} - Q_i^{\min}} \right) \right) + \sum_{Q \in pos} \left(W_i * \left(\frac{Q_i - Q_i^{\min}}{Q_i^{\max} - Q_i^{\min}} \right) \right) \quad \ldots.(1)$$

Where, neg and pos are the sets of negative and positive quality service respectively.

In negative (resp. positive) parameters, the higher (resp. lower) the value, the worse is the quality. W_i are weights assigned by users to each parameter. Q_i is the value of the ith quality of service of the service execution plan obtained through the aggregation functions. $Q_i^{\max}$ is the maximum value for the i^{th} quality parameter for all potential service execution plans, and $Q_i^{\min}$ is the minimum. The above given definition state that the reason of including $Q_i^{\max}$ and $Q_i^{\min}$ is to normalize various quality attributes, so that they are comparable to each other. Some of quality attributes are Response time, Availability, Reliability, Cost, Reputation, Encryption, Authentication, Non-repudiation and Confidentiality.

Genetic algorithm for optimizing the cost model

Genetic algorithm is applied here to select the web services optimally based on the quality parameters. The first step is the generation of an initial population for evolutionary process. The service selected is known as chromosome (candidate). The set of chromosomes are obtained for every combination of web services. Then, by making use of evolutionary concept, more candidates are generated from an initial population. In order to generate large number of candidate sets, the genetic operators such as cross over and mutation are used.

Selection: From the initial population, pair of chromosomes is selected randomly. To select, two random integers is generated in between the size of population. Then, two chromosomes relevant to the generated number are selected from the initial population.

Crossover: The crossover operator is applied on the selected two candidates, and this produces two individuals newly. Here, we have used the single point cross over.

Mutation: The obtained new set of individuals is then fed to the mutation operator. To have a better exploration of the search space, mutation operator is carried out. Again, we obtain two individuals newly from the single point mutation operator.

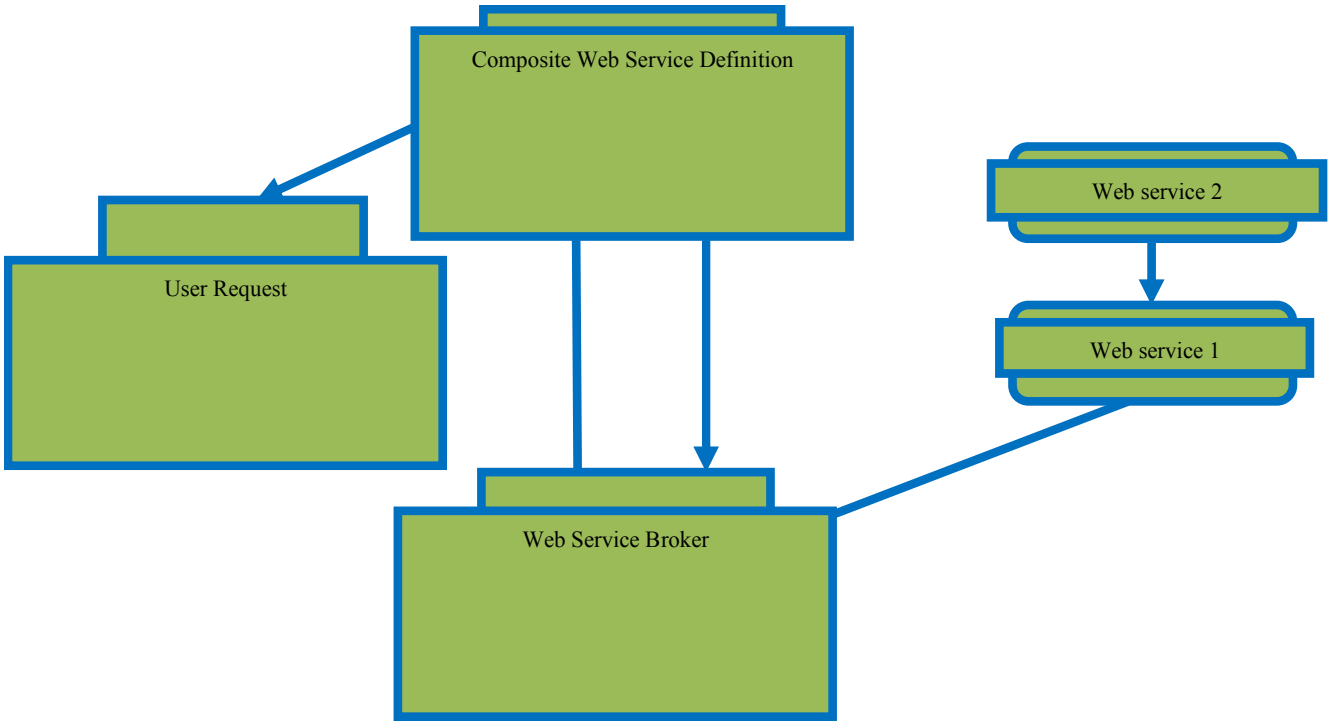

Fig. 2. Web service composition

Termination: After performing cross over and mutation operators, we obtain four individuals newly so that, the population is updated with four new set of individuals. Again, the selection, crossover and mutation operators are performed iteratively. Finally, maximal cost value relevant to the service plan is selected as final output and given for the composition.

Web service composition

As the traffic though the network increases it is become an inevitable need for a web to have two or more web services, thus the idea of web service composition is taken in concern. In some scenarios, we can see that, the functioning of a web service need the invoking of other web services and taking this scenario in concern a service is developed, which is used to combine the services of other web services. Such services are known as composite web services and the process of developing composite web services are known as *web service composition*. The process can be illustrated using the following figure 2. The web service broker configures the web service composition definition according to the web services selected from genetic algorithm.

Conclusion

This paper presents a service composition framework that enables users to easily access services without compromising the quality parameters. The proposed method contains two major steps. In the first step, web services are selected from the service registry by matching the user requirement. The selection of web services should satisfy all the quality parameters considered in the work. The optimal selection of web services uses the genetic algorithm which can select the desired services without worrying about the underlying technical details. Also, genetic algorithm considered the quality services-enabled cost model to select the best execution plans. Once the services are selected form the optimization plan, web service composition is done to compose all the service details in a precise way.

REFERENCES

Jaya Prakash, R. and R. Vimal Raja, “Evaluating Web Service Composition Methods with the help of a Business Application”, *International Journal of Engineering Science and Technology*, Vol. 2, No.7, pp. 2931-2935, 2010.

Ralph, W. Feenstra, Marijn Janssen, and René W. Wagenaar, “Evaluating Web Service Composition Methods: the Need for Including Multi-Actor Elements”, *Electronic Journal of e-Government*, Vol. 5, No. 2, pp. 153-164, 2007.

Kaouthar Boumhamdi and Zahi Jarir, “A Flexible Approach to Compose Web Services in Dynamic Environment”, *International Journal of Digital Society* (IJDS), Vol. 1, no. 2, pp. 157-163, 2010

Paulraj, D. and S. Swamynathan, “Composition of Composite Semantic Web Services Using Abductive Event Calculus”, High Performance Architecture And Grid Computing, Vol. 169, No. 2, pp. 201-213, 2011.

PonHarshavardhan, J. Akilandeswari, and M.Manjari, “Dynamic Web Service Composition Problems and Solution -A Survey”, *MES Journal of Technology and Management*, vol.2, no. 1, pp. 1-5, 2011.

Qi Yu, Manjeet Rege, Athman Bouguettaya, Brahim Medjahed, Mourad Ouzzani, "A two-phase framework for quality-aware Web service selection", SOCA, vol. 4, pp. 63–79, 2010.

Zibin Zheng, Hao Ma, Lyu, M. R., King, I., "Collaborative Web Service QoS Prediction via Neighborhood Integrated Matrix Factorization", IEEE Transactions on Services Computing, vol. 6, no. 3, pp. 289-299, 2013.

Meditskos, Georgios; Bassiliades, N., "Structural and Role-Oriented Web Service Discovery with Taxonomies in OWL-S", *IEEE Transactions on Knowledge and Data Engineering*, vol. 22, no. 2, pp. 278-290, 2010.

Zibin Zheng, Hao Ma, Lyu, M. R., King, I., "QoS-Aware Web Service Recommendation by Collaborative Filtering", *IEEE Transactions on Services Computing*, vol. 4, no. 2, pp. 140-152, 2011.

HongXia Tong , Jian Cao, Shensheng Zhang, Minglu Li, "A Distributed Algorithm for Web Service Composition Based on Service Agent Model", *IEEE Transactions on Parallel and Distributed Systems*, vol. 22, no. 12, pp. 2008-2021, 2011.

Mansour, H. E., Dillon, T. "Dependability and Rollback Recovery for Composite Web Services", *IEEE Transactions on Services Computing*, vol. 4, no. 4, pp. 328-339, 2011.

Zibin Zheng, Yilei Zhang; Lyu, M. R., "Investigating QoS of Real-World Web Services*", IEEE Transactions on Services Computing*, vol. 7, no. 1, pp. 32-39, 2014

El Hadad, J., Manouvrier, M., Rukoz, M. "TQoS: Transactional and QoS-Aware Selection Algorithm for Automatic Web Service Composition", *IEEE Transactions on Services Computing*, vol. 3, no. 1, pp. 73-85, 2010

****