CHAPTER - 8

CONCLUSION AND FUTURE ENHANCEMENTS

8.1 Conclusion

Software is common in all aspects of our lives, such as finding the availability of a product, searching for a doctor, and buying a product. Nowadays, an important part of any software system is designed using software services and realized using Web service technologies. With increasing number of Web services, it is difficult for a user to find the desired services and integrate these services to perform a task. Al-Masri et al. [40] reported that there is more than 130 percentage growth in the number of published Web services. Similar observation can be made by reviewing the statistics from Web service search engines such as Seekda [8]. In particular, Programmable web directory [143] indicates an exponential increase in the number of Web services over the last three years has indexed more than 9000 services that are used in our daily activities, such as dating, shopping, and job searching.

This rapid growth in the number of services increased the importance of the service selection task due to the presence of low quality services. The fundamental challenges of service selection are specifying service requirements, evaluation of the service offerings and aggregating the evaluation results into a comparable unit. Service selection is a very complex and challenging task, especially if it takes a variety of different non-functional properties into account.

The customer's requirements and the service offerings have both functional and complex non-functional aspects, which need to be expressed and for evaluation matched against each other. This research work concentrates on service selection based on non-functional quality of service.

The unbelievable popularity of WS has stimulated the researchers to invent more accurate Web service discovery techniques. A number of recent research works address semantic heterogeneity. However, a greater section of the WS existing over the Web is not annotated by rich semantic languages as WSDL is the standard language to express a service. This requires recommending innovative Web service discovery process using smart searching methods. Hence, this thesis proposes a new approach for finding semantically similar WS for a user request using the support-based semantic kernel built from a reduced-size matrix.
In the state-of-the-art approaches for service selection in order to filter out low quality candidates during the selection process, non-functional aspects are exploited as the key decision making criteria. As a result, QoS is a significant concept since QoS properties describe non-functional aspects of Web services and evaluate their conformance degree. Unfortunately, the QoS metrics of certain services cannot be provided due to the actual situation. Therefore, forecasting QoS values of WS is a crucial task in the field of service engineering. This work proposes an innovative method for forecasting QoS values by fusing Pearson Slope One methods and this work also attempts to reduce the forecasting error by adopting statistical process control based smoothing and weight adjustment methods.

As part of a Web service discovery system, the ranking process allows users to discover their desired services more effectively. As most of the existing ranking approaches ignores the role of the user's requirements which is an important factor in the ranking process, this research work also proposes an improved vector based ranking method by taking the user’s requirements into consideration.

The above mentioned proposed approaches are implemented and the results show a better accuracy compared to the baseline works.

Finally, a new architectural model for service selection system is proposed and implemented and it uses implicit feedbacks and proposes a CF based service selection algorithm using the proposed Web service technique and using support-based kernel and the enhanced vector-based ranking method which considers the user requirements in ranking process. The proposed model overcomes the cold start problem for new users and new services by making recommendations for a new user considering all other users’ interests and for new services by providing a separate list ordered by their publication dates for services which are not invoked. Also the system is flexible by supporting more QoS attributes. Two versions of application are developed using the proposed architectural model such as one using keyword approach for clustering WS and distance vector method for ranking WS and the other using proposed semantic approach for clustering WS and the enhanced vector-based method for WS ranking. The evaluation results show that the application developed using the proposed approaches achieves a better accuracy with regard to Web service recommendations.
Main contributions:

There are four main contributions of this research work:

- Firstly, a new Web service discovery technique constructed on the semantic similarity resulting from the trained support-based kernel is presented. Also a new approach is proposed for the creation of latent semantic kernel with the support based algorithm using an innovative idea of clustering and merging.
- Secondly, an innovative method for forecasting QoS values by combining Pearson and Slope One methods is proposed and also this work attempts to reduce the forecasting error by the adopting statistical process control based smoothing and weight adjustment methods.
- Thirdly, this research proposes an improved vector-based method for Web service ranking by taking users’ requirements into consideration.
- Finally, it proposes a new architectural model for service selection system which uses implicit feedbacks and also proposes a CF-based service selection algorithm to overcome the cold start problem of CF method.

8.2 Future Enhancements

The below mentioned are future enhancements with regard to this research work.

- In this thesis, the aim is to assist the service consumption for individual use and the purpose is to recommend users’ services that are close to their interest. In future, for service composition, services can be recommended for linking relevant services to selected positions in a designed process.
- An extensive analysis can be made to check the suitability of Wikipedia as a source of semantics in Web service discovery to improve the Web service discovery process.
- The complication in service quality forecasting in the mobile computing environment needs to be addressed.
- The proposed work can be integrated into the cloud environment. The implicit and explicit data can be exploited which are owned by a cloud service provider to discover the relevant services to a business process. The relations between services based on the exchanged messages in the cloud can also be inferred.