RESEARCH ARTICLE OPEN ACCESS

# Quality of Service Web Service Selection Based On Response Time

Dr.M.Saravanan , Akshit Badyal , Gaurav Singh, Anurag Rao
Department of Information Technology, SRM Institute of Technology, Chennai, India.

## Abstract:

Choosing an ideal web service is a difficult talk and if you are trying to access a web service but its taking too long to get you your desired result then it results in user exhaustion .So we have proposed this model that will help the users to find the best web serves according to their requirements and help them to get easy access.

## I.INTRODUCTION

Web service means different things to different people.Web Services have some hidden web services within it and the execution of the web service depends upon the execution of these hidden web services. Output of one service is input for another and if there is any delay in the responsiveness of the web service it may be because those hidden web services which is not responsive enough for the user request. Finding the ideal web service has always been a difficult task and different models have already been introduced but none of them are perfect.We have also proposed a model which will rank the web services using cost , availability and response time as factors.Depending upon these factors the best web services are ranked.

## II.PROPOSED SYSTEM

We have proposed a probabilistic model that predicts the best web service based in response time , availability and cost of web service and select the optimum web service from functionally equivalent web service at runtime. We assigned these values to web services using random set generator function which creates a set of three factors i.e cost, availability, response time and randomly assigns the values to these factors of each web service and then Utility value is generated using our utility function. Now using utility value we can find the probabilistic insights of the web services by genetic algorithm, with the help of genetic algorithm we can predict the probabilistic behaviour of the web services and select the optimum one for the user of the model by comparing probabilistic values of each web service.Two other algorithms Ant Colony and Analytic algorithm are also applied to the data generated by random set generator function and services with best response time, cost and availability according to user need is predicted. By a running a test on prediction accuracy our model can out to be more detailed and accurate than existing models.Our model not only predicts the best web service but also provides a reliable and efficient solution for the user request.The whole models works on three major algorithms Genetic ,Ant Colony Algorithm and Analytic Algorithm.The genetic algorithm is uses the given constrains ie response time , cost and availability and calculates a utility value and using that utility value we calculate the fitness score of a particular web services.The ideal web services according to the user request are displayed in the result panel.The ideal web services will be those web services which has the highest fitness score amongst the other web services. The Ant Colony algorithm which commonly called as Ant Colony Optimisation (ACO) which is used find the optimal path for finding the ideal web services. Ant colony algorithm as the name suggests relates to “ants”, in real ant colonies the real ants finds the shortest way to their food using the pheromone left behind by the fellow ants.They uses the uses the previous results

to find the right path. The pheromone which is nothing but a chemical compound present inside an ant that gives smell and colour pattern to the ants to follow This frogmen gets darker and noticeable again the path is followed again again and when the food is finished,They return back to their home using the same track and sooner the frogmen vanishes away with the sunlight and other factors.Similar to that we are using the results of the current web services to get to the best web services according to the user request.Many factors are being considered while doing Ant Colony Optimization(ACO) like number of ants variant, iterations you want to test ,alpha() ,beta ,dilution variable and using these values different iterations are being applied to get to the best path to web service.In the iterative method the probability of all the web services is being calculated then the highest utility values is being is chosen And once we have the highest utility value we immediately update the pheromone index indicating the first best path to a web service has been found and in next iteration same iteration or some different iteration method is called to find other paths to the best web services. This process keeps going until you get your ideal web service with the best pheromone value.The Analytic Algorithm is used for analysis of web services by calculating the availability of the web services. By using enumeration we can find out the availability of web service candidate. We are applying complete enumeration , which means forward and backward enumeration both. Forward enumeration is adding new service candidate to service candidate list along with the utility values of each candidate , on the other hand backward enumeration deletes the candidate from service candidate list . If our composition is complete which means if we have traversed the whole list of service candidate we need to switch the composition tier and then again perform enumeration on new service candidate class. So by doing this enumerations we will have only those web service candidates left in the list who are available.This application will also show results visually for algorithms so that the users can study the pattern.A graph is plotted to find number of different composition / generation and fitness value / generation for better understanding of genetic algorithm. At the bottom result panel is designed to show the results which is the predicted response time, availability and cost of the web service which best suits user requirements.

## I. ALGORITHM

To calculate the best web service according to user request we have used three major algorithms which will support our project and give an optimal results for the given user input. The descriptive explaination is given further ahead about the 3 algorithms Genetic Algorithm, Ant Colony Algorithm and Analytic Algorithm

### A. GENETIC ALGORITHM

The Ant Colony algorithm which commonly called as Ant Colony Optimisation (ACO) which is used find the optimal path for finding the ideal web services. Ant colony algorithm as the name suggests relates to “ants”, in real ant colonies the real ants finds the shortest way to their food using the pheromone left behind by the fellow ants.They uses the uses the previous results to find the right path. The pheromone which is nothing but a chemical compound present inside an ant that gives smell and colour pattern to the ants to follow This frogmen gets darker and noticeable again the path is followed again again and when the food is finished, They return back to their home using the same track and sooner the frogmen vanishes away with the sunlight and other factors. Similar to that we are using the results of the current web services to get to the best web services according to the user request. Many factors are being considered while doing Ant Colony Optimization(ACO) like number of ants variant, iterations you want to test ,alpha() ,beta ,dilution variable and using these values different iterations are being applied to get to the best path to web service.In the iterative method the probability of all the web services is being calculated then the highest utility values is being is chosen And once we have the highest utility value we immediately update the pheromone index indicating the first best path to a web service has

been found and in next iteration same iteration or some different iteration method is called to find other paths to the best web services. This process keeps going until you get your ideal web service with the best pheromone value.

**B. ANT COLONY OPTIMIZATION**

Genetic algorithm is the search algorithm inspired by Charles Darwin theory of natural evolution. The algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.

The process of selection starts with finding the fittest individual among the population and then producing offspring which will inherit the characteristics of the parents and forms new generation. If the parents have good fitness value then their off springs have better chance at surviving . There are 5 phases in genetic algorithm.

**Initial Population:**

The process starts with set of individual called population. Each individual will have a set of parameters called genes which are combined to together to form chromosome. All the operations starts from this population.

**Fitness Function:**

The fitness function is responsible for finding the fitness score of each individual .The genes which are fit enough are reproduced to form new generation with better characteristics.

**Selection:**

In the selection phase the individual with best fitness score are selected so that they can transfer their genes to the next generation. Selection of the individual can be done using three algorithms i.e. Roulette wheel selection, Linear Selection, Binary tournament

**Crossover method:**

It is the most crucial part of the algorithm. For the parents to mate and form new generation a crossover point is randomly chosen within genes and the mating will not occur beyond the crossover point. We have used two crossover methods i.e. one point crossover and two point crossover in this algorithm.

**Mutation:**

In mutation we flip some of the values in newly formed genes after crossover to get best fitness values. The main idea of mutation behind is to maintain diversity within the population and to prevent premature convergence. All of this process takes place in a mating pool.

**Termination:**

This is the last step of the genetic algorithm. If there is convergence in the population(unable to produce new off spring with significant difference from previous generation) then it means there are no new combinations available and the best off springs have been reached. We have used three termination method i.e. Iteration, Consecutive Equal Generations Fitness value convergence.

Then the whole population is sorted in order of fitness value and the best results are shown in result panel.

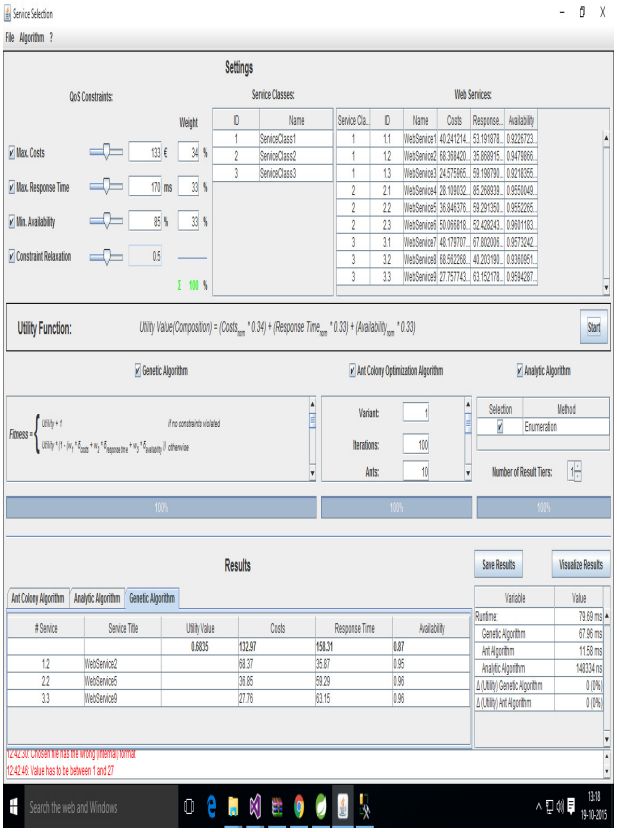
**C.ANALYTIC ALGORITHM**

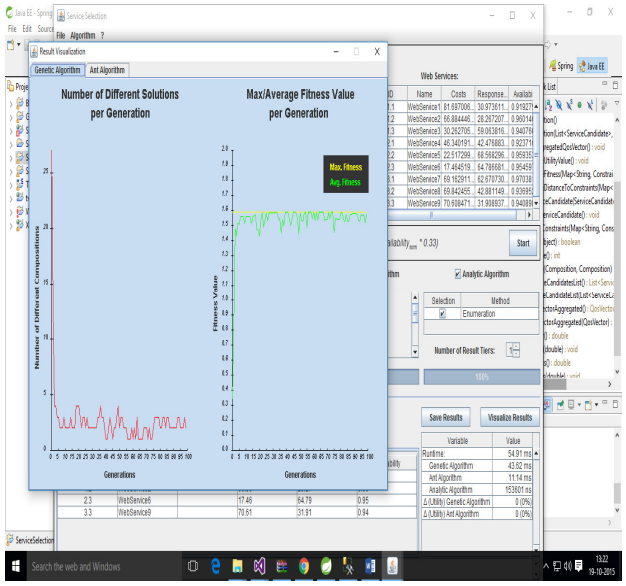
We are using this to calculate the availability of the web service. By using enumeration we can find out the availability of web service candidate. We are applying complete enumeration i.e. forward and backword enumeration. Forward enumeration is adding new service candidate to service candidate list along with the utility values of each candidate a on the other hand backward enumeration deletes the candidate from service candidate list . If our composition is complete means, if we have traversed the whole list of service candidate we need to switch the composition tier and then again perform enumeration on new service candidate class. So by doing this backward and forward

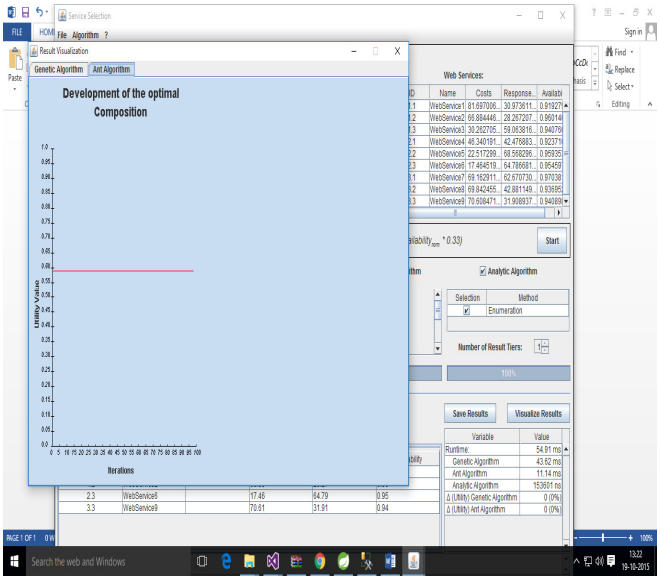
enumeration we will have only those web service candidates in the list who are available

## IV.EXPERIMENTAL RESULTS

With the assistance of the algorithms, the probabilistic estimation of all the web services was figured given reaction time, cost and accessibility. At last the web service with the best esteem was selected. We likewise demonstrated how our way was faster and considerably more productive.




## V. CONCLUSION

In this paper, we have proposed a probabilistic model that predicts the best web service based on response time , availability and cost of web service and select the optimum web service from functionally equivalent web service at runtime. We assigned these values to web services using random set generator function which creates a set of three factors i.e cost,

availability, response time and randomly assigns the values to these factors of each web service and then Utility value is generated using our utility function. Now using utility value we can find the probabilistic insights of the web services by genetic algorithm, with the help of genetic algorithm we can predict the probabilistic behaviour of the web services and select the optimum one for the user of the model by comparing probabilistic values of each web service.Two other algorithms Ant Colony and Analytic algorithm are also applied to the data generated by random set generator function and services with best response time, cost and availability according to user need is predicted.By a running a test on prediction accuracy our model can out to be more detailed and accurate than existing models.Our model not only predicts the best web service but also provides a reliable and efficient solution for the user request

## REFERENCES


1. V. Grassi, ‘‘Architecture-Based Reliability Prediction for ServiceOriented Computing,’’ inArchitecting Dependable Systems III. Berlin, Germany: Springer-Verlag, 2005, pp. 279-299.
2. V. Cortellessa and V. Grassi, ‘‘Reliability Modeling and Analysis of Service-Oriented Architectures,’’ inTest and Analysis of Web Services. Berlin, Germany: Springer-Verlag, 2007, pp. 339-362.
3. G. Stefano, C. Ghezzi, R. Mirandola, and G. Tamburrelli, ‘‘Quality Prediction of Service Compositions through Probabilistic Model Checking,’’ in Proc. 4th Int’l Conf. Quality SoftwareArchitect. Models Architect. 2008, pp. 119-134.
4. D.A. Menasce, ‘‘Composing Web Services: A QoS View,’’ IEEE Internet Comput. Vol. 8, no. 6, pp. 80-90, Nov. 2004.
5. H.Zheng, J.Yang, W.Zhao, and A.Bouguettaya, ‘‘QoS Analysis for Web Service Compositions Based on Probabilistic QoS,’’ in Service-Oriented Computing. Berlin, Germany: Springer-Verlag, 2011, pp. 47-61.
6. Z. Zibin and R.L. Michael, ‘‘Collaborative Reliability Prediction of Service-Oriented Systems,’’ inProc. 32nd ACM/IEEE Int’l Conf. Software. Eng., Cape Town, Africa, 2010, vol. 1, pp. 35-44.
7. R.Perrone, R.Macedo, G.Lima, and V.Lima, an Approach for Estimating Execution Time Probability Distributions of ComponentBased Real-Time Systems,’’J. Universal Comput. Sci., vol.15, no.11, pp. 2142-2165, 2009.
8. M. Cristescu and L. Ciovica, ‘‘Estimation of the Reliability of Distributed Applications,’’Infa. Econ., vol. 14, no. 4, pp. 19-29, 2010.
9. D. Zhong, Z. Qi, and X. Xu, ‘‘Reliability Prediction and Sensitivity Analysis of WS Composition,’’ in Petri Net: Theory and Applications, V. Kordic, Ed. Rijeka, Croatia: Intech, 2008, pp. 459-470.
10. J. El Haddad, M. Manouvrier, G. Ramirez, and M. Rukoz, ‘‘QoSDrivena Selection of Web Services for Transactional Composition,’’ inProc. IEEE ICWS, 2008, pp. 653-660.
11. B. Sami, G. Claude, and P. Olivier, ‘‘Transactional Patterns for Reliable Web Services Compositions,’’ inProc. 6th Int’l Conf. Web Eng., Palo Alto, CA, USA, 2006, pp. 137-144.
12. L. Li, L. Chengfei, and W. Junhu, ‘‘Deriving Transactional Properties of Composite Web Services,’’ inProc. IEEE ICWS, 2007, pp. 631-638.
13. K. Boumhamdi and Z. Jarir, ‘‘A Flexible Approach to Compose Web Services in Dynamic Environment,’’Int’l J. Digit. Soc., vol.1, no. 2, pp. 157-163, 2010.
14. Y. Tao, Z. Yue, and L. Kwei-Jay, ‘‘Efficient Algorithms for Web Services Selection with End-to-End QoS Constraints,’’ ACM Trans. Web, vol. 1, no. 1, p. 6, May 2007.
15. Z. Yilei, Z. Zibin, and M.R.Lyu, ‘‘WSPred: A Time-Aware Personalized QoS Prediction Framework for Web Services,’’ in Proc. IEEE 22nd ISSRE, 2011, pp. 210-219.
16. Z. Yilei, Z. Zibin, and M.R.Lyua, ‘‘WSPred: A Time-Aware Personalized QoS Prediction

Framework for Web Services,'' in Proc. IEEE 22nd ISSRE, 2011, pp. 210-219.
17. S. Maheswari, ''QoS Based Efficient Web Service Selection, 'Eur.J. Sci. Res., vol. 66, pp. 428-440, 2011.
18. C. Leilei, Q. Wang, W. Xu, and L. Zhang, ''Evaluating the Survivability of SOA Systems Based on HMM,'' inProc. IEEE Int'l Conf. Web Serv., 2010, pp. 673-675.
19. G. Rahnavard, M.S.A. Najjar, and S. Taherifar, ''A Method to Evaluate Web Services Anomaly Detection Using Hidden Markov Models,'' inProc. ICCAIE, 2010, pp. 261-265.
20. F. Salfner, ''Predicting Failures with Hidden Markov Models,'' in Proc. 5th Eur. Dependable Comput. Conf., 2005, pp. 41-46.
21. M. Zaki, A. Ihsaaan, and B. Athman, ''Web Services Reputation Assessment Using a Hidden Markov Model,'' inProc. 7th Int'l Joint Conf. Serv.-Oriented a Comput. 2009, pp. 576-591.
22. W. Ahmed and Y.W. Wu, ''A Survey on Reliability in Distributed Systems, ''J. Comput. Syst. Sci., vol. 79, no. 8, pp. 1243-1255, Dec. 2013.
23. P. Blunsom, Hidden Markov Models, Retrieved May 19, 2006, and 2004. [Online]. Available: www.cs.mu.oz.au/460/2004/materials/hmmtutorial.pdf.
24. L. Li, L. Chengfei, and W. Junhu, ''Deriving Transactional Properties of Composite Web Services,'' inProc. IEEE ICWS, 2007, pp. 631-638.
25. K. Boumhamdi and Z. Jarir, ''A Flexible Approach to Compose Web Services in Dynamic Environment,''Int'l J. Digit. Soc., vol.1, no. 2, pp. 157-163, 2010.