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QoS BASED SERVICE COMPOSITION FOR SERVICE COMPUTING USING ENHANCED PSO

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Abstract:
In service composition, service delivery is the important factor which estimates and satisfies the needs of the end user. Due to availability of enormous service providers providing required computing facility across various domains. The selection and retrieval of appropriate service is done using various evolutionary algorithms. Here we use an enhanced particle swarm optimization algorithm to classify the services available services based on the functional and non functional QoS factors. The enhanced PSO algorithm used in this work focuses on the attributes such as effectiveness, reliability, cost, availability, distance and interoperability. The result shows that the best interoperable service is chosen and delivered to the end user. For example, the best integrated separate reservation system is retrieved for travel, hotel and other resources required to satisfy the need of customer as a single service.

Key Words: Particle Swarm Optimization; Web Services; Quality of Service & Interoperability

1. Introduction:

Due to the availability of numerous services offering the same need to the end user, the service selection mechanism is a tedious task. An efficient optimization technique is essential to compute the optimum value to retrieve and deliver to the end user. Based on the previous methodologies used inter operable value is not computed for the different services accessed and delivered to the user. Without computing the interoperable value, the full fledged user request cannot be satisfied. For example a travel agency may book a vehicle, railway or airway and hotel based upon the need of the consumer. So there is a need for the framework to fulfill the need of the consumer with the optimum value. It is necessary to compute the interaction between two different services available in the globe. The service available irrespective of geographical location is given to the end user without computing the interoperability value in the previous works. The previous methodology uses PSO, GA, ABC and other optimization algorithms to evolve the best resource available in the globe without considering interoperable value. The parameters involved for computation are availability, response time, efficiency, cost and reliability. The standard QWS dataset and github dataset are used for the computation of parameter values. To ensure the operational functionality of two independent services the interoperable value is computed in the proposed work based on the availability and the distance required in accessing the services. From the dataset the above values are computed but the distance and the availability of service is calculated based on the nearest user gets access to the service.

2. Literature Review:

Quality of service (QoS) is an important issue in the design and management of web service composition. The number of available web services has proliferated, and then offered the same services increasingly. The same web services are distinguished based on their quality parameters. Also, clients usually demand more value added services rather than those offered by single, isolated web services. Therefore, selecting a composition plan of web services among numerous plans satisfies client requirements and has become a challenging and time-consuming problem. This paper has proposed a new composition plan optimizer with constraints based on genetic algorithm. The proposed method can find the composition plan that satisfies user constraints efficiently [1]. Bahadori, S., et al., proposed a method using genetic along with tabu search which offers late binding by considering non functional constraints such as execution cost and response time to retrieve the service closer to the user requirements [2]. Gaur, V., P. Dhyani, and O. Rishi proposed Greedy with tabu search algorithm for composition by considering the factor communication overhead which reduces the performance [4]. The framework enables the end user to determine the optimal service composition based on the input weight for individual service Quality of Service. The Genetic algorithm and basic Tabu search is applied for the user centric Quality of Service ranking prediction and the optimal service composition [5]. The optimal retrieval mechanism using QoS attributes is proposed in this paper [6]. The methodology and the algorithm proposed and used in web service composition are outlined and their similarities in attributes used for retrieval [7]. The fitness function generates the maximum feasible value based on the QoS attributes and user request. A planner graph is constructed based on the solution set evaluated from the fitness function [8]. The rapid growth in web services offering the same functionalities is a challenging task for service composition and thus some methodologies are developed for effective composition. A framework is developed to reproduce the suitable

service based on the attributes of QoS. The essential attributes related to the query submitted by the user are used during composition and thus the effective service is delivered to the consumer based on their needs and request. The semi heuristics models eliminates the unsatisfied constraints while delivery the output [9].

3. Methodology Proposed:

The particle swarm optimization works based on the bird movement in search of a location for its food. Here the available pool of services is considered as food and the continuous movement is the user request. The service accessed details are maintained and are accessed via the dataset and thus the availability value is computed. Let n be the number of services available in the repository to service n tasks. Here it is available in the dataset.

For each service
{
Compute the availability (A)
Compute the distance vector matrix using latitude and longitude from the dataset
Calculate cost and reliability
For each available service calculate the interoperable service value (I) and assign it for every service (I α A)
}
Initialize threshold value (T) with the function calculating a minimum value of cost, distance and maximum value of availability
Initialize pBest as the threshold value (T)
Initialize gBest ith the maximum threshold value (T)
Do until maximum iterations or minimum error criteria (until threshold value is reached – max availability and interoperability with min cost and distance)
{
  For each service
  {
    Calculate Data fitness value using the function
    If the fitness value is better than pBest
    {
      Set pBest = current fitness value
    }
    If pBest is better than gBest
    {
      Set gBest = pBest
    }
  }
  For each service
  {
    Calculate service interoperable value from the selected service
    Use gBest and service interoperable value to update service Data
  }

4. Experimental Setup:

The results are evaluated on a core i5 processor with 4 GB RAM and QWS dataset with 2400 services and also with github dataset with 5400 services simultaneously. The language used is java running on the netbeans IDE. Initially the dataset are loaded in a mySQL database for computation. The distance vector matrix is calculated for distance and the nearest value and availability is also calculated. The experiment is varied among 2500 services and 5000 services respectively by computing the distance vector matrix, the distance estimated from the user to repository and the user accessed the service nearby to estimate the time required to access and service availability at the time of request and the time needed to generate the response from the service. The graph shows that the recall and precision comparison. The enhanced PSO performs better than other versions of Genetic algorithm.

5. Conclusion:

The previous work discusses about the algorithm used in finding the feasible solution for the available services with the parameters cost, availability, response time and reliability. In the proposed work the improved version of the algorithm focuses on calculating the availability, cost, response time and the interoperability value for the available services. The best service is chosen and given for the end user with highest threshold value for availability, cost, distance and response time as it is calculated from the real updated dataset. The interoperable value calculated is with min error as the number of service available in the pool is min. As the number of service is increased the interoperable value calculated is an approximate value with max error and is to be addressed in future.

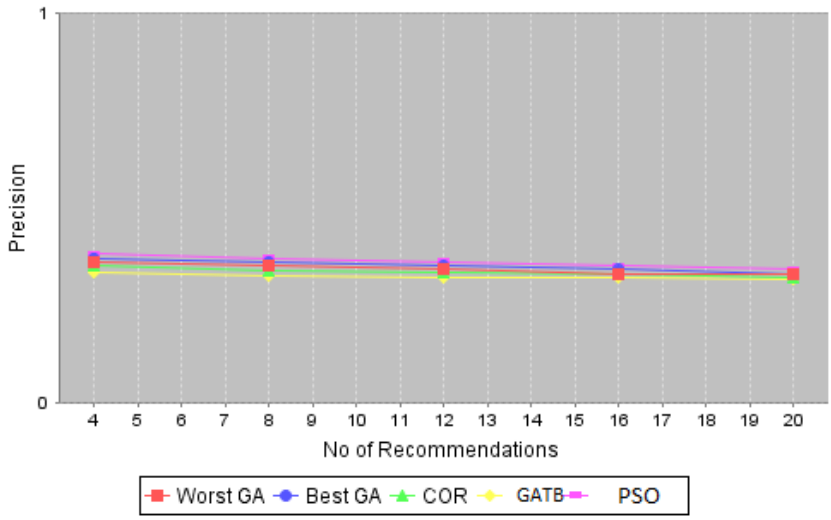

Figure 1: Precision

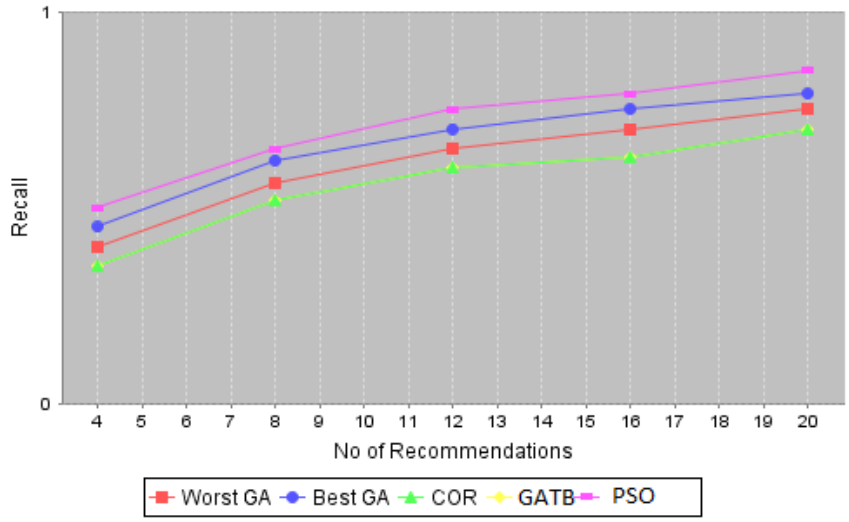

Figure 2: Recall

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