

QOS Based Dynamic Logistics Service Composition on Social Network with Complex Structures

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Abstract: In this study we proposed to adopt a Partner First algorithm with path planning based on service oriented computing framework here combining path planning with service composition. The Public Logistics Platform aims to provide customers with end-to-end logistics services by finding and composing a huge quantity of web services from logistics service providers. The availability of many independent services on an open network provides the opportunity of composing individual instances. Web services provide features such as e-Booking, e-Shopping; e-Banking that helps users to acquire everything from where they are currently. Hence, giving multiple options to the user's request would help them select a plan according to their desire and comfort us. A concept of partner circle is defined which can significantly reduce the search space in path planning. We focus on services described with XML documents and accessed via XML protocols processed with Quality of Services (QOS) by using the combination of path planning with PartnerFirst algorithm is more effective and efficient.

Keywords: Service Composition, Service Oriented Computing, Path Planning, Web Service, QOS.

1. Introduction

Enhance the system by providing multiple compositions. Combining Path Planning [1] with Service Composition, user centric dynamic service composition is presented based on the Social Network [3] [6], which is the cooperation network of service providers here. Return the composition to users and provide them with the option of selecting the service which is efficient, in terms of cost, time and performance.

Service-Oriented Computing (SOC) [4] enables loosely composition of services to provide a complex function. There exist many achievements in the research area of service composition. For service compositions, functional and non-functional requirements need to be considered when choosing such services. The latter is specified by Quality of Service (QoS) [2] [3] [7], including attributes such as latency, price, reliability etc. QoS is especially important when many functionally equivalent services are available.

In today's fast moving technology world everyone wants to have better quality of service whatever they want to use with their constraints addressed. Here user constraints [6] [10] vary from user to user and it cannot be same for everyone. User wants to use a better reliable service or user wants to use less expensive services or with multiple constraints such as less expensive with more reliable service constraints. Currently lots of research is focused on in this area how to compose web services dynamically to address user constraints.

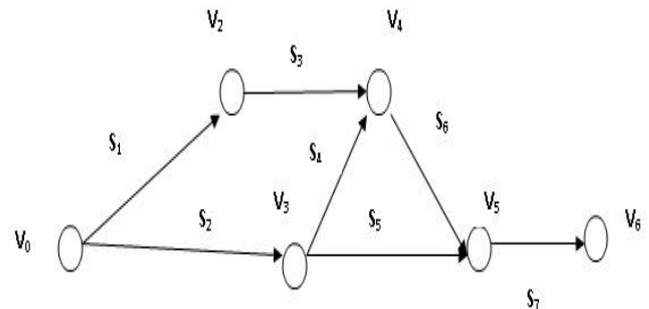


Figure 1: A Logistics Network

Web services is used to one of way to implement a service-oriented architecture [12] [13] Web services make functional building-blocks accessible over standard Internet protocols independent of platforms and programming languages. These services can represent either new applications or just wrappers around existing legacy systems to make them network-enabled.

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The small world experiment proves that everyone and everything is six or fewer steps away, by introduction from any other person in the world, so that a chain of "a friend of a friend" can be made to connect any two people in a maximum of six steps. This theory is verified in practical and applied to

the areas such as information science, biology and communication technology etc. This theory shows that the distance among actors in a relation network is always short.

AI [14] [15] Planning Tools is one way to compose service path gives a survey about the current AI Planning approaches. Proposes the Xplan to automatically build the service workflow and offers a re-planning component which can somehow deal with the service failure situation. Proposes a service description language PDDL [12] [13] [14] to translate the goal service into the planning domain and then translated the results back into the service domain.

To support and enable agile business processes, the Service-oriented Architecture (SOA) paradigm is often recommended. One of the key features of SOA is that (IT-supported) business processes and, respectively, workflows are realized by composing loosely coupled services – a practice known as service composition. These services autonomously provide a more or less coarse-/fine-grained functionality. Following the vision of the Internet of Services, multiple service providers offer various services at different service marketplaces. If multiple services, which are equally appropriate to accomplish certain tasks, are available at service marketplaces, enterprises can choose to compose those services which meet cost and Quality of Service (QoS) constraints best.

Web Services are the most famous implementation of service oriented architectures that has brought some challenging research issues. One of these is the composition, i.e. the capability to recursively construct a composite Web service as a workflow of other existing Web services, which are developed by different organizations and offer diverse functionalities, transactional properties and Quality of Service (QoS) [16] [17]. The selection of a Web service, for each activity of the workflow, meeting the user's requirements, is still an important challenge. Indeed, the selection of one Web service among a set of them that fulfill some functionalities is a critical task, generally depending on a combined evaluation of QoS. However, the conventional QoS-aware [18] [19] composition approaches do not consider the transactional constraints during the composition process.

2. Related Work

In this section, we review and classify relevant previous studies into three categories: similarity measures, mobile pattern mining techniques, and mobile behavior predictions.

2.1 QOS Aware Service Composition

Service compositions build new services by orchestrating a set of existing services. In the Internet of Services there may be many functional similar services, but with different Quality of Service (QoS) [9] [10] [11]. Thus a significant research problem in service compositions is how to select the composition's composite services that the overall QoS of the composition is being maximized. This paper summarizes, classifies and evaluates major research efforts in this area and

gives an overview about further open research questions [2] [3].

2.2 Service based on distributed System

A proper understanding of the general nature, potential and obligations of electronic services may be achieved by examining existing commercial services in detail [1] [2] [3]. The everyday services that surround us, and the ways in which they engage with them, are the result of social and economic interaction that has taken place over a long period of time. If they attempt to provide electronic services, and do not take this history into account, then they will fail [10] [11] [12]. Any attempt to provide automated electronic services that ignores this history will deny consumers the opportunity to negotiate and refine, over a large range of issues, the specific details of the actual service to be provided. To succeed, we require a rich and accurate means of representing services. An essential ingredient of service representation is capturing the non-functional properties of services [2]. These include the methods of charging and payment, the channels by which the service is requested and provided, constraints on temporal and spatial availability, service quality, security, trust and the rights attached to a service. Not only are comprehensive descriptions essential for useful service discovery, they are also integral to service management, enabling service negotiation, composition, and substitution.

2.3 QOS routing and supporting for Multimedia application

Several new architectures have been developed for supporting multimedia applications such as digital video and audio. However, quality-of-service (QoS) routing is an important element that is still missing from these architectures. In this paper, they consider a number of issues in QoS routing [24] [25]. They first examine the basic problem of QoS routing, namely, finding a path that satisfies multiple constraints, and its implications on routing metric selection, and then present three path computation algorithms for source routing and for hop-by-hop routing

2.4 Covering path planning in agricultural field

Methods and algorithms to solve this problem are developed. These algorithms are applicable to both robots and human-driven machines. The necessary condition is to cover the whole field, and the goal is to find as efficient a route as possible [17] [18]. As yet, there is no universal algorithm or method capable of solving the problem in all cases. Two new approaches to solve the coverage path planning problem in the case of agricultural fields and agricultural machines are presented for consideration. Both of them are greedy algorithms [18]. In the first algorithm the view is from on top of the field, and the goal is to split a single field plot into subfields that are simple to drive or operate. This algorithm utilizes a trapezoidal decomposition algorithm, and a search is developed of the best driving direction and selection of subfields. This article also presents other practical aspects that are taken into account, such as under drainage and lying headlands. The second algorithm is also an incremental

algorithm, but the path is planned on the basis of the machine's current state and the search is on the next swath instead of the next subfield. There are advantages and disadvantages with both algorithms, neither of them solving the problem of coverage path planning problem optimally [16] [17] [18]. Nevertheless, the developed algorithms are remarkable steps toward finding a way to solve the coverage path planning problem with no directional vehicles and taking into consideration agricultural aspects.

3. Preliminaries

3.1 Web Services Composition

Web services are distributed applications. The main advantage of web services over other techniques is that web services can be dynamically discovered and invoked on demand, unlike other applications in which static binding is required before execution and discovery [20] [21]. Semantic and ontological concepts have been introduced to dynamically compose web services in which clients invoke web services by dynamically composing it without any prior knowledge of web services. Semantic and ontological techniques are used to dynamically discover and compose at the same time (run time).

3.2 Automated Web services composition

The automated web service composition methods generate the request/response automatically. Most of these methods are based on AI planning. First request goes to Translator which performs translation from external form to a form used by system, and then the services are selected from repositories that meet user criteria [22] [23] [24]. Now the Process Generator composes these services. If there is more than one composite service that meets user criteria then Evaluator evaluates them and returns the best selected service to Execution Engine. The results are returned to clients (Requester). There should be well defined methods and interfaces through which clients interact with the system and get the response [26].

4. Proposed Enhancement

4.1 Proposed Method

The proposed system PartnerFirst algorithm is used. PartnerFirst algorithm provides the huge size of search space keeps the time complexity high. Through the use of service provider cooperation network, the PartnerFirst algorithm can significantly reduce the search space by preferentially searching services in the partner circle. Finally, the algorithm can get a service path with optimal QoS with in a tolerable interaction time. Enhances a systematic approach is proposed to calculate QoS for composite services with complex structures, taking into consideration of the probability and conditions of each execution path. In particular, QoS solutions are provided for unstructured conditional and loop patterns. We also show how QoS-based service selection can be conducted based on the proposed QoS calculation. Experiments have been conducted to show the effectiveness

of the proposed method Enhancement, discover multiple composite services, nonfunctional preferences, pragmatic knowledge. Feasible composition, assign weights Options to the user, select plan based on his preference.

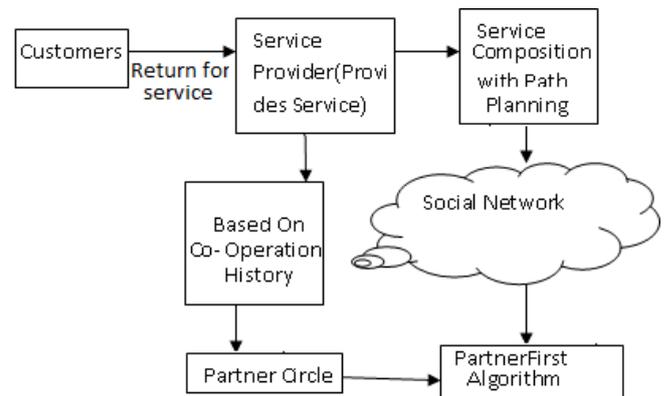


Figure.3.1: Architecture Flow Of QoS process

4.2 Techniques and Algorithms

4.2.1 QoS-Aware Service Composition Technique

Quality of service (QoS) [8] [11] aware service composition approach capable of defining at run-time a service composition plan meeting both functional and non-functional constraints and optimizing the overall quality of service.

4.2.2 Social Network Analysis Technique

Social network analysis is an approach and set of techniques used to study the exchange of resources among actors (i.e., individuals, groups, or organizations). One such resource is information. Regular patterns of information exchange reveal themselves as social networks, with actors as nodes in the network and information exchange relationships as connectors between nodes [19] [20]. Just as roads structure the flow of resources among cities, information exchange relationships structure the flow of information among actors. Social network analysis assesses information opportunities for individuals or groups of individuals in terms of exposure to and control of information.

4.2.3 Path Planning Algorithm

A*(Path planning) [1] [2] is a computer algorithm that is widely used in path finding and graph traversal, the process of plotting an efficiently traversable path between points, called nodes. Noted for its performance and accuracy, it enjoys widespread use. However, in practical travel-routing systems, it is generally outperformed by algorithms which can pre-process the graph to attain better performance, although other work has found A*(path planning) to be superior to other approaches. A* (path planning) uses a best-first search and finds a least-cost path from a given initial node to one goal node (out of one or more possible goals) [18] [25]. As A* traverses the graph, it follows a path of the lowest expected total cost or distance, keeping a sorted priority queue of alternate path segments along the way.

It uses a knowledge-plus-heuristic cost function of node x (usually denoted $f(x)$) to determine the order in which the search visits nodes in the tree. The cost function is a sum of two functions:

- The past path-cost function, which is the known distance from the starting node to the current node x (usually denoted $g(x)$)
- A future path-cost function, which is an admissible "heuristic estimate" of the distance from x to the goal (usually denoted $h(x)$) [19].

The $h(x)$ part of the $f(x)$ function must be an admissible heuristic; that is, it must not overestimate the distance to the goal. Thus, for an application like routing, $h(x)$ might represent the straight-line distance to the goal, since that is physically the smallest possible distance between any two points or nodes [12] [13] [14].

If the heuristic h satisfies the additional condition for every edge (x, y) of the graph (where d denotes the length of that edge), then h is called monotone, or consistent. In such a case, A^* can be implemented more efficiently—roughly speaking, no node needs to be processed more than once (see closed set below)—and A^* is equivalent to running Dijkstra's algorithm with the reduced cost $d'(x, y) := d(x, y) + h(y) - h(x)$ [30] [31] [32].

4.2.4 Partner First Algorithm

Using accurate algorithm will take exponential time to get an answer. Though heuristic algorithm can largely improve the efficiency, it still has many limitations especially in the massive services environment; the huge size of search space keeps the time complexity high. Through the use of service provider Cooperation Network, the PartnerFirst algorithm can significantly reduce the search space by preferentially searching services in the Partner Circle. Finally, the algorithm can get a service path with optimal QoS within a tolerable interaction time by reasonable pruning strategy.

4.3 Advantage

- 1) Heuristic algorithm can largely improve the efficiency, it still has many limitations especially in the massive services environment; the huge size of search space keeps the time complexity high.
- 2) Through the use of service provider cooperation network, the partner first algorithm can significantly reduce the search space by preferentially searching services in the partner circle.
- 3) Finally, the algorithm can get a service path with optimal QoS within a tolerable interaction time by reasonable pruning strategy.

5. Future Work

The logistics service contains only sequence pattern. In order to extend the concept of partner circle to normal service composition problem, more complicate patterns need to be considered. The cooperation relationship between service providers just uses some simple result in Social Network Analysis. More intensive achievement requires further discussion. The PartnerFirst algorithm still has room for improvement, like the self-adaptability which requires further consideration of the parameters etc.

6. Conclusion

In this paper, by the utilization of the research achievement in the sociology, we propose the PartnerFirst algorithm based on the concept of Partner Circle along with social network. The PartnerFirst algorithm achieves the purpose of path planning through the improved A^* algorithm (path planning), which can significant reduce the search space by preferentially searching the services in the Partner Circle. The experiment shows that the PartnerFirst algorithm can generate an optimal service path within an acceptable period of time. It also proves that the usefulness of the algorithm especially in the massive services context. A concept of partner circle is defined which can significantly reduce the search space in path planning. We focus on services described with XML documents and accessed via XML protocols processed with Quality of Services (QoS) by using the combination of path planning with PartnerFirst algorithm is more effective and efficient.

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