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Full Length Research Article

MODELLING APPROACH FOR LOCATION OF SEMANTIC WEB SERVICES

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ABSTRACT
Technology on semantic web services nowadays addresses only the synthetic services. These therefore provide limited sets of rigid services that cannot adapt to present contemporary changing environment. In this work, we propose an approach that would automate semantic service location, however, some conceptual model and assumptions that lead to identifying the solutions were defined. Furthermore, a thorough understanding of what a service means, various levels of abstraction and assumptions made on various elements that are involved in the location process were made. This was to ascertain the steps and kinds of descriptions that would be implemented to provide efficient and usable automated approach to web services. Additionally, we analyze the matching techniques that are of interest in locating services that would fulfil the requester's goals. However, the proposed model those not impose any restrictions on how to implement it for specific application but some useful approach for providing such implementation.

Keywords: Conceptual Model, Web Service, Semantic Web Service, Synthetic Service and Web.

INTRODUCTION
The **Semantic Web** is an extension of the **Web** through standards by the World Wide **Web** Consortium (W3C). These standards promote common data formats and exchange protocols on the **Web**, most fundamentally the Resource Description Framework (RDF). The Services is aim at enabling a huge, dynamic and federated network of media entities and information, enriched with machine-processable semantics. The current architecture which is the Service Oriented Architecture (SOA) has three main roles.

These are the Service Provider, Service registry and Service requester to be able to implement the basic operations of publication, discovery and binding. However, the current technology is based on Web Service Description Language (WSDL) (Christensen *et al*., 2007), Simple Object Access Protocol (SOAP) (Zaremski *et .al*., 1997) and University Description Discovery and Integration UDDI (Bellwood *et. al*., 2002).

They only identify the synthetic aspect of Semantic Web Services and therefore provide only rigid solutions that cannot adapt to the changing environment without human intervention. A software engineer has to keep watch at the strategic choke points/loops and scalability as well as economy in the management of Web services (Ionzalez-Castillo *et al*., 2001). Human intervention at different stages is prone to error. Therefore, the work seek to limit human intervention at the Semantic Web by automating the process. Automation of the Semantic Web could lead to more discoveries and execution of services, composing and enabling seamless interoperation between services (Fensil *et al*., 2001; Pablo *et al., 2012*) thus enabling intelligent web services.

Initiatives by most researchers nowadays provides semantic web that focuses on developing technologies, languages, reasoning languages and tools for realizing and appropriate backbone for the Web Services vision. Automatic locating available service to perform a given business activity can significantly reduce the cost of making applications for businesses to work together and can enable a much more flexible integration where providers are dynamically selected based on what they provide and possibly, other functional properties such as trust, security and so on.

LITERATURE REVIEW/ RELATED WORK
The problems of semi-automatically retrieving software components is very similar to the automatic location of services. Specification matching has been proposed in several works (Priest, 2004) to evaluate how software components relate to a given query i.e. user's need. Specification matching relies on the axomatization of software components and user queries. A formal (logical) relation *OS* then defined and whether a given query and component satisfy this relation is checked. Such a relation must capture the notion of reusability i.e. if the relation holds for formally specified components and queries. It means that the component can be reused to solve the problem captured by the query.

The work on software component retrieval has not defined a conceptual model for the location of relevant components but only different notions of match for a given query and a given component have been studied (Lara, 2004). While such notions of match focus on locating a software component that can be used in the place where the software component represented by the query could, in service discovery be focus on what results can be delivered by the service. Therefore, the notions of match studied for software component retrieval have to adapt to the Web services domain. Service contracting is not directly considered as it is outside the application area of software component retrieval. A more detailed account of the work on software component retrieval; and its relation to service discovery is given (Kiffer, 2004).

Automatic Web Service Discoveries: A number of proposals for using Description Logics (Franz, 2007; Krotcsch *et al*., 2012, 2013) and Ontology Web Language OWL-S (2004), or similar descriptions for the automatic discovery of services are available (Lee, 2004; Pablo *et. al*, 2012). However, none of them provides a conceptual model and they regard discovery as a one step process. In addition, these approaches are not suitable for contracting as they do not employ rules for describing the relation between the results of the service and the input given.

METEOR-S discovery (Verma, 2005; Netra, 2011) is very similar to the approaches mentioned above but it uses request templates similar to our pro-defined goals, it also annotates services registries, specializing them on a given domain and exploiting such annotations during discoveries. However, it does not define a conceptual model and it is not suitable for contracting.

According to Rolling and Wing (1991) in LARKS deals with the description of agent capabilities and requests and the matchmaking. The discovery model used in LARKS defines different filters of different complexity and accuracy, allowing the user to select the trade-off between the efficiency and accuracy he needs. However, this model does not address the problem of the different levels of abstraction that are expected in service descriptions and does not discuss how the request will be defined by users. Furthermore it does not consider the contracting of services. Logical Framework (Kifer *et. al*., 2004) on service discovery and contracting already offered a distinction between these two steps. It was built on top of it and examined the conceptual model described in (Priest, 2004) to elaborate a comprehensive conceptual model including client specifies his needs in terms of what he wants to achieve by using a concrete service $S \in A_P$ of some provider P. Our assumption is that a user care about what he wants to get from P but not about how it is achieved, the conceptual element which formally reflects this desire in WSMO is the so-called goal. In particular, goals describe what kind of output and effects are expected by the client.

The Formal Model for Services and Goals. The state-based perspective to formalize the concepts involved in the process of automatic location of services was used. A state $\omega \in U$ (where *U* is the set of all possible states) determines the properties of the real world and of the available information at some point in time e.g. the number of rooms currently available in a given hotel. An abstract service *A* is the set of transformations i.e. a relation on the state space *U. where*

$S \in A$ represent concrete state transformation $S = (\omega, \omega^1)$

for each $[S \in A] = [S = (\omega, \omega^1)]$ with $\omega,\ \omega^1 \in U$

delivery of service S, which formally denotes output $s(\omega^1) \in U$ and effect $s(\omega^1) \in U$

Since S depends on $(i_1 \ldots\ldots, i_n)$ provided by the requester

Then $A \rightarrow A\ (i_1 \ldots\ldots, i_{n\ A}) \in U * U$ { that the service requested provided}

Therefore Goals (G) is output $G \in U$ and effect $G \in U$

Eventually,

$$A\ (i_1 \ldots\ldots, i_n) \rightarrow S = (\omega, \omega^1) \in A\ (i_1 \ldots\ldots, i_{n\ A})$$

$S = \omega^1 \in G$ *to produce an output $Out_S\ (\omega^1)$, out (G)*

MAIN IDEA AND METHOD

We propose an approach that would automate semantic service location, however, some conceptual model and assumptions that lead to identifying the solutions need to be defined. Accordingly, a thorough understanding of what a service means, various levels of abstraction based on the above framework and lastly, the assumptions made on various elements that are involved in the location process.

Service: The notion of service is systematically overloaded the logical framework above. Several communities have different interpretations which makes it difficult to understand and relate single approaches and exchange ideas and results. In defining services, it is relevant to identify the entities involved. For example, a service provider P usually needs certain information from a requester. For instance, a hotel management might requires the name of the person booking the room, the requested room features and a valid credit card number as input information in order to book a room, this input data $i_1 \ldots\ldots, i_n$ will determine what concrete service $S \in A_P$ has to be provided by P.

Description of requester needs. From the approach by Web Service Modelling Ontology (WSMO) (Lara, 2004), a client specifies his needs in terms of what he wants to achieve by using a concrete service $S \in A_P$ of some provider P. Our assumption is that a user care about what he wants to get from P but not about how it is achieved, the conceptual element which formally reflects this desire in WSMO is the so-called goal. In particular, goals describe what kind of output and effects are expected by the client.

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Therefore Goals (G) is output G ϵ U and effect G ϵ U

Eventually,

A $(i_1\ldots\ldots, i_n) \rightarrow S = (\omega, \omega^1) \in A\ (i_1\ldots\ldots, i_{n\,A})$

$S = \omega^1 \in G$ *to produce an output*

Out $_S\ (\omega^1)$*, out (G)*

Hence effect eff $_S\ (\omega^1)$*, eff (G) { will match}*

Since each element $S = (\omega, \omega^1) \in A\ (i_1\ldots\ldots, i_{n\,A})$

Determined by $\omega \in$ *dom* $A\ (i_1\ldots\ldots, i_{n\,A})$

$i_1\ldots\ldots, i_n$ *{ Input information that the requester is willing to provide}*

For a provider to provide a given concrete service, we determine

dom (A) and $(i_1\ldots\ldots, i_{n\,A})$

unfortunately, we cannot assume

A $(i_1\ldots\ldots, i_{n\,A})$ *{ the concrete service to be provided based on the requester's request}*

dom A $(i_1\ldots\ldots, i_{n\,A})$ *is static over time*

Hence, due to dynamic nature, the hotel reservation will not be able to book a room with single bed on a specific date if all such rooms a fully booked.

Assumptions. In order to define a model for the overall location process (including service discovery and contracting), we need to make clear our assumptions on the domain from which we derive the model. Such assumptions are discussed below:

Pre – defined goals, Service requesters are not expected to have the required background in formalizing their goals. Thus, goals have to be expressed clearly and understandable. These will enable requesters to precisely indicate their needs. These will give room to a well-defined, formal, reusable and generic goals that would be expected for the requester's objectives.

Abstract Capability, This will provide a contracting capabilities between the information provided by the requester and the available set of concrete service from the service provider. It is worthy of note that abstract capability is expected to be complete but not always correct. For every S ≠ P {where S is the concrete service and P is the service provider}

For example, our flight service provider in the country will say there able to provide flight to all the airports in the country and will develop model to fit in the services they can provide. However, there are some services to some other areas within the country that cannot be provided be P which might not be captured in its model. Therefore, whether the concrete services is will or will not be provided be P, during the contracting process, appropriate concrete service S is match to appropriate service that P can provide. Country that cannot be provided be P which might not be captured in its model. Therefore, whether the concrete services is will or will not be provided be P, during the contracting process, appropriate concrete service S is match to appropriate service that P can provide.

Contracting Capabilities. A service provider P will have to itemize what it can offer by the process of contracting capabilities which is automatically derived logically. It will also outline conditions that the requesters must satisfied the contracting process before the requester request would be considered.

Conceptual Model for Service Location, as discussed above on the formal model for services, goals and assumption on the domain on P platform, this work propose a conceptual model for the computational based location of services. The steps will be describe in Figure 1 below: The different steps of the overall process are:

Goal discovery. The request provide his necessary details, goal discovery will locate the expected goal that fits the requester desires from the Pre-defined goals. The resultant goal is an abstraction of the requester desire into a generic and usable goal. Goal Refinement. The goals from the goal discovery are refined based on the requester's demand. The step will result on the formalized requester's goals

Service Discovery. After the refinement, it will check the available services in accordance with the abstract capabilities discover the condition that will fulfill the requester's goal.

Service Contracting. The strength of the contracting capability, the abstract services selected in the step above will then be checked for their ability to deliver suitable concrete service that fulfills the requester's goal. Such services will be eventually selected.

For example, a requester who wants information on hotel reservation for a room on 20 November 2016, such information from the requester is expressed in text form and in a language. These will enable requesters to precisely indicate their needs. These will give room to a well-defined, formal, reusable and generic goals that would be expected for the requester's objectives.

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For example, a requester who wants information on hotel reservation for a room on 20 November 2016, such information from the requester is expressed in text form and in a language understandable by both requester and service provider. The search information about the room requested by the requester on the particular date will be performed keyword-based matching on the existing pre-determined goal such as specific room needed by the requester. Once the particular is located, it reflects a concrete value by the requester. Also, the 20 November choose by the requester would be refined manually or automatically.

Service Discovery. As discussed in Section 3, the capability of a conceptual model in semantic service can be considered on various levels of abstraction. The most fine-grained perspective on an abstract service *A* is considered a family of relation state space *U* based on the WSDL and UDDI approaches. In this work, we will identify the computational semantic service to find a suitable service for requesters or compound service developers.

Discovery Process

(i) Transform the requests of customers in forms of Service Template compliance with Service computation. All the Assumptions in Section 3 will be used in the match. It is necessary for compound service developers to decompose the request into atomic process.

(ii) Search engine in UDDI matches the customer's request against Service Advertisement in the propose conceptual model such as the Input, Output, Precondition and Effect (IOPE) as explain in the each function in Section 3.

(iii) Analyze the performance constraints and order the selected services in the candidate set so that customers can select the most suitable services according to their own preference. Hence the Matching algorithm will be exploited, which is introduced in the next section.

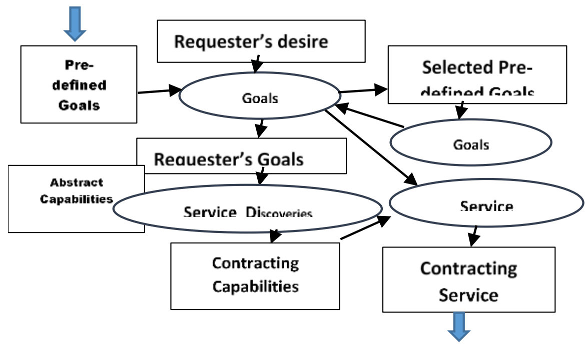

Fig 1: A Conceptual Model for the Discovery Process

SEMANTIC MATCHING

During the discovery process, several Agents are needed. Those Agents aim to implement matching algorithms. With the increase of Web Services specification in UDDI, it is difficult to find out a suitable service. The traditional retrieval technologies, such as keyword-based match, are not applicable. So is the classical set theory, whose logic is based on either 0 or 1. In this work, fuzzy Theory and Similarity Function (Farrel, 2007) are selected to match service template against service advertisement.

A Similarity Matching

The result of match computed by Formula below is on closed interval [0, 1]. This is a quantified analysis whose result is more accurate than that of some other algorithms.

$$S(a, b) = \sum (\mu_i \, s_I(a, b)) \quad (\mu_I > 0, \ \sum \mu_I = 1)$$

Where S (a, b) is similarity between a and b, where a is a description given by a provider and b is the input made by a requester and μ is the weigh coefficient, it reflect weightiness of attributes of service. Apparently, it is easy to compute the value of similarity when IOPE is matched in step (ii) during discovery process. As for the match is step (iii)

$$Similarity\,(C, S)) = \sum w_f * sim\,(C_f\, S_f)$$
$$\sum sim\; C\; S = = (3)$$

Where C is a current request/expected reply, S is a stored case in the case base, w is the normalized weight defined by equation, n is the number of the attributes/features in each case, f is the index for an individual attribute/feature and sim (C_f,, S_f) is the local similarity function

B Implementation

The model and method introduced are also use within SOA. This Section states how to enable service discovery as described above.

C Enhancing UDDI

Indisputably, all of the concrete services as proposed in Section 3 are stored in the UDDI Registry while the existing UDDI Registry neither supports the description in OWL nor the Assumptions stated in Section 3. Our work therefore is extend the UDDI Registry by maintaining it full compatibility so that both the developers and the customers can either exploit the existing UDDI or invoke the Application Programming Interface (APIs) Provided.

Luckily, the UDDI goal is to describe web services meaningfully and structured to provide information to certain specifications, concepts and other shared design efficiently. Also the UDDI v2 defines several elements into categories. Making use of the extensive mechanism, UDDI can contain service description compliance with the Assumptions above. UDDI Version 3.0 key objective is to support secure interaction of private and public implementations as major element of service-oriented infrastructure. "The UDDI Version 3.0.2 Specification describes the Web services, data structures and behaviors of all instances of a UDDI registry. Its protocol also is a key member of the group of interrelated standards that comprise the Web services stack. It defines a standard method for publishing and discovering the network-based software components of a service-oriented architecture

D Annotated WSDL

While semantic service is edited in OWL rather than OWL-S, WSDL is a de-facto standard for service functionality description. In the proposed method, we select Semantic Annotations for WSDL (SAWSD) (Farrel, 2007). SAWSDL defines a set of extension attributes for WSDL that allows description of additional semantic of WSDL components. SAWSDL doesn't specify a language for representing the semantic models. Instead it provides mechanism by which concepts from the semantic model can be referenced from within WSDL and XML schema components using annotations. It also can be mapped into an RDF form compatible with previous versions.

Conclusion

In this paper, we presented a model for the automatic location of services that considers the static and dynamic aspects of service description and identifies what notion of match and techniques are useful for the matching of both. Our model shows three important features; ease of use for the requester, efficient pre-filtering of relevant services and accurate contracting of services that fulfill a given requester's goal. We further elaborated on previous work and results on semantic web services, service discoveries by analyzing what steps and what kind of description as necessary for an efficient and usable automatic service location. Service Discovery is an ongoing research direction in Web Service community. The model is introduced to enrich the semantics of Web Service including performance description. The proposed construction of service makes it easy to identify and maintain the relationships among services. Exploiting such a Services as well as extension of UDDI and SAWSDL service discovery techniques are used to match Service Template against Service Advertisement efficiently. Further work includes: Conduct more study in mechanism in UDDI in order to enhance its semantics and to improve the match algorithm with reference to optimization technology in nonlinear systems.

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