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WEB SERVICE DISCOVERY USING FUNCTIONAL LEVEL SERVICE CATEGORIZATION APPROACH

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ABSTRACT

The Web services set of standards is aimed at facilitating and improving the quality of component-based applications on the web. Web services have become a new wave of Internet technology development. A vast majority of Web Services exist without explicit associated semantic descriptions. As a result many services that are relevant to a specific user service request may not be considered during service discovery. . Here the approach involves semantic-based service categorization and semantic enhancement of the service request. This paper proposes a solution for achieving functional level service categorization based on an ontology framework. The semantic-based categorization is performed offline at the universal description discovery and integration (UDDI). The semantic enhancement of the service request achieves a better matching with relevant services. The service request enhancement involves expansion of additional terms that are deemed relevant for the requested functionality. An efficient matching of the enhanced service request with the retrieved service descriptions is achieved utilizing Latent Semantic Indexing (LSI)

KEYWORDS: Web Services Discovery, Semantic, UDDI

INTRODUCTION

The web is a huge information space filled with interconnected resources. The service is an application that exposes its functionality through an API. A web service is a standard way of integrating web-based applications using the XML, Simple Object Access Protocol (SOAP)[1], Web Service Description Language (WSDL)[2], and Universal Description Discovery Integration (UDDI)[3] open standards over an Internet protocol. The lack of semantics in description creates inefficiencies in exploiting the Web service discovery.

Describing Web service with semantics provides the ability for automatic Web service discovery, invocation, composition and interoperation, and Web service execution monitoring.The web services within the service registry (UDDI) have predefined categories that are specified by the service providers. Services may be listed under different categories. Given the large number of web services and the distribution of similar services in multiple categories in the existing UDDI infrastructure, it is difficult to find services that satisfy the desired functionality. Such service discovery may involve searching a large number of categories to find appropriate services. Therefore, there is a need to categorize /web services based on their functional semantics rather than based on the classifications of service providers.

Semantic categorization of web services will facilitate service discovery by organizing similar services together. Existing service discovery approaches often adopt keyword-matching technologies to locate the published web services. This syntax-based matchmaking returns discovery results that may not accurately match the given service request. As a result, only a few services that are an exact syntactical match of the service request may be considered for selection. Thus, the discovery process is also constrained by its dependence on human intervention for choosing the appropriate service based on its semantics.

RELATED WORK

In literature, there are significant proposals for semantic Web service discovery based on service functionality and capability described using OWL-S/WSMO/DAML-S/WSDL-S [4] [5] [6] [7] [8] [9] [10] [11] . The authors [12][13] [14] propose an additional matching filters (degree of match) to obtain the semantic similarity between two ontological concepts for the service matchmaking. The paper [24] proposes the mechanism to match the semantic descriptions of

Web services adopting different ontological concepts. Efforts have been made in [15], [16] to obtain the semantic similarity between domain concepts though fuzzy set based techniques. A majority of the current approaches for web service discovery call for semantic web services that have semantic tagged descriptions through various approaches, e.g., OWL-S, Web Services Description Language (WSDL)-S. However, these approaches have several limitations. First, it is impractical to expect all new services to have semantic tagged descriptions. Second, descriptions of the vast majority of already existing web services are specified using WSDL and do not have associated semantics. Also, from the service requestor's perspective, the requestor may not be aware of all the knowledge that constitutes the domain. Specifically, the service requestor may not be aware of all the terms related to the service request. As a result of which many services relevant to the request may not be considered in the service discovery process.

Existing service discovery approaches often adopt keyword-matching technologies to locate the published web services. This syntax-based matchmaking returns discovery results that may not accurately match the given service request. As a result, only a few services that are an exact syntactical match of the service request may be considered for selection. Thus, the discovery process is also constrained by its dependence on human intervention for choosing the appropriate service based on its semantics.

Given the large number of web services and the distribution of similar services in multiple categories in the existing UDDI infrastructure, it is difficult to find services that satisfy the desired functionality.Such service discovery may involve searching a large number of categories to find appropriate services. Therefore, there is a need to categorize web services based on their functional semantics rather than based on the classifications of service providers.

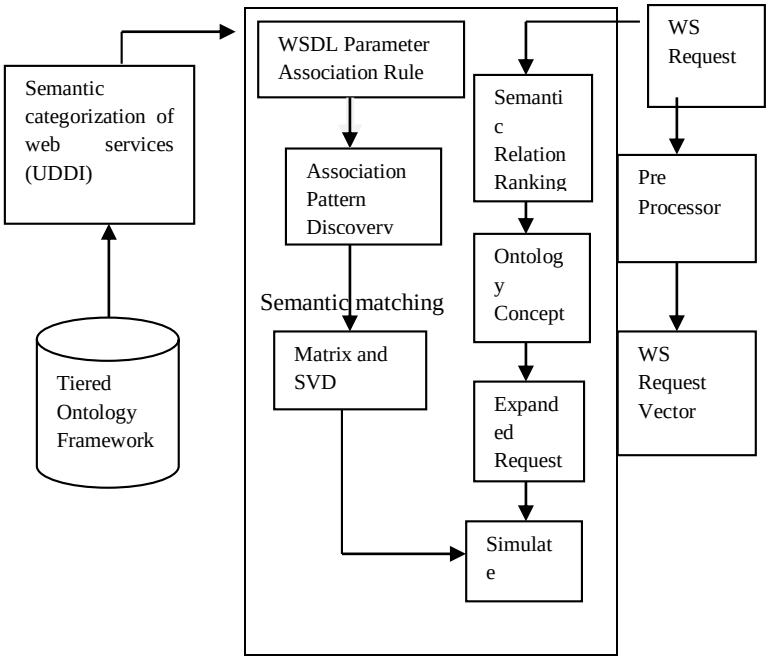
PROPOSED ARCHITECTURE

An integrated approach needs to be developed for addressing the two major issues related to automated service discovery: 1) semantic-based categorization of web services; and 2) selection of services based on semantic service description rather than syntactic keyword matching. Moreover, the approach needs to be generic and should not be tied to a specific description language. Thus, any given web service could be described using WSDL, OWL-S, or through other means. Semantic-based categorization of web services is performed at the UDDI that involves semantics augmented /classification of web services into functional categories.

The semantically related web services are grouped together even though they may be published under different categories within the UDDI. Service selection then consists of two key steps: 1) parameters-based service refinement; and 2) semantic similarity-based matching.

In order to address the limitations of existing approaches, an integrated approach needs to be developed for addressing the two major issues related to automated service discovery: 1) semantic-based categorization of web services; and 2) selection of services based on semantic service description rather than syntactic keyword matching. As in Fig.1.the proposed approach, semantic-based categorization of web services is performed at the UDDI that involves semantics augmented classification of web services into functional categories.

Figure:



Web service discovery approach using service categorization and refinement

IMPLEMENTATION

Service Categorization

The semantic categorization of UDDI combine ontology's with an established hierarchical clustering methodology, following the service description vector building process. For each term in the service description vector, a corresponding concept is located in the relevant ontology. If there is a match, the concept is added to the description vector. Additional concepts are added and irrelevant terms are deleted based on semantic relationships between the concepts. The resulting set of service descriptions is clustered based on the relationship between the ontology concepts and service description terms. Finally, the relevant semantic information is added to the UDDI for effective service categorization.

Service Refinement

The next step is service selection from the relevant category of services using parameter-based service refinement. Web service parameters, i.e., input, output, and description, aid service refinement through narrowing the set of appropriate services matching the service request. The relationship between web service input and output parameters may be represented as statistical associations. These associations relay information about the operation parameters that are frequently associated with each other. To group web service input and output parameters into meaningful associations, we apply a hyper clique pattern discovery. These associations combined with the semantic relevance are then leveraged to discover and rank web services.

Semantic Matching

The parameter-based refined set of web services is then matched against an enhanced service request as part of Semantic Similarity-based Matching. A key part of this process involves enhancing the service request. Our approach for web semantic similarity-based service selection employs ontology-based request enhancement and LSI based service matching. The basic idea of the proposed approach is to enhance the service request with relevant ontology terms and then find the similarity measure of the semantically enhanced service request with the web service description vectors generated in the service refinement phase.

CONCLUSION AND FUTURE WORK

This paper projected semantic based service discovery. The web service discovery relies on semantic categorization of web services and semantic enhancement of service request. The semantic categorization of web services is achieved

by ontology framework as offline in UDDI. Semantic enhancement of web services is achieved by parameter based service refinement and semantic similarity based matching. The matching of increased service request with retrieved service description is achieved by Latent Semantic Indexing (LSI).Ranking of semantic relationships, hyper clique pattern discovery, additionally used for the invention. Solely single web service is taken into account for matching service request. Therefore web service composition is not satisfied.

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