



A service concept recommendation system for enhancing the dependability of semantic service matchmakers in the service ecosystem environment

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ABSTRACT

A Service Ecosystem is a biological view of the business and software environment, which is comprised of a Service Use Ecosystem and a Service Supply Ecosystem. Service matchmakers play an important role in ensuring the connectivity between the two ecosystems. Current matchmakers attempt to employ ontologies to disambiguate service consumers' service queries by semantically classifying service entities and providing a series of human computer interactions to service consumers. However, the lack of relevant service domain knowledge and the wrong service queries could prevent the semantic service matchmakers from seeking the service concepts that can be used to correctly represent service requests. To resolve this issue, in this paper, we propose the framework of a service concept recommendation system, which is built upon a semantic similarity model. This system can be employed to seek the concepts used to correctly represent service consumers' requests, when a semantic service matchmaker finds that the service concepts that are eventually retrieved cannot match the service requests. Whilst many similar semantic similarity models have been developed to date, most of them focus on distance-based measures for the semantic network environment and ignore content-based measures for the ontology environment. For the ontology environment in which concepts are defined with sufficient datatype properties, object properties, and restrictions etc., the content of concepts should be regarded as an important factor in concept similarity measures. Hence, we present a novel semantic similarity model for the service ontology environment. The technical details and evaluation details of the framework are discussed in this paper.

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1. Introduction

The term "Service Ecosystem" has emerged from Veryard's book (Veryard, 2000), in which the author utilized a biological concept to analyse the components of our business and software environment. The Service Ecosystem contains both human users and artifacts which can be divided into two major components: (1) services that are meaningful and viable in the ecosystem; and (2) devices that enable the release and delivery of these services into the ecosystem. Services and devices in the Service Ecosystem are heterogeneous by nature and cover nearly all commercial and electronic services and devices in human society. Moreover, in accordance with the notion of demand/use and supply, Veryard separated the ecosystem into four components each with its own respective internal activities described as follows:

1. Service Use Ecosystem, in which services are demanded, used, and use of services are architected and configured, as well as

service publications being subscribed by human users and artifacts.

2. Service Supply Ecosystem, in which human users and artifacts architect, configure, publish, provide or deliver services through stable interfaces.
3. Device Use Ecosystem, in which devices are configured, installed, connected or called, and device behavior and system behavior are predicted.
4. Device Supply Ecosystem, in which devices are architected, provided and managed.

In addition, there are several factors that influence the above activities within each ecosystem. Availability is one of them, which is the ecological principle of the Service Supply Ecosystem. Availability refers to the accessibility, ease-of-use and reliability of services being supplied (Veryard, 2000). Furthermore, availability also impacts upon the connectivity between the Service Use Ecosystem and the Service Supply Ecosystem.

In order to ensure the availability of service supply, one important factor is to enable a service entity to be precisely matched with a service request. Whilst currently there are plenty of commercial search engines available for the service matchmaking,

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