

Dissertation

„Service Matching with Contextualized Ontologies“

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Abstract

In this thesis, we look at the problem of how the quality of service discovery can be increased. Three major issues are addressed to solve this problem: service **annotation**, service **composition**, and service **contextualization**.

Service annotation is the process of describing a service with semantic meta-data. In traditional service discovery a request fails instantly if keywords do not match the descriptions. With semantic annotation the service's meaning is machine-processable and automatic service matching is possible. Unfortunately, creating these annotations is mostly handwork.

Service composition allows increasing the set of possible matches. If the function of a service does not match a request exactly, it will fail. Composeable services can combine basic functionality from different services to meet the individual request precisely. The immense amount of semantic information needs to be handled efficiently here.

Service contextualization integrates context information into the matching process. User's and service's contexts contain facts of their individual environments and preferences. It can be used to improve the discovery quality by eliminating mismatches.

We present approaches that contribute to the previously described issues. The goal of this thesis is to improve the quality of service matching with an **automatic semantic service annotation framework, manageable service composition consideration and a service contextualization approach**.

The main elements of the thesis are a WSDL-to-OWL-S algorithm, which creates automatically semantic annotations to new developed Web services without extensive manual description work, a matching-cut procedure reducing the available semantic information in the service composition process which makes compositions considerable in the service discovery, and a service contextualization technique integrating context information from different domains into the service matching process completes the contribution.

We have implemented the approaches prototypically. The matchmaking components were evaluated with a large set of real semantic Web services to show the benefits of our approaches.

Keywords

Service Matching, Web Services, Semantic Service Description, Semantic Web, Context-Awareness, Location-based Services, Annotation, Contextualization, Service Composition, Ontologies, WSDL, OWL-S, Matching-Cut, Semantic Matchmaker, WLAN Positioning