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Supporting the Semi-Automatic Acquisition of Semantic RESTful Service Descriptions

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Abstract. This paper presents SWEET: Semantic Web sErVICES Editing Tool, the first tool developed for the semi-automatic acquisition of semantic RESTful service descriptions, aiming to support a higher level of automation of common RESTful service tasks, such as discovery and composition.

1 Introduction

The increasing importance and use of Web services have resulted in researchers proposing Semantic Web Services (SWS) as means for automating many common tasks involved in using Web services. Discovery, negotiation, composition and invocation can have a higher level of automation, when Web services are supplemented with semantic descriptions of their properties. On the other hand, the growing popularity and use of Web 2.0 technologies has led to the increased adoption of the RESTful paradigm. Not only are RESTful services more lightweight than WSDL-based services because they follow no strict description format. They also enable combining heterogeneous data coming from diverse services, in order to create data-oriented service compositions called mashups. Similarly to traditional SWS, which improve the automation of WSDL-based solutions, the adding of annotations to RESTful services can bring further automation to the process of creating mashups, in addition to the discovery and invocation tasks.

Current approaches in the area of semantic RESTful services (SRS) include the development of formalisms for the semantic annotation. MicroWSMO [3] is one such formalism, which relies on the hREST [1] microformat for describing the main aspects of a service such as operations, inputs and outputs, and uses hooks for relating semantic information. SA-REST [2], on the other hand, uses the grounding principles of SAWSDL and RDFa for marking service properties. Even though, there is some research done targeted at supporting the use of SRS, for example in the form of mashpus [2], there are no contributions aiming to support the acquisition of semantic descriptions of RESTful services.

SWEET: Semantic Web sErVICES Editing Tool is the first tool developed to assist the semi-automatic acquisition of SRS. Its goal is to hide formalism complexities from the user and to assist him/her in adding metadata by recommending suitable annotations. As a result, SWEET contributes directly to improving the automation of the discovery and composition of RESTful services.

2 Supporting the Annotation of RESTful Services

SWEET consists of three main components, including the visualization component, the data preprocessing component and the annotations recommender. The annotations recommender assists the user in annotating a service by suggesting suitable annotations for the service as a whole (domain ontology recommendation) and for its individual properties. This component is based on a hybrid recommendation approach combining content based recommendation, implemented by computing similarity measures, between the description of the new service to be annotated and previously annotated services, and ontology-based recommendation. The data preprocessing component implements functionalities for data preparation for the visualization component, caching mechanisms and simple rule-based analysis. Finally, the main task of the visualization component is to implement the user interface, which enables users to identify service properties based on the MicroWSMO ontology, to choose an appropriate domain ontology based on the annotations recommender suggestions, and to annotate service properties by making model reference to the domain ontology. In addition, the visualization component assist the user in recognizing the service structure and properties by graphically highlighting the service address, operations, inputs and outputs. This component is inspired by PowerMagpie [4], taking the form of a vertical widget as an extension of a classical web browser. In this way, the user can view the RESTful service description in a browser, start SWEET and make annotations. The result is a MicroWSMO service description, which can be shared and reused by other users. While all three components have complete specifications, including design models and computational methodologies, only the visualization component is fully implemented and the other two are still under development.

SWEET is a major contribution towards providing semantics for RESTful services, since it reduces the amount of necessary manual work by making annotation suggestions and hides formalism complexity behind an effective and easy-to-use user interface. The development of SWEET is based upon work partially supported by the EU funding under the project SOA4All (FP7 - 215219).

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