

A Model of User Preferences for Semantic Services Discovery and Ranking

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Abstract. Current proposals on Semantic Web Services discovery and ranking are based on user preferences descriptions that often come with insufficient expressiveness, consequently making more difficult or even preventing the description of complex user desires. There is a lack of a general and comprehensive preference model, so discovery and ranking proposals have to provide ad hoc preference descriptions whose expressiveness depends on the facilities provided by the corresponding technique, resulting in user preferences that are tightly coupled with the underlying formalism being used by each concrete solution. In order to overcome these problems, in this paper an abstract and sufficiently expressive model for defining preferences is presented, so that they may be described in an intuitively and user-friendly manner. The proposed model is based on a well-known query preference model from database systems, which provides highly expressive constructors to describe and compose user preferences semantically. Furthermore, the presented proposal is independent from the concrete discovery and ranking engines selected, and may be used to extend current Semantic Web Service frameworks, such as WSMO, SA-WSDL, or OWL-S. In this paper, the presented model is also validated against a complex discovery and ranking scenario, and a concrete implementation of the model in WSMO is outlined.

Keywords: User Preferences, Ontology Modeling, Semantic Web Services, Service Discovery, Service Ranking.

Summary of the Contribution

In this paper, published in the 7th Extended Semantic Web Conference (ESWC 2010) [1], we presented a highly expressive model aimed at decoupling user preferences definition from underlying formalisms of discovery and ranking engines. These engines typically offer ad hoc ontologies to define user preferences, constraining the expressiveness and making difficult their combination with other discovery and/or ranking approaches. In order to overcome these issues, we proposed an intuitive preference model based on a strict partial order interpretation of preferences.

Essentially, our preference ontology offers the user a series of constructs that allow to define (1) concrete *atomic* preference terms, which state preferred values for a particular service property, and (2) *composite* preferences, which allow the composition of different preference terms using intuitive criteria.

Concerning atomic preference terms, our ontology provides both qualitative and quantitative facilities, that can be correspondingly applied to non-numerical and numerical service properties. Each atomic preference term refers to a single property, though they can be combined using composite preferences. Therefore, composite preferences allows the definition of complex preferences regarding several service properties.

In order to evaluate the usefulness of our proposal, we validated our model using a complex scenario about logistics management from the SWS Challenge¹. This scenario consists on seven logistics service offers, described in natural language in terms of different properties, along with a series of service requests (goals) that contain both hard requirements and user preferences. The performed validation proved that our preference model can be used to define complex user preferences.

Additionally, we discussed the extension of WSMO service goals with preference information using our model. This application allowed a seamless integration of preference definitions in WSMO descriptions, refining the service goal meta-model. Therefore, current discovery and ranking approaches could still be applied to extended goals definitions, whereas specialized ranking engines can be easily implemented to account for preferences.

In conclusion, this research work presented a novel approach to define user preferences for Semantic Web Services that offers a highly expressive, intuitive semantic model, which supports and combines both qualitative and quantitative preference terms. Moreover, our proposal is independent of the underlying discovery and ranking formalisms, allowing its extension and application to any Semantic Web Services framework.

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References

1. García, J.M., Ruiz, D., Ruiz-Cortés, A.: A model of user preferences for semantic services discovery and ranking. In: Aroyo, L., Antoniou, G., Hyvönen, E., ten Teije, A., Stuckenschmidt, H., Cabral, L., Tudorache, T. (eds.) ESWC (2). Lecture Notes in Computer Science, vol. 6089, pp. 1–14. Springer (2010)

¹ The complete scenario description can be found at http://sws-challenge.org/wiki/index.php/Scenario:_Logistics_Management