

# Query Discovery for Translating User Model Data

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**Abstract.** To exploit the fact that students usually extensively use numerous Web applications to gain knowledge, it is advantageous for the E-learning applications to exchange and share information with other applications. To exchange information we have to be able to translate this user model information between the different application models. Based on Semantic Web technology, we look into generating these translations and in this paper we address current research on the language for expressing these translations.

## 1 Student Modeling on the Semantic Web

Many applications, in particular e-learning systems, need to maintain accurate and up-to-date information about their users in order to personalize the information and functionality they offer. Moreover, the Web is an ever-growing source for both information and applications. The overwhelming choice results in users dividing their time over many applications and the needed information for the applications gets scattered over all applications. Both applications (more detailed user information) and users (less overhead) would greatly benefit from the exchange of information between applications.

The Semantic Web initiative provides a common data model to express data and data about data (meta data). Moreover, a Web-language like OWL allows to describe the semantic structure of data in form of an ontology. But, even though you can describe properties and structure of the data, it does not allow you to specify the *meaning* of the data.

## 2 Mapping Language

In [1] we looked at the general structure of a translation component for user profiles. One of the issues of such a component is choosing the language to specify the mappings. The mapping should be a 'recipe' that specifies how to translate a given schema instance of schema *A* into an instance of schema *B*. Designing a mapping language requires to consider a number of issues. Some of these issues are:

- Semantic Web ontologies are descriptive, meaning that they *describe* a data domain rather than that they *prescribe* how to write down data. This has the consequence that the exact structure of an RDF document is not known beforehand.
- Information in RDF is structured as a graph. The elements within this graph do not always contain atomic “pieces” of information, but rather are only meaningful in combination with several other elements in its surrounding.
- Information in different models may use a different syntax for semantically equivalent objects. In general, we should be able to translate information between schematic elements that have an X-to-one relationship (i.e. not only equality).
- Some information should only be translated if one or more conditions hold. In the context of the student models we may, for example, only be interested in practical experience for some subject if this experience is gained less than a year ago.
- We might also want to use external data in our translation. For elements that have an X-to-one relationship we might want to use a data dictionary for our translation.

Mapping languages are already studied to some agree for relational databases and XML sources (e.g. [2], [3]). They are usually part of a larger process called query discovery [2]. In our study we also target query discovery and we focus on Semantic Web data. We want to try to exploit the explicit logic of e.g. OWL schema descriptions. Furthermore, we choose to focus on user data, to already have a context of what the information in the schemas is about (i.e. the specific users).

We discussed a number of issues that are of importance for our current research where we are creating a mapping tool for the automated translation of RDF-data adhering to different ontologies. We support the inclusion of not only ontology mappings, but also a number of other ingredients that help to derive the complete recipe for translating a student model into a model for another application. The tool is based on data expressed in RDF/OWL and uses elements from relevant query languages for the query expressions. This mapping tool is part of our larger effort for creating interoperability of user models [1].

## References

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