Ontology Alignment Specification Language

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Abstract. Ontology mediation is one of the key research topics for the acomplishment of the semantic web. Different tasks can be distinguished under this generic term: instance transformation, query rewriting, instance unification, ontology merging or mapping creation. All first four tasks require a mapping specification between the ontologies to be mediated. Mapping creation using tools and algorithms is outputting such a specification. We argue in this thesis proposal that a specific language to express mapping specifications is needed. This proposal presents arguments why such a language is needed, introducing particularly the concept of mapping patterns, based on a study of the frequent mismatches arising when trying to mediate between ontologies. Such a language is then proposed and its applicability is demonstrated for three scenarios: a graphical tool for ontology mapping, an output format for ontology matching algorithms and a merging algorithm. We also give first results on the language design, mainly represented by an alignment ontology.

1   Contributions of the proposed thesis

With this thesis we expect to achieve the following goals:

 — Having a language able to model ontology mappings patterns.
 — Having demonstrated this language is of practical use by using it for concrete mediation tasks.
 — Providing usable tools around the language (API, patterns library)
 — Having the mapping language being used as a standard way for representing and exchanging ontology mappings

The language referenced in this proposal is already used by two ontology mapping tools: a graphical mapping editor a text editor to edit mapping documents. The mapping language is compatible and extends the ontology alignment format used as part of the Ontology Alignment Evaluation Initiative[1]. The Alignment Format allows to express simple mappings while the mapping language is more expressive. A few algorithms are actually able to detect such complex mappings. We developed a merging algorithm[1] able to automatically merge a set of ontology in a network, given one to one mappings between ontologies. As today the language is reaching some maturity given the feedback of the graphical mapping tool implementation and the support of the ontology alignment format. Next steps are given in Section 3.

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[1] http://oaei.ontologymatching.org

2 Results

We defined based on a list of requirements a mapping language specified in semantic web standard RDF, and using an OWL ontology in its last version. We also maintain a Lisp-style syntax, more convenient to be read. Due to limited place we will not present the syntax in this document but strongly encourage the reader to look at the language specification and ontology[2]. A Java API providing methods to parse and export mapping documents as well as giving an in-memory representation is under development. We also developped a library of common mapping patterns and currently adapt it to rdf graph patterns. This library is available in [2]. Parts of this work are published in [3, 4, 1, 5].

3 Conclusions and Future Work

We have studied a set of requirements a mapping language should have and compared state of the art formalisms to represent mapping with this requirements. From this we have designed an ontology mapping language answering the given requirements at best. We actually have a rather stable syntax for the language and propose a library of common mapping patterns and an API to deal with mapping language constructs. We also aligned the language with the Alignment Format and propose an algorithm to merge a set of ontology on provided mappings. We currently work on a SPARQL based mediation engine, able to transform instances from one ontology to another at the RDF level. We plan to finish this thesis before the end of the current year and therefore need to start the writing task soon. We also plan to push the mapping language towards standardization.

References

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[2] **http://www.omwg.org/TR/d7/**