

The Relevance of Reasoning and Alignment Incoherence in Ontology Matching

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Abstract. Ontology matching has become an important field of research over the last years. Although many different approaches have been proposed, only few of them are committed to a well defined semantics. As a consequence, the possibilities of reasoning are not exploited to their full extent. A reasoning based approach will not only improve ontology matching, but will also be necessary to solve certain problems that hinder the progress of the whole field. We focus on the notion of alignment incoherence to understand the capabilities of reasoning in ontology matching.

1 Problem Statement

Ontology matching has been identified as key element towards realizing the vision of the semantic web by bridging the gap between different conceptualizations of similar or overlapping domains. The core problem is the detection of semantic relations between concepts, properties or instances of two ontologies. In addition, many important side issues have been tackled, e.g. collaborative ontology matching, matcher selection, versioning of alignments, etc. Nevertheless, the role of semantics and in particular the role of reasoning in the context of ontology matching has been neglected or dealt with in an imprecise manner. This can be explained by the fact that many ontologies typically used as testcases within the matcher community are hierarchies that do not contain expressive constructs such as disjointness or property restrictions. Some of these ontologies, for example, are not modeled by knowledge engineers but based on automatically converting poorly structured knowledge bases into OWL.¹ Thus, any reasoning based approach will not exploit its full potential on most accepted testcases. Another explanation can be found in the history of ontology matching which can be seen as a further development of matching database or XML schemas. Ontologies are in most cases interpreted within a DL based semantics, where we find clear definitions of notions like e.g. entailment, satisfiability and inconsistency. Contrary to this, a comparable model based semantics is often not

¹ In the Ontology Alignment Initiative [1], for example, we find a large deal of ontologies that are automatically generated OWL representations of Thesauri or Web directories or have been converted from formalisms like OBO.