One Query at a Time: Incremental, Collective Ontology Matching

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1 Introduction

Ontology matching is not an end in itself but a prerequisite for applications like query answering over different data sources. In software repository analysis, for example, queries reflect process metrics that researchers want to investigate. Hence, being able to answer such queries on multiple data sets without having to perform data transformations or manual query rewriting is a desirable objective. Unfortunately, the terminological differences and often complex correspondences between different software repository representations impede a completely automatic matching and necessitate user input to create more comprehensive alignments [4].

Our work is concerned with the question of when and how users should introduce their expertise into the matching process. Similar to other approaches, such as the keyword-based information retrieval tasks, which Ellis et al. [1] use to extract user knowledge about ontology alignments, we integrate the input process into the desired application – query translation between different software repositories. From the way this task is carried out, both simple and complex correspondences are inferred. In future translation tasks, these correspondences are reused to incrementally reduce the number of required user interactions. As users only translates their queries of interest, the overall effort for alignment creation is collectivized. In this poster, we present the general architecture of our system and the rules used for complex alignment extraction.

2 Rule-Based Inference of Ontology Alignments

Our approach assumes a setup were a source and a target repository are described by ontologies $\mathcal{O}_{R1}$ and $\mathcal{O}_{R2}$ containing the respective TBoxes $\mathcal{T}_{R1}$ and $\mathcal{T}_{R2}$, respectively. A query translation thus aims to recreate a query, which was originally issued on $\mathcal{O}_{R1}$, by using concepts from $\mathcal{T}_{R2}$. A graph based abstraction is used to express the queries in a query language independent manner [2]. After a preprocessing step performed an automatic ontology matching, users can transform the remaining unmatched elements of those query graphs using the editor shown in Figure 1. To this end, they select the input element(s) and provide an according output graph. In simple cases, the output graph is structurally similar to the input graph, and only node and edge labels change. Inference of element correspondences is straightforward and comprises concept equivalence and subsumption. If relabelling does not suffice and the graph structure changes, complex correspondences are inferred. Our system employs a rule set to determine which types of correspondences users provide through their input/output graph transformations. The rules are based on the patterns identified by Ritze et al. [3]. For any subsequent query translations, existing transformations are automatically applied by the system, hence, users only have to provide correspondences for missing elements and the required manual effort gradually decreases.

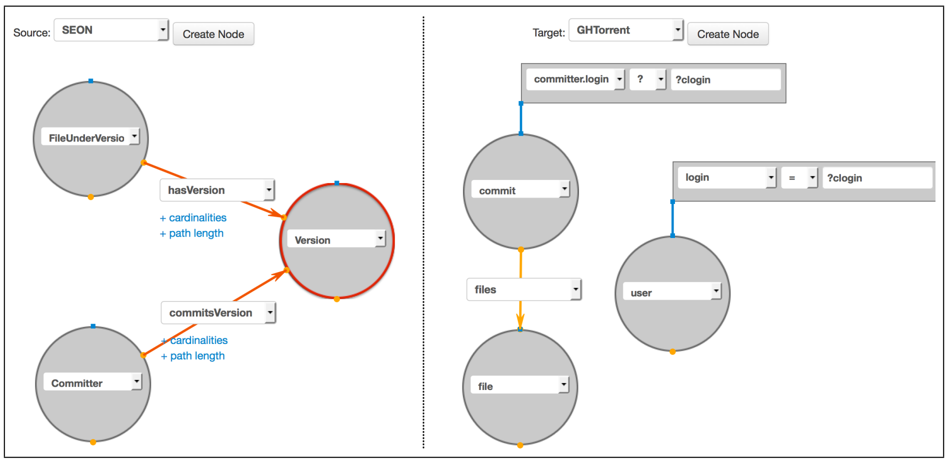

Figure 1. Query graph editor for translating input graph elements (marked red) to an output graph on the right hand side.

References

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