A Visual SOA-based Ontology Alignment Tool

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Abstract. Ontology alignment is the process of matching related concepts from different ontologies. We propose a semi-automatic, visual approach which combines two algorithms for finding candidate alignments with visual navigation and analysis tools. The implementation is based on a Service-Oriented Architecture (SOA) to achieve scalability.

1. Motivation

A variety of ontology alignment algorithms have been proposed [1]. However, when algorithms cannot deliver the desired performance, it is necessary to include humans in the process. Visual semi-automatic alignment tools have been developed for this purpose, allowing experts to apply their knowledge. A survey of such systems [2] provides a summary of user requirements which served us as guidelines for designing our visual Semantic Mediation Tool.

2. Proposed Solution

The Semantic Mediation Tool (SMT) is a client-server tool for semi-automatic, visually supported alignment of ontologies. Alignment algorithms are executed on the server built around a service-oriented architecture to provide scalability. Currently two algorithms are available: the first uses an external taxonomy (WordNet) to measure the distance between the concepts based on their labels, using the Wu-Palmer measure [5]; the second is a machine learning-based method consisting of concept vectorization, hierarchical concept clustering [4] and cluster-local match finding.

The client (Figure 1) displays concept mappings computed by the alignment algorithms and provides visual tools supporting the user in reviewing the suggested mappings. Ontology membership of concepts is encoded by color (red vs. green) in all components of the interface. A table (top-left) lists all computed mappings and allows the user to accept or reject them. For the mapping selected in the table (blue row), each concept is visualized in one the two Multimodal Semantic Browsers [3] (on right). The browsers are graph visualizations showing concepts within their

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ontological neighborhood, providing additional, detailed information valuable for reviewing. An information landscape (bottom-left) offers an overview of all concepts in a layout where similar concepts are placed close to each other [4]. Landscape regions are labeled with terms describing underlying concepts, which empowers the user to identify regions covering topics of interest and regions containing promising matching candidates (i.e. areas filled with both red and green dots). Concepts from a region can be selected using a lasso selection tool, which will filter the mappings in the table so that only mappings containing selected concepts will be shown.

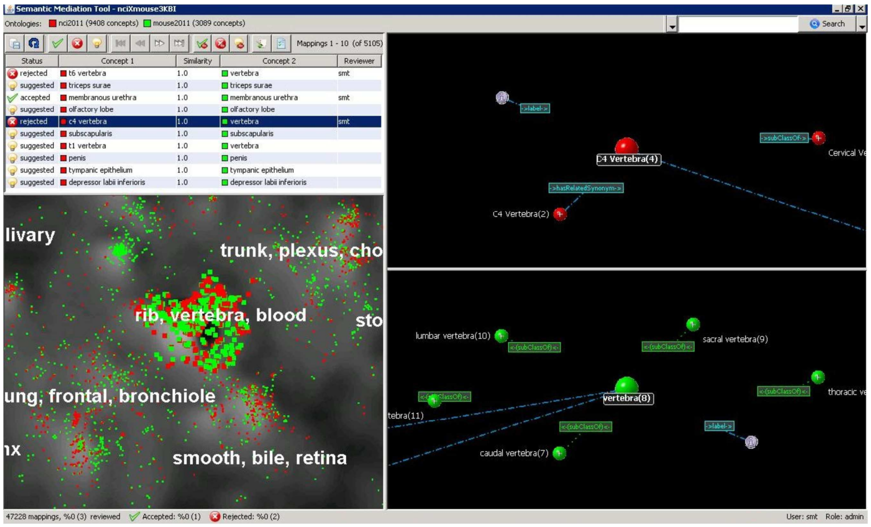

Figure 1 – SMT client mediating 18816 concepts from the Anatomy benchmarks.

3. Future Work

As the next step, we see the evaluation of the alignment algorithms using OAEI data sets, with preliminary results already revealing issues such as the lack of a string-based matcher. Usability evaluation of the user interface shall be performed using controlled experiments to evaluate the impact and usefulness of the visualizations.

References

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