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A Graph Derivation Based Approach for Measuring and Comparing Structural Semantics of Ontologies

Abstract:

Ontology reuse offers great benefits by measuring and comparing ontologies. However, the state of art approaches for measuring ontologies neglects the problems of both the polymorphism of ontology representation and the addition of implicit semantic knowledge. One way to tackle these problems is to devise a mechanism for ontology measurement that is stable, the basic criteria for automatic measurement. In this paper, we present a graph derivation representation based approach (GDR) for stable semantic measurement, which captures structural semantics of ontologies and addresses those problems that cause unstable measurement of ontologies. This paper makes three original contributions. First, we introduce and define the concept of semantic measurement and the concept of stable measurement. We present the GDR based approach, a three-phase process to transform an ontology to its GDR. Second, we formally analyze important properties of GDRs based on which stable semantic measurement and comparison can be achieved successfully. Third but not the least, we compare our GDR based approach with existing graph based methods using a dozen real world exemplar ontologies. Our experimental comparison is conducted based on nine ontology measurement entities and distance metric, which stably compares the similarity of two ontologies in terms of their GDRs.