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Assessing the Quality of Domain Ontologies: Metrics and an Automated Ranking System

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Abstract— The ability of a user to select an appropriate, high-quality domain ontology from a set of available options would be most useful in knowledge engineering and other intelligent applications. Doing so, however, requires good quality assessment metrics as well as automated support when there is a large number of ontologies from which to make a selection. This research analyzes existing metrics for domain ontology evaluation and extends them to derive a Layered Ontology Metrics Suite based on semiotic theory. The metrics are implemented in a Domain Ontology Ranking System (DoORS) prototype, the purpose of which is to search an ontology library for specific terms to retrieve candidate domain ontologies and then assess their quality and suitability based upon the suite of metrics. The prototype system is compared to existing approaches to automated ontology quality ranking to illustrate the usefulness of the research.

Keywords—Domain ontology, interoperability, metrics, ontology assessment, ontology evaluation, ranking, ontology, semiotics, semiotic layers, domain ontology ranking system

1 INTRODUCTION

In philosophy, the study of ontology deals with the nature of reality - exploring the similarities, differences and relationships between the types of entities that exist [15]. Researchers in information systems and knowledge-based systems have expanded the definition so that the term ontology refers to, not only the vocabulary itself, but also the concepts the vocabulary is intended to express [14]. Domain Ontologies, in

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