

Evaluating the Effectiveness of a Knowledge Representation Based on Ontology in Ontoweb System

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Abstract. In the past few years, several studies have emphasized the use of ontologies as an alternative to information organization. The notion of ontology has become popular in fields such as intelligent information integration, information retrieval on the Internet, and knowledge management. Different groups use different approaches to develop and verify the effectiveness of ontologies [1] [2] [3]. This diversity can be a factor that makes it difficult the formalization of formal methodologies of evaluation. This paper seeks to provide a way to identify the effectiveness of the knowledge representation based on ontology that was developed through Knowledge Based System tools. The reason for that is because all processing and storage of gathered information and knowledge base organization is done using this structure. Our evaluation is based on case studies in the Ontoweb system [4], involving real world ontology for money laundry domain. Our results indicate that modification of ontology structure can effectively reveal faults, as long as they adversely affect the program state.

1 Introduction

The application testing is an important stage of the system development process. These tests intend the verification of all the functionalities of the tool, inferring that the results are the ones expected when the system was conceived. However, it is particularly difficult to engage in ontology evaluation where the entire system design assumes a high degree of interaction between user and system, and makes explicit allowance for clarification and recovery. This is the case of KMAI - an intelligent knowledge management platform [5].

The unique approach towards the formal evaluation of ontologies is OntoClean [6], as it analyses the intentional content of concepts. Although it is well documented in numerous publications, and its importance is widely acknowledged, it is still used rather infrequently due to the high costs for applying OntoClean, especially on

tagging concepts with the correct meta-properties. Open response tests, especially those making use of nonsense words, require an extensive training of the listeners. However, additionally to the word and phoneme scores, possible confusions between phonemes are obtained. This allows for diagnostic analysis. Redundant material (sentences, rhyme tests) suffers from ceiling effects (100% score at poor-to-fair conditions) while tests based on nonsense words may discriminate between good and excellent conditions.

In earlier works, we used a methodology called Mind Engineering [7] to identify and organize ontologies using a collaborative web tool called Knowledge Engineering Suite (see item 2.2). This tool is a module of a KMAI Platform. Mind Engineering allows building a knowledge base, improving the construction of the ontology of the domain and the automatic representation of cases in knowledge-based systems, either in the legal area or any other knowledge management domain [8]. The methodology of test it is focused in the verification of the expected result of the system when of the use of the ontologies for the recovery of the information. The tests are affected from the terms that are part of the domain ontologies created for a specific application.

Despite the fact that testing provides a proof of correctness for only those test cases that pass, it remains popular due in part to its low, incremental cost. Our evaluation is based on two case studies involving real world applications based on ontology. Our results indicate that specification based assertions can effectively reveal faults, as long as they adversely affect the program state.

Therefore our paper is organized as follows. In section 2 we present the KMAI System and Knowledge Engineering structure. In section 3 we describe the participation of the ontology structure in the KMAI System and aspects of ontology application. In turn these aspects will be applied in our recall measures. In section 4 we will introduce ontology evaluation process. Section 5 will develop recall measures for ontology in the Ontoweb system. We end with a brief conclusion and with future work.

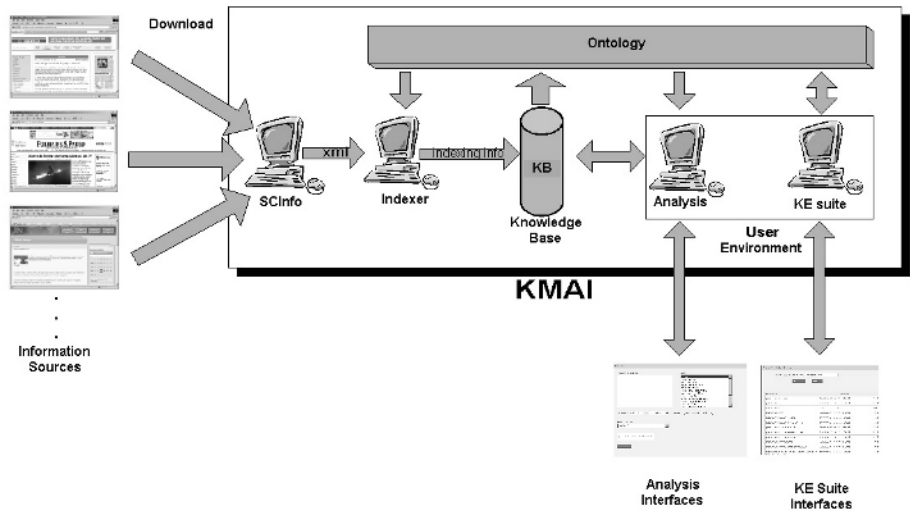


Fig. 1. The participation of the ontology structure in the Kmai System