

Divergent Exploration of an Ontology

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ABSTRACT

This paper discusses an ontology exploration tool which allows the users to explore an ontology according to their own perspectives. It extracts concepts from an ontology and visualizes them in a user-friendly form, i.e. conceptual map, in which the user is interested. It helps users to understand the extracted knowledge from the ontology, and contribute to integrated understanding of ontologies and domain dependent knowledge.

Keywords

ontology exploration, view point, conceptual map

1. INTRODUCTION

Ontologies are designed to provide systematized knowledge and machine readable vocabulary of domains for Semantic Web applications. It is important that the ontology captures the essential conceptual structure of the target world as generally as possible. However, such ontologies are sometimes regarded as verbose and divergent descriptions by domain experts because they often want to understand the target world from the domain-specific viewpoints in which they are interested. In many cases their interests are different, even if they are experts in the same domain. Therefore, it is highly desirable to have not only knowledge structuring from the general perspective but also from the domain-specific and multi-perspective so that concepts are structured for appropriate understanding from the multiple domains. To satisfy the requirement, we developed an ontology exploration tool which allows the users to explore and understand ontology from multiple perspectives according to their interest.

2. DIVERGENT EXPLORATION OF AN ONTOLOGY

Ontology is defined as an “explicit specification of conceptualization” by Gruber [1]. In other words, a target world is captured (conceptualized) by the author of the ontology. Construction of a well-designed ontology presents an explicit understanding of the target world that can be shared among people. That is, the essential conceptual structure of the target world is understood through its ontology. Based on ontology engineering, a variety of knowledge can be organized in terms of general, highly versatile concepts and relationships. Because an ontology systematizes generalized concepts and relationships in a domain-neutral way at the primitive level, domain-specific knowledge viewed from a specific viewpoint can be represented by combining them. The viewpoint-dependent knowledge can also be generated from ontology thanks to the machine readable format of the ontology. We propose divergent exploration of an ontology to generate the viewpoint-specific knowledge from it.

The divergent exploration in “the ocean of concepts” enables researchers to search for interesting concepts/relationships that have been hidden in the conventional unstructured world guided by divergent thinking across domains. The divergent exploration of an ontology can be performed by choosing arbitrary concepts according to the explorer’s intention to obtain what we call “multi-perspective conceptual chains.” There should be many ways of tracing the conceptual chains geared for various aspects of the ontology. The multi-perspective conceptual chains represent the explorer’s understanding of ontology from the specific viewpoint. The visualization of them in a user-friendly form, i.e., a conceptual map, contributes to integrated understanding of the ontology and its target world from multiple perspectives across domains. It bridges the gap between ontology and domain experts (Fig.1). On the basis of this observation, we developed an ontology exploration tool which supports the divergent exploration of an ontology and the generation of a conceptual map.

3. DEVELOPMENT OF AN ONTOLOGY EXPLORATION TOOL

The ontology exploration tool have two main functions: 1) exploration of multi-perspective conceptual chains depending on viewpoints and 2) visualization of them. In this section, we summarize these functions with an example.

We define the viewpoint for exploring an ontology as the combination of a focal point and an aspect. The focal point indicates a concept to which the user pays attention as a starting point of the exploration. The aspect is the manner in which the user explores the ontology. Because an ontology consists of concepts and the relationships among them, the aspect can be represented by a set of methods for extracting concepts according to its relationships. We classify the relationships into *four types*

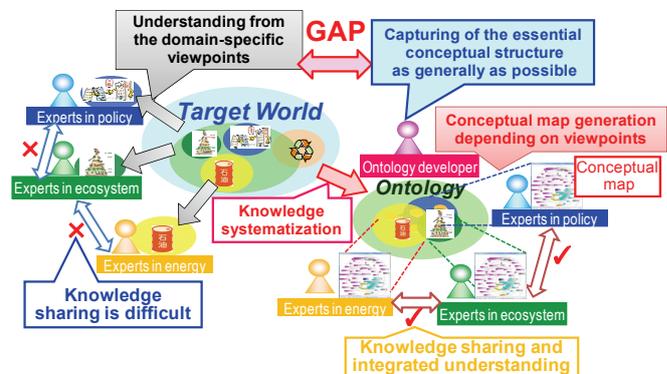


Fig.1. Understanding of an ontology and its target world systematically across domains using multiple conceptual maps.

