

Chapter 7

Domain-Specific Ontologies Trading for Retrieval and Integration of Information in Web-Based Information Systems

José-Andrés Asensio
University of Almería, Spain

Javier Criado
University of Almería, Spain

Luis Iribarne
University of Almería, Spain

Nicolás Padilla
University of Almería, Spain

ABSTRACT

This chapter introduces the use of domain-specific ontologies through Web trading services as a mechanism for retrieval and integration of information between different systems or subsystems. This mechanism is based on a three-level data architecture, which can be demonstrated by the use of trading service. This architecture includes data at its first level, meta-information on its second level in order to facilitate the processes of retrieval of information, and meta-meta-information at its third level to facilitate the integration of information-through-trading-services. This proposal is a new approach to the process of retrieval and integration of information for Web-based Information Systems (WIS). This chapter presents a case study for a WIS application of an Environmental Management Information System (EMIS), called SOLERES.

DOI: 10.4018/978-1-61520-921-7.ch007

INTRODUCTION

With the progress of technology, Information Systems (IS) must be more and more flexible, easily scalable, and providing full accessibility to its users, enabling the collaborative work, and facilitating the access to the information and so on, an information which can come from different sources, to help them in the decision-making process, etc., that is called “convergent systems”. All these features can be achieved basically through the use of: (a) a common vocabulary between all systems, provided by the ontologies, and (b) a certain capacity to mediate between systems, which favours communication, negotiation, coordination, etc. In this way, current WIS are developed under open and distributed paradigms, and are based on rules and standards that enable interaction and interconnection in real time (Xiao-Feng *et al.*, 2006). The main tools used for implementing these systems are XML technologies, semantic web, techniques of query and extraction of information, or web data-mining, among others (Taniar *et al.*, 2004).

Usually, web users have a great volume of information and use search engines, websites, digital libraries, and other systems, for querying and retrieval of information. Even so, users have to make an effort to locate the relevant content. In an attempt to solve this problem, a wide variety of techniques have been developed in Web-Based Information Systems (WIS), related to searching, recovering (Carrillo-Ramos *et al.*, 2006) and filtering of information. Trader can be considered as another solution to perform these processes in open and distributed systems (Trader, 1996). Although traditionally used as middleware to provide interoperability among objects, they can be easily adapted to replace these objects for information, as it will be exposed in the development of this work.

The rest of the chapter is structured as follows. Section 2 provides a brief description of the state of the art in this field. Section 3 provides

an overview of the architecture of data with the three levels mentioned above, and its justification with the use of the trading service for retrieval and integration of information. Then, in Section 4 this is applied in a sample scenario. And finally, conclusions are presented in Section 5.

RELATED WORK

This section reviews the most important work done in the field of the application of domain-specific ontologies and trading services to the processes of retrieval and integration of information.

Some works suggest the use of ontologies in the process of searching and retrieval of information in order to improve this process (Chien *et al.*, 2007; Chien *et al.*, 2010). For example, in (Qi *et al.*, 2008) they use a domain-specific ontology for the query of web documents. There are also works that propose ontologies as a mechanism for the integration between different systems. While in (Dartigues *et al.*, 2007) an approach to the integration between a Computer-Aided Design-(CAD) system and a Computer-Aided Process Planning (CAPP) system is described, in (Rajapakse *et al.*, 2008) they propose another domain-specific ontology for the integration of information-databases with scientific literature and the subsequent search. For its part, (Sousan *et al.*, 2007) provides an Intelligent-Web-Service based on semantics for the retrieval and integration of information that uses a domain-specific ontology, which contains the user preferences and is developed and refined by the searching that they perform.

As far as trading services are concerned, there are works that use a domain ontology to define the vocabulary that describes the services, and a trader that facilitates the finding of service which best fits the preferences of the user (Sora *et al.*, 2009). In (Zein *et al.*, 2006) they go a step further and propose an ontology-based-trader to

10 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the product's webpage:

www.igi-global.com/chapter/domain-specific-ontologies-trading-retrieval/52867?camid=4v1

This title is available in InfoSci-Social Technologies, InfoSci-Books, Business-Technology-Solution, Communications, Social Science, and Healthcare, InfoSci-Select, InfoSci-Media and Communications, InfoSci-Social Sciences and Humanities, InfoSci-Select, InfoSci-Select. Recommend this product to your librarian:

www.igi-global.com/e-resources/library-recommendation/?id=21

Related Content

Contextual Ontology Modeling Language to Facilitate the use of enabling Semantic Web Technologies

Laura Caliusco, César Maidana, Maria R. Galli and Omar Chiotti (2006). *Web Semantics & Ontology* (pp. 68-90).

www.igi-global.com/chapter/contextual-ontology-modeling-language-facilitate/31198?camid=4v1a

Deriving Competitive Foresight Using an Ontology-Based Patent Roadmap and Valuation Analysis

Amy J.C. Trappey, Charles V. Trappey, Ai-Che Chang and Jason X.K. Li (2019). *International Journal on Semantic Web and Information Systems* (pp. 68-91).

www.igi-global.com/article/deriving-competitive-foresight-using-an-ontology-based-patent-roadmap-and-valuation-analysis/223109?camid=4v1a

A Modal Defeasible Reasoner of Deontic Logic for the Semantic Web

Efstratios Kontopoulos, Nick Bassiliades, Guido Governatori and Grigoris Antoniou (2013). *Semantic Web: Ontology and Knowledge Base Enabled Tools, Services, and Applications* (pp. 140-167).

www.igi-global.com/chapter/modal-defeasible-reasoner-deontic-logic/76175?camid=4v1a

Automatic and Semi-Automatic Techniques for Image Annotation

Biren Shah, Ryan Benton, Zonghuan Wu and Vijay Raghavan (2007). *Semantic-Based Visual Information Retrieval* (pp. 112-134).

www.igi-global.com/chapter/automatic-semi-automatic-techniques-image/28924?camid=4v1a