

Chapter 5

A Methodology for the Development of Computer Ontologies Based Extractor Information

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ABSTRACT

In this chapter we propose a new methodology for ontology building, which is based on a set of mapping rules from a conceptual schema (Entity-Relationship) and its corresponding logical model (relational model) toward a conceptual ontology. The proposed methodology consists of three big steps, which are, the Transformation (mapping), the Formalization and the Codification. The crucial step in the building process of this methodology, is the transformation, this last is based on an automatic extraction of information for a conceptual model ER (such as entities, relationship, properties and cardinalities). The data stored in the database (the schema extension) are extracted and used to create instances of the ontology. At the end of this stage we will have a complete conceptual ontology can be used in different applications. The objective behind this work has several aims, which can be exploited in many fields, among others, search and retrieval of relevant terms in a domain of discourse, our methodology minimizes the manual work and gives a good result in an optimal time, the second is to facilitate the migration of an information system based on a classical approach (entity-relationships and relational model) towards another solution based on an ontological approach, while retaining the principle of operation of the first system.

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INTRODUCTION

Most methodologies of ontology construction are based on two phases, the ontologization and the operationalization. Ontologization is to build a conceptual ontology, this last will provide a detailed description of real perceived, that is free or as free as possible, in this case the designer must take into consideration the different sources of knowledge (glossaries of terms, other ontologies, texts, interviews with experts ...). The operationalization is to encode the conceptual ontology obtained using an operational language of representation of knowledge (with a mechanism inference).

Currently, most work are based on the acquisition of knowledge from one or several corpus of text, they are based on a linguistic analysis (lexical and syntax) on specific tools as the tool SYNTEXUPERY created by Didier. (Bourigault D., 2002) or FASTR (Jacquemin C., 1997) and tools to extract the grammatical relations as Shallow parser RASP¹ (Briscoe T., 2002). These methods minimize manual work for the extraction of terms and relationships, but in reality, there are several sources of data, not only texts collected to build a corpus, but as in the geographical domain, there are images, spatial data, plans, maps etc. For this reason, it is necessary to develop methods and techniques that reduce the effort needed for the process of acquiring knowledge; this is the objective of the ontology learning. Maedche and Staab (Maedche A., 2001) distinguish different ontology learning which focus on the type of input used for learning, ie, ontology learning from text, dictionary, basic knowledge, schema of semi-structured schema and from database schema (Xu Z., 2004).

Almost 99.9% of businesses using databases, where it comes our ideas, which are based on the reuse of these databases for the creation of ontology, meaning we will replace the database of the company by ontology which gives us a unifying framework and provides metadata or annotations to improve communication between humans and

also between organizations. In additionally, the ontology provides:

- A basic conceptual structure from which it is possible to develop knowledge-based systems those are shareable and reusable.
- Interoperability between sources of information and knowledge.
- A clear distinction between “ontology” and “knowledge base” should be done from their roles; ontology provides a system of concepts that are used to build a knowledge base and therefore ontology can be considered as a Meta system in a traditional knowledge base.

METHODOLOGIES FOR THE CONSTRUCTION OF ONTOLOGIES: STATE OF THE ART

Until 1996, the first ontologies have been developed without following methods or methodologies approved. In recent years, many methods have been created for the development of ontologies; in this paragraph we are going to cite some of them without going into details of each one.

The Method “TOVE”

This method is based on the experience obtained by the development of ontology for the project TOVE (TOrento Virtual Enterprise), the ontology is built manually from the business scenarios for which it will be used. The various steps of this method remains without detailed descriptions, moreover it is dedicated to the specification of ontologies for enterprise (Gruninger M., 1995).

Methontology

Developed by the team LAI of the Polytechnic University of Madrid. This methodology includes

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