Chapter 3

Concept Acquisition Modeling for E-commerce Ontology

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To bolster the interoperability of agent-based commerce systems, trading agents are expected to adopt a set of common ontologies. Although there are extant general-purpose ontologies and approaches of engineering them, there seem to be no ontology that is specific for e-commerce or the methodologies for constructing e-commerce ontology. This chapter presents a concept acquisition modeling approach to facilitate the acquisition, classification and representation of e-commerce concepts. It proposes a systematic way to make comparisons between concepts based upon some understanding of their semantics. The process is comprised of classification criteria, questions scheme, rules for classifying relations and optimization, and concept representation for the e-commerce based ontology. Of particular interest is the use of context-dependent and language-independent classification knowledge. The explicit representation nature of the approach enables the development of shared ontologies and its reuse in other ontologies and applications.

This chapter appears in the book, Optimal Information Modeling Techniques by Kees van Slooten. Copyright © 2002, IRM Press, an imprint of Idea Group Inc.
INTRODUCTION

The phenomenal growth in Internet computing over the past decade has created enormous business opportunities for many modern enterprises selling or advertising their products on the WWW. Although there are extant electronic payment, information brokering and automated negotiation systems for bolstering e-commerce, the heterogeneous systems deployed by business organizations may impede the development of common standards that facilitate systems interoperability (Chandrasekaran et al., 1999; Glushko et al., 1999; Smith and Poulter, 1999).

The challenges related to the proliferation of standards include (1) How to support the representation of business information? (2) How should the ontological relations of e-commerce concepts be defined and organized? (3) How to acquire e-commerce concepts? Like knowledge-based system (KBS) development, ontology development faces a concept-acquisition bottleneck. Unlike KBS developers, ontology developers lack sufficient methodologies to recommend what task activities should be performed and at what stage of ontology development (Lopez et al., 1999).

This paper presents an ontology-based concept acquisition method to facilitate the acquisition and classification of e-commerce concepts. It proposes a systematic way to make comparisons between concepts based upon some understanding of their semantics. An inference mechanism is developed for understanding concepts and how the concepts are related semantically; for example, to make a connection between the price of US dollars and the price of HK dollars. While a conventional dictionary is not very helpful in this situation, it is desirable to characterize a concept using a set of properties from an ontology that can be used as a surrogate for a concept’s meaning and provide gradation, dependency or association relationships to other concepts.

This chapter describes an e-commerce relation ontology to provide semantic relationships among concepts. An e-commerce concept acquisition process is introduced to acquire and classify concepts based on the e-commerce relation ontology. The approach can be applied to several applications, for example, information retrieval or negotiation with other agents. This chapter is to capitalize the experience in the concept acquisition and representation for e-commerce systems.

E-COMMERCE CONCEPT RELATION ONTOLOGY

Ontology represents an explicit specification of a domain conceptualization (Gruber, 1993). The classes and relations of the e-commerce concept relation ontology are shown in figure 1, which supports gradation, dependence and association classes among concepts. The hierarchical graph illustrates inheritance,