A Note on the Translation of Conceptual Data Models into Description Logics: Disjointness and Covering Assumptions

Giovanni Casini: Centre for AI Research, CSIR and UKZN, South Africa

Aurona Gerber: Centre for AI Research, CSIR and UKZN, South Africa

Thomas Meyer: Centre for AI Research, CSIR and UKZN, South Africa

ABSTRACT

Conceptual modeling is nowadays mostly done using languages such as Entity-Relationship (ER)Models, Unified Modeling Language (UML), and Object-Role Modeling (ORM). These models are used to depict the ontological organization of relevant concepts or entities. Such models share a common modeling approach, based on the notions of class or entity and the relations or associations between classes or entities. Recent developments in knowledge representation using logic-based ontologies have created new possibilities for conceptual data modeling. It also raises the question of how existing conceptual models using ER, UML or ORM could be translated into Description Logics (DLs), a family of logics that have proved to be particularly appropriate for formalizing ontologies and reasoning about them. Given a conceptual data model, two assumptions are usually made that are not explicitly stated but need to be clarified for its DL translation: (1) disjointness assumption: all the classes are to be assumed pairwise disjoint if not specified otherwise; and (2) covering assumption: the content of every class must correspond to the union of its immediate subclasses (this includes the assumption that we do not consider anything apart from what is expressed in the model). In this paper we propose two simple procedures to assist modelers with integrating these assumptions into their models, thereby allowing for a more complete translation into DLs.