Incoherence and Subsumption for recursive views and queries in Object-Oriented Data Models

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Abstract

Object-oriented data models are being extended with recursion to gain expressive power. This complicate both the incoherence detection problem which has to deal with recursive classes descriptions and the optimization problem which has to deal with recursive queries on complex objects. In this paper, we propose a theoretical framework able to face the above problems. In particular, it is able to validate and automatically classify in a database schema, organized in an inheritance taxonomy, (recursive) classes, views and queries. The framework adopts the ODL formalism (an extension of the *Description Logics* developed in the area of Artificial Intelligence) which is able to express the semantics of complex objects data models and to deal with cyclic references at the schema and instance level. It includes *subsumption* algorithms, which perform automatic placement in a specialization hierarchy of (recursive) views and queries, and *incoherence* algorithms, which detect *incoherent* (i.e., always empty) (recursive) classes, views and queries. As different styles of semantics: greatest fixed-point, least fixed-point and descriptive can be adopted to interpret recursive views and queries, first of all we analyze and discuss the choice of one or another semantics and, secondly, we give the subsumption and incoherence algorithms for the three different semantics. We show that subsumption computation and incoherence detection appear to be feasible since in almost all practical cases they can be solved in polynomial time algorithms.

Key words: Object-Oriented DataModels, Descriptive Logics, Recursive Views and Queries, Incoherence, Subsumption.

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