Semantic Optimization in Tractable Classes of Conjunctive Queries

We review recent advances in semantic query optimization. We focus on the core class of conjunctive queries (CQs). Since CQ evaluation is NP-complete, a long line of research has concentrated on identifying fragments of CQs that can be efficiently evaluated. One of the most general such restrictions corresponds to bounded generalized hypertreewidth, which extends the notion of acyclicity. Here we discuss the problem of reformulating a CQ into one of bounded generalized hypertreewidth. Furthermore, we study whether knowing that such a reformulation exists alleviates the cost of CQ evaluation. In case a CQ cannot be reformulated as one of bounded generalized hypertreewidth, we discuss how it can be approximated in an optimal way. All the above issues are examined both for the constraint-free case, and the case where constraints, in fact, tuple-generating and equality-generating dependencies, are present.