The Impact of Disjunction on Reasoning under Existential Rules: Research Summary

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Abstract

Datalog$^\pm$is a Datalog-based language family enhanced with existential quantification in rule heads, equalities and negative constraints. Query answering over databases with respect to a Datalog$^\pm$ theory is generally undecidable, however several syntactic restrictions have been proposed to remedy this fact. However, a useful and natural feature however is as of yet missing from Datalog$^\pm$: The ability to express uncertain knowledge, or choices, using disjunction. It is the precise objective of the doctoral thesis herein discussed, to investigate the impact on the complexity of query answering, of adding disjunction to well-known decidable Datalog$^\pm$ fragments, namely guarded, sticky and weakly-acyclic Datalog$^\pm$ theories. For guarded theories with disjunction, we obtain a strong 2EXP lower bound in the combined complexity, even for very restricted formalisms like fixed sets of (disjunctive) inclusion dependencies. For sticky theories, the query answering problem becomes undecidable, even in the data complexity, and for weakly-acyclic query answering we see a reasonable and expected increase in complexity.

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