A polynomial reduction of forks into logic programs. (English) Zbl 1496.68329

Summary: In this research note we present additional results for an earlier published paper [the authors, Artif. Intell. 275, 575–601 (2019; Zbl 1478.68338)]. There, we studied the problem of projective strong equivalence (PSE) of logic programs, that is, checking whether two logic programs (or propositional formulas) have the same behaviour (under the stable model semantics) regardless of a common context and ignoring the effect of local auxiliary atoms. PSE is related to another problem called strongly persistent forgetting that consists in keeping a program’s behaviour after removing its auxiliary atoms, something that is known to be not always possible in Answer Set Programming. In [loc. cit.], we introduced a new connective ‘|’ called fork and proved that, in this extended language, it is always possible to forget auxiliary atoms, but at the price of obtaining a result containing forks. We also proved that forks can be translated back to logic programs introducing new hidden auxiliary atoms, but this translation was exponential in the worst case. In this note we provide a new polynomial translation of arbitrary forks into regular programs that allows us to prove that brave and cautious reasoning with forks has the same complexity as that of ordinary (disjunctive) logic programs and paves the way for an efficient implementation of forks. To this aim, we rely on a pair of new PSE invariance properties.

MSC:
68T30 Knowledge representation
68N17 Logic programming
68T27 Logic in artificial intelligence

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answer set programming; nonmonotonic reasoning; equilibrium logic; denotational semantics; forgetting; strong equivalence

Software:
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References:
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