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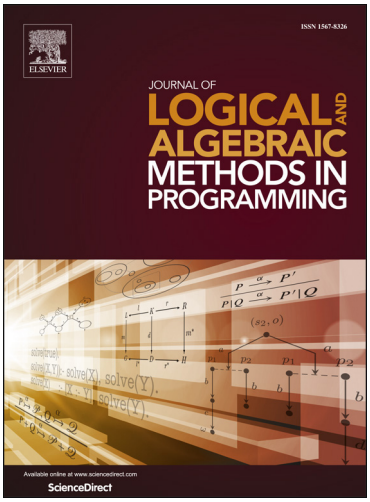

Logic programming: Laxness and saturation

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Logic programming: laxness and saturation[☆]

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Abstract

A propositional logic program P may be identified with a $P_f P_f$-coalgebra on the set of atomic propositions in the program. The corresponding $C(P_f P_f)$-coalgebra, where $C(P_f P_f)$ is the cofree comonad on $P_f P_f$, describes derivations by resolution. That correspondence has been developed to model first-order programs in two ways, with lax semantics and saturated semantics, based on locally ordered categories and right Kan extensions respectively. We unify the two approaches, exhibiting them as complementary rather than competing, reflecting the theorem-proving and proof-search aspects of logic programming. While maintaining that unity, we further refine lax semantics to give finitary models of logic programs with existential variables, and to develop a precise semantic relationship between variables in logic programming and worlds in local state.

Keywords: Logic programming, coalgebra, coinductive derivation tree, Lawvere theories, lax transformations, saturation

1. Introduction

Over recent years, there has been a surge of interest in category theoretic semantics of logic programming. Research has focused on two ideas: lax semantics, proposed by the current authors and collaborators [1], and saturated semantics, proposed by Bonchi and Zanasi [2]. Both ideas are based on coalgebra, agreeing on variable-free logic programs. Both ideas use subtle, well-established category theory, associated with locally ordered categories and with right Kan extensions respectively [3]. And both elegantly clarify and extend established logic programming constructs and traditions, for instance [4] and [5].

[☆]No data was generated in the course of this research.

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