ELECTRONIC NEWSLETTER ON
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Today

The reference articles for contemporary logics of actions and change continue to arrive. Besides the previously advertised articles by Thielscher and Doherty, today we advertise reference articles by Lifschitz and Sandewall. Two additional articles have been promised in the near future.

ETAI Publications

Received research articles

Action Languages

by **Michael Gelfond and Vladimir Lifschitz**

Abstract: Action languages are formal models of parts of the natural language that are used for talking about the effects of actions. This article is a collection of definitions related to action languages that may be useful as a reference in future publications.

Cognitive Robotics Logic and its Metatheory: Features and Fluents Revisited

by **Erik Sandewall**

Abstract: Cognitive Robotics Logic (CRL) is an extensible logic language for characterizing actions and change, in particular for use in cognitive robotics. Its development emphasizes the issues of syntax, expressivity, underlying semantics and entailment methods (defined in terms of the semantics). Development of proof methods is de-emphasized. The salient results from this approach refer to the range of applicability and other related properties of the entailment methods. These results constitute a metatheory of actions and change.

CRL is syntactically defined as a base language and a surface language. The base language is characterized by the following aspects:

- its three major predicates *Holds*, *Occurs*, and *Occlude*, which provide coherence when the language is extended;
- its reportoire of categorial functions, which is augmented when additional expressiveness is required in the language.

The surface language provides additional notational convenience, and is defined by translation to the base language.

The range of expressivity includes actions with duration, nondeterministic actions, actions in hybrid worlds with piecewise continuous fluents, some forms of ramification and causation, imprecise sensors and actuators, action failure, and some aspects of goal-directed agent behavior.

Entailment methods are functions that map scenario descriptions to sets of *intended models*. They are defined using a reportoire of set-theoretic operations on sets of formulas and sets of models, including but not restricted to minimizing a set of models with respect to a preference relation.

A progression of underlying semantics is defined, beginning with the partial state-transition semantics and its immediate generalization, the trajectory semantics. These underlying semantics are used for the formal analysis of the range of applicability of various entailment methods, including both those proposed by the others in this research, and those that developed in the course of the present work.

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