ELECTRONIC NEWSLETTER ON REASONING ABOUT ACTIONS AND CHANGE

Issue 98082 Editor: Erik Sandewall 23.11.1998

Today

Today's issue contains the answer by Chitta Baral and Son Cao Tran to Erik Sandewall's questions about their ETAI submitted article, "Relating Theories of Actions and Reactive Control".

The open review period has now been concluded for the article by Marc Denecker, Daniele Theseider Dupré, and Kristof Van Belleghem, "An Inductive Definition Approach to Ramifications". The authors have submitted a revised article, which is being sent to referees. The revised version has been published by the Linköping E-Press and is found by an additional link in the same webpage as the original version of the same article, as usual.

ETAI Publications

Discussion about received articles

Relating Theories of Actions and Reactive Control

by Chitta Baral and Son Cao Tran

Comment from: **authors**

Dear Erik:

We really appreciate your comments. Following is a point by point response to your comments. In addition, we plan to revise our paper to take into account some of your suggestions and our responses to it.

Best regards

Chitta and Son

1. We agree that our current formulation in terms of maintaining goals is weaker than the formulation where the control never allows the agent to get into an unacceptable state, regardless of exogenous actions. The later approach is used in (among other approaches) policy determination algorithms for Markov Decision Process based approaches [DKKN95,KBSD97]. (As we point out in the paper, the algorithms in [DKKN95,KBSD97] consider the control module as a whole and do not have the sufficiency condition for correctness of individual goals.)

We feel that the later approach is too strong and often there may not be any control module satisfying the stronger criteria.

Nevertheless, studying a middle ground between the two is important.

Following your suggestions, one middle ground can be based on using a maximum number (say m) of exogenous actions that are considered (or allowed) between two successive agent actions.

Let G be the set of goal states. We can define $core(G, m)$ as a subset of G, from where application of any m exogenous actions will result in a state in G, and there exists a sequence of exogenous actions of length $m+1$ that will take us to a state outside G.

We can then use this parameter m in defining satisfaction of maintenance goals, by modifying Defn 3.6 in the paper, to have $Closure(S, M, A) \subseteq G$ and for all states s in $Closure(S, M, A)$, each step of executing M takes us to a state in $Core(G, m)$.

We do not forsee any problem with concurrency with this approach. But the definition of achievement and maintainance will no longer be uniform, and as a result the definition for mixed control modules will get a little complicated.

We will try to pursue this in greater detail (or at least mention this) in the revised version of our paper.

2. As you mention, our paper can be formulated in terms of states, state spaces and transition functions without talking about action theory.

We felt that by doing that, the connection between an action specification and the states and transition function it defines in a succinct and elaboration tolerant (often) way is pushed into the background, and we wanted to stress that states and transition functions are not often directly given but are rather specified by an action description. For that reason, we bring in action theories.

We will point this out in our revised version.

3.

(a) Our results rely on earlier theorems about existence of least fixpoints obtained through iterating a monotonic function.

(b) We have two kind of theorems in our paper: correctness based on sufficiency condition (Theorem 4.1 and 7.1) and correctness of automatic construction algorithms (Proposition 4.1 and 7.3). The later propositions are of course important, as any algorithms should have a result about its correctness. The former theorems are important because they are used in developing the algorithm, and are crucial in proving the correctness of the algorithms.

4. We appreciate your observation. We had not considered this connection.

One difference with respect to your KR 96 approach is that in your approach the first step of your "closure" is by applying an action and the subsequent steps are due to a *successor* relation, while in our approach the subsequent steps are due to exogenous actions.

Regardless of this difference, we will point out the connection in our revised version.

5. Calling natural events as actions may sound odd some time. The reason we chose to call everything actions are several.

(i) The exogenous actions are not just natural actions, but are actions that are beyond the control of the agents. They could be the action of another agent in a multi-agent world. Thus they are a super set of what I would normally think of as "natural actions".

(ii) By just saying actions, we avoid talking separately about a theory of events. Otherwise every time we talk about effect of actions we would have to talk about effect of events, and their will be a lot of duplication.

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`http://www.ida.liu.se/ext/etai/actions/njl/`