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Today

We have received an additional invited commentary to Camilla Schwind, from Hector Geffner, with respect to her ETAI submitted article; concurrently we have received a message from Camilla that she now submits a revised article for refereeing. Hector's questions are found below; the revised article is accessible from the discussion page as indicated below.

In the discussion about modality and modal logic, we have received John McCarthy's response to the contributions by Herbert Wansing and Joe Halpern. John's answer is available in postscript at
http://www.ida.liu.se/ext/etai/rac/notes/1999/05/njracn.ps
or by a clickable link from the HTML version of this Newsletter, on our webpage.

ETAI Publications

Discussion about received articles

Causality in Action Theories

by **Camilla Schwind**

Comment from: **Hector Geffner**

Erik has asked me to comment on Camilla Schwind's paper "Causality in Action Theories". Here are few comments that I hope Camilla and others may find useful.

The paper is an assessment of four theories of action that handle causal relations, in terms of a set of nine inference rules; namely, monotonicity, transitivity, contraposition, reflexivity, etc. The paper discusses (briefly) which rules should be valid and why, and then analyzes which inference rules are valid in each proposal.

This type of analysis has been common in the study of the logics of conditionals in philosophy (e.g, Lewis, Stalnaker, Adams, Nute, Pollock, ..) and more recently in the study of non-monotonic consequence relations and belief revision in AI (e.g., Gabbay, Makinson, Kraus et al; Gardenfors, Katsuno and Mendelson, ..).

I think this is a principled and meaningul approach to assess entailment relations, in particular in an area where a lot of the discussion is often based on individual examples.

Yet when applying this type of analysis to causal reasoning, it's natural to ask questions like:

1. are the inference rules considered particularly relevant to causal reasoning?
2. are there significant inference rules that are not in the list?

I'm not less sure about this, as the paper does not make a convincing argument about the choice of the rules. Indeed, to me, it looks that very few of the rules have to do with "causality", and most have to do with "plausible (non-monotonic) reasoning" in general. Indeed, monotonicity, transitivity, conjunction, cases, right weakening, and left logical equivalence, have been discussed before in the general non-mon setting. The arguments supporting the validity or invalidity of each of these rules in the general setting applies in the specific setting of non-monotonic causal reasoning. So they have little to do with "causal" reasoning in particular. The same could be said about the other three rules left.

I think for this analysis to be more insightful, the principles have to appeal to the *distinction between causal and non-causal relations.*

For example, something that could be called "Pearl's principle" (see his papers) says something like this:

Let T be a theory including two causal relations:
C1 = "A causes B to have (truth) value v", and
C2 = "C causes B to have (truth) value v'",
where v and v' can be any truth values (or non-truth values). Furthermore, let C1 be a "strict" causal relation (no exception). Then "Pearl's principle" says that the theory [$T \wedge A$ is true] should be equivalent to the theory [$T' \wedge A$ is true], where T' is T with the causal relation C2 removed.

The interesting point is that the same principle is NOT supposed to hold when "A causes B" is replaced by "A implies B". So, if reasonable, the principle says something that is true for "A causes B" that is NOT true for "A (logically or defeasibly) implies B".

Other "causality" principles could be formulated in a similar way (again, I'd suggest to look at Pearl's work).

I think that one could get further by analyzing and building on principles such as these – that are based on the distinction between causal and non-causal relations – than on more general principles of plausible reasoning. I've attempted something like this in an IJCAI-97 paper but with limited success.

Hector Geffner

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