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Title: Unifying Frameworks for Non-Monotonic Reasoning

I am interested in research on unifying frameworks in the domain of knowledge representation and reasoning.

Of particular interest are: approximation fixpoint theory and justification theory (and especially: investigating the relation between these two).

Approximation Fixpoint Theory (AFT) is a lattice-theoretic framework that was founded in the early 2000s by Denecker, Marek, and Truszczyński as a way of unifying the semantics of different non-monotonic logics. In recent years, interest in AFT has gradually increased, with applications now ranging from foundations of database theory to abstract argumentation. Motivated by the success of AFT in this wide range of applications, I am interested in extending, as well as further analyzing this framework.

Based on an old characterization of semantics of logic programs by means of justifications Denecker et al recently introduced a general, abstract $\text{theory of justifications}$. Justification theory can characterize semantics of many knowledge representation formalisms and is complementary to AFT.

Like approximation fixpoint theory, this theory can also characterize semantics of many other knowledge representation formalisms.

Unlike AFT, justification theory does not work for arbitrary lattice operators, but is focused on powerset lattices.

On the other hand, justification theory provides a notion of nesting and refined information such as *why* a certain atom holds.

There seem to be strong correspondences between the two theories, including similar notions of duality. However, the exact relationship between the two domains is largely unexplored.

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