An Inconsistency Tolerant Model for Belief Representation and Belief Revision

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Abstract

In [1], the authors gave axioms for revising consistent, logically closed belief sets. The AGM axioms, however, allow the trivial update where all previous beliefs are destroyed by a new, contradictory piece of information. They also require a survey of our entire belief set before revisions can take place.

The *Language Splitting (LS)* model [2] provided an axiomatization for update operators that blocked the trivial update, and by splitting our total theory via a language partition, ensured that the only part of a theory that would be revised would be the part relevant to the new belief.

We generalize the *LS* model and allow subtheories with overlap, via a notion of *partial language splitting*. This allows for the tolerance of inconsistency in our explicit beliefs while retaining (locally) classical logic, but blocking outright contradictions. Our model enables an agent to answer queries using Belnap's four-valued logic. Axioms analogous to the AGM axioms hold and the relevance considerations of the original *LS* model are preserved. The distinction between implicit and explicit beliefs is adequately represented and psychologically plausible, computationally tractable procedures for query answering and belief base revision are obtained.

References:

[1] Alchourron, C., Gärdenfors, P. and Makinson, D. (1985) On the Logic of Theory Change: Partial Meet Functions for Contraction and Revision. *Journal of Symbolic Logic*, Vol 580, pp 510-530.

[2] Parikh, Rohit. Beliefs, Belief Revision and Splitting Languages. *Preliminary Proceedings of Information Theoretic Approaches to Logic, Language and Computation*, 1996, pp. 183-187. Final version to appear, CSLI, 1999.