Paraconsistency in hybrid logic

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When collecting information one can come across with inconsistencies in various forms and there must be a way to deal with them. In fact, databases, knowledgebases and software specifications very often carry inconsistencies and we should be able to reason about this kind of data having, at the same time, assertions of the form q and $\neg q$ (local inconsistencies) without producing global inconsistency. Paraconsistent reasoning is the natural way to deal with inconsistencies. There are several paraconsistent logics studied in the literature [4]. One of them is the quasi-classical (QC) logic proposed in [1, 3]. This logic turns out to be powerful since it provides a measure for the inconsistency of data represented as a set of first-order formulas. Measuring inconsistency is crucial to an effective management of the information. It is worth to be able to compare different knowledgebases in what concerns to inconsistencies and choose the one with less conflicts.

In [3], the notion of Tarski's satisfaction is decoupled by considering two interpretations for the predicate symbols: one for positive literals and the other for negative literals. As in the standard case, models (called bistructures) can be represented by a set of ground literals. The definition of minimal QC models is introduced and it is proved that no useful information is lost when using only these models. The main result of the paper is the way we can determine the inconsistency measure of a model; it is given by the quotient between the number of inconsistencies on the bistructure and the total possible number of inconsistencies on it.

In this talk we present an introduction to the study of paraconsistency in hybrid logic ([2]) following the work by Grant and Hunter ([3]). One important result that allows this generalization is the existence of Robinson diagrams in (global) hybrid logical. Moreover, we can represent hybrid models by a set of hybrid formulas in an extended language with new nominals such that all worlds are named. In order to avoid double negation, we assume that all formulas are in negation normal form. The generalization is not straightforward as we will explain, but the analogue of many notions can also be formulated in this context, for example: bistructure, conflict base, minimal model, etc.

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References

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