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Title: Tight inference and real-valued logic

Abstract: In real-valued logics, the possible truth-values of a formula F are a subset of $\mathbb{R}$. We define the "tight values set" of a formula F, subject to a set of constraints, to be the set of possible truth-values that F can take as one varies the assignments over those that satisfy the constraints. The constraints themselves may restrict the truth-values of certain formulas to specified sets (or even restrict the truth-values of tuples of formulas to specified relations). We instantiate this definition to two propositional logics: Łukasiewicz logic and propositional probabilistic logic. We illustrate the notion of tight-values with simple examples, including answering simple questions about rules of deduction, e.g., "if the value of the Łukasiewicz logic formula $x \to y$ is in the interval $[C, C']$ and the value of x is in the interval $[D, D']$ then what are the possible values of y?" We represent constraints in the formalism of "multi-dimensional sentences", introduced in *Foundations of reasoning with uncertainty via real-valued logics* (PNAS, 2024). For the case that the constraints are presented as finite unions of intervals with rational end-points, we establish an upper bound on the complexity of computing the tight-values set for Łukasiewicz logic by resorting to linear-programming, and we show that deciding if a given rational is in the tight-values set is NP-complete.