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Inconsistency-tolerant hierarchical probabilistic computation tree logic and its application to model checking

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An inconsistency-tolerant hierarchical probabilistic computation tree logic (IHpCTL) is developed to establish a new extended model checking paradigm referred to as IHpCTL model checking, which is intended to verify randomized, open, large, and complex concurrent systems. The proposed IHpCTL is constructed based on several previously established extensions of the standard probabilistic temporal logic known as probabilistic computation tree logic (pCTL), which is widely used for probabilistic model checking. IHpCTL is shown to be embeddable into pCTL and is relatively decidable with respect to pCTL. This means that the decidability of pCTL with certain probability measures implies the decidability of IHpCTL. The results indicate that we can effectively reuse the previously proposed pCTL model-checking algorithms for IHpCTL model checking.

