
Model-Bounded Monitoring of Hybrid Systems

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Résumé

Monitoring of hybrid systems attracts both scientific and practical attention. However, monitoring algorithms suffer from the methodological difficulty of only observing sampled discrete-time signals, while real behaviors are continuous-time signals. To mitigate this problem of sampling uncertainties, we introduce a model-bounded monitoring scheme, where we use prior knowledge about the target system to prune interpolation candidates. Technically, we express such prior knowledge by linear hybrid automata (LHAs)-the LHAs are called bounding models. We introduce a novel notion of monitored language of LHAs, and we reduce the monitoring problem to the membership problem of the monitored language. We present two partial algorithms-one is via reduction to reachability in LHAs and the other is a direct one using polyhedra-and show that these methods, and thus the proposed model-bounded monitoring scheme, are efficient and practically relevant. This is a joint work with Masaki Waga and Ichiro Hasuo.

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