

Lazy Automata Techniques for WS1S

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We present a new decision procedure for the logic WS1S. It originates from the classical approach, which first builds an automaton accepting all models of a formula and then tests whether its language is empty. The main novelty is to test the emptiness on the fly, while constructing a symbolic, term-based representation of the automaton, and prune the constructed state space from parts irrelevant to the test. The pruning is done by a generalization of two techniques used in antichain-based language inclusion and universality checking of finite automata: subsumption and early termination. The richer structure of the WS1S decision problem allows us, however, to elaborate on these techniques in novel ways. Our experiments show that the proposed approach can in many cases significantly outperform the classical decision procedure (implemented in the MONA tool) as well as recently proposed alternatives.

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