

A Derivative-Based Decision Procedure for WS1S

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Weak monadic second-order logic of one successor (WS1S) is a simple and natural formalism for specifying regular properties. WS1S is decidable, although the decision procedure's complexity is non-elementary. Typically, decision procedures for WS1S exploit the logic-automaton connection, i.e., they escape the simple and natural formalism by translating formulas into equally expressive but less concise regular structures such as finite automata. In this talk, I will present a decision procedure for WS1S that stays within the logical world by directly operating on formulas. The key operation is the derivative of a formula, modeled after Brzozowski's derivatives of regular expressions. The presented decision procedure has been formalized and proved correct in the interactive proof assistant Isabelle.
