

BOUNDS FOR TREE AUTOMATA WITH POLYNOMIAL COSTS¹

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ABSTRACT

We consider tree automata with costs over semirings in the sense of (Seidl, 1994). We define the concept of a finitely factorizing semiring and of a monotonic semiring, both as the generalization of well-known particular semirings, and show that the cost-finiteness of tree automata with costs over finitely factorizing and monotonic semirings is decidable. We show that, for tree automata with costs over finitely factorizing and naturally ordered semirings, cost-finiteness and boundedness are equivalent. Hence it is also decidable whether a tree automaton with costs over a finitely factorizing, monotonic, and naturally ordered semiring is bounded with respect to the natural order. With this we generalize the results of (Seidl, 1994) concerning the decidability of the boundedness of tree automata with costs over the classical semiring of natural numbers and the $(\max, +)$ -semiring of natural numbers.

Keywords: Polynomials over semirings, tree automata with costs, cost-finiteness

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