Deciding the Twins Property for Weighted Tree Automata over Extremal Semifields

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It is known that deterministic weighted tree automata are strictly less powerful than their general (nondeterministic) counterparts. The paper [1] contains a review of known sufficient conditions under which determinization is possible. One of these conditions requires that (i) the weights are calculated in an extremal semiring [4], (ii) there is a maximal factorization [3], and (iii) the weighted tree automaton has the twins property.

It has remained open whether the twins property is decidable, until Kirsten [2] gave an affirmative answer for a particular case: weighted string automata over the tropical semiring. He also showed that the decision problem is PSPACE-complete. In our presentation, we adapt and generalize Kirsten's proof: we show that the twins property is decidable for weighted tree automata over extremal semifields.

References

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