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Title: Decidability of Equivalence for Deterministic Top-Down Tree-to-Weight Transducers

Abstract: The use of the Hilbert-method for deciding equivalence of certain deterministic top-down tree transducers is fully explored. Deterministic top-down tree-to-weight transducers (over a monoid) are introduced as a joint generalization of the existing variants (over free monoids or free groups) and weighted extensions of them. Following the general approach of the seminal paper [Seidl,Maneth, Kemper: Equivalence of deterministic top-down tree-to-string transducers is decidable. JACM 65(4):1–30, 2018], it is shown that as long as the weight monoid effectively embeds into a computable and commutative field, the equivalence problem for those transducers is decidable. Additionally, it is demonstrated that all finitely presented, cancellative, and commutative monoids whose torsion subgroup is locally cyclic permit such an embedding. All of these restrictions except finite presentation are necessary for the embedding, and finite presentation is assumed to permit computation, so these restrictions are natural. The obtained results complement the existing decidability results for (non-commutative) free monoids.