

On One-Pass Term Rewriting and Tree Recognizers with Comparisons Between Brothers

Matti Rönkä

In [FJSV] two restricted ways to apply a term rewriting system (TRS) to a tree were considered. When the *one-pass root-started* strategy is followed, rewriting starts from the root and continues step-wise towards the leaves without ever rewriting anything produced by a previous rewrite step. *One-pass leaf-started rewriting* is defined similarly, but rewriting begins from the leaves. In the *sentential form inclusion problem* one asks whether all trees which can be obtained from the trees of some regular tree language T using a given TRS belong to another given regular tree language U , and in the *normal form inclusion problem* the same question is asked about the normal forms of T . These problems are shown to be decidable for both one-pass strategies for a left-linear TRS.

Bogaert and Tison [BoTi] introduce tree automata with equality and disequality constraints on direct subterms (REC_{\neq} automata). They show that the corresponding family of tree languages has good closure properties and, most importantly, that the emptiness problem is decidable for REC_{\neq} automata.

In this paper we define both bottom-up and top-down *generalized tree recognizers with constraints between brothers* (GCBB recognizers), and show that both types are equivalent to REC_{\neq} automata. Using GCBB recognizers we generalize the results in [FJSV] for TRSs in which the left-hand sides of the rules may contain non-linearities in brother positions.

References

- [FJSV] Z. Fülöp, E. Jurvanen, M. Steinby and S. Vágvölgyi. On one-pass term rewriting. Acta Cybernetica, 14:83-98, 1999.
- [BoTi] B. Bogaert and S. Tison. Equality and disequality constraints on direct subterms in tree automata. STACS 92 In Lecture Notes in Computer Science 577 : 161-171, 1992.