Fernau, Henning; Kuppusamy, Lakshmanan; Raman, Indhumathi

Generalized forbidding matrix grammars and their membrane computing perspective. (English) Zbl 07437061


Summary: Matrix grammars are one of the first approaches ever proposed in regulated rewriting, prescribing that rules have to be applied in a certain order. In traditional regulated rewriting, the most interesting case shows up when all rules are context-free. Typical descriptional complexity measures incorporate the number of nonterminals or the length, i.e., the number of rules per matrix. When viewing matrices as program fragments, it becomes natural to consider additional applicability conditions for such matrices. Here, we focus on forbidding sets, i.e., a matrix is applicable to a sentential form only if none of the words in its forbidding set occurs as a subword in w. This gives rise to further natural descriptional complexity measures: How long could words in forbidding sets be? How many words could be in any forbidding set? How many matrices contain non-empty forbidding contexts? As context-free grammars with forbidding sets are known as generalized forbidding grammars, we call this variant of matrix grammars also generalized forbidding. In this paper, we attempt to answer the above four questions while studying the computational completeness of generalized forbidding matrix grammars. We also link our research to processing strings with membrane computing and discuss appropriate variations of P systems.

For the entire collection see [Zbl 1475.68021].

MSC:

68Q07 Biologically inspired models of computation (DNA computing, membrane computing, etc.)

Keywords:
generalized forbidding grammars; matrix grammars; computational completeness; descriptional complexity; P systems

Full Text: DOI

References:
