GRAMMARS WITH CONTROL BY IDEALS AND CODES

JÜRGEN DASSOW

Otto-von-Guericke-Universität Magdeburg, Fakultät für Informatik
PSF 4120, 39016 Magdeburg, Germany
dassow@iws.cs.uni-magdeburg.de

ABSTRACT

Regularly controlled grammars, conditional grammars, tree controlled grammars, and contextual grammars with selection belong to the devices where regular languages are used to restrict/control the derivations. We study the effect on their generative power if we use regular (left and right) ideals and (special) regular codes instead of arbitrary regular languages.

Keywords: regularly controlled grammars, tree controlled grammars, conditional grammars, contextual grammars with selection, ideals, codes

1. Introduction

In the theory of formal languages, in order to increase the generative power, one imposes very often conditions to perform a step in the generation of words. By practical reasons as well as by theoretical considerations, it is very useful that one can check these condition by an efficient procedure. Thus one relates these conditions to regular languages for which the membership problem can be decided in linear time.

In this paper we consider as generating devices

– regularly controlled grammars where only those words belong to the generated language where the sequence of applied rules belongs to a regular language (over the set of rules) which is given in advance,

– conditional grammars where pairs of rules and regular sets are given, and the rule can be applied if and only if the current sentential form belongs to the regular set associated with the rule,

– tree controlled grammars where only those words belong to the generated language which have a derivation tree where all words of all levels of the derivation tree belong to a regular set given in advance,

– contextual grammars with selection languages, where a context can only be added to a word if and only if it belongs to a regular set associated with the context.