

PARALLEL COMMUNICATING GRAMMAR SYSTEMS WITH BOUNDED RESOURCES: RESULTS, TECHNIQUES, OPEN PROBLEMS^{1,2}

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ABSTRACT

Parallel communicating grammar systems (PC grammar systems) are language theoretical models for distributed computation. In a PC grammar system several grammars work on their own sentential forms in parallel and their work is organized in a communicating system to generate a single language. In this paper we summarize some important results on those classes of parallel communicating grammar systems where the component grammars are with bounded resources (with size parameters bounded by constants). We demonstrate that these economically presented systems are powerful tools for language generation, even the class of recursively enumerable languages can be obtained by classes of some variants.

Keywords: Parallel communicating grammar systems, size complexity, recursively enumerable languages.

1. Introduction

One of the important problems in formal language theory is how concise descriptions can be given for language classes in terms of different types of string rewriting systems, that is, what are the size properties of the different generative devices. In determining a certain class of languages, those classes of grammars which are bounded in size (grammars with bounded resources) are of particular interest, since they give an economical description of the language class. A natural question is, whether or not a certain class of generative devices provides a concise description of a language class.

These questions have been extensively studied in size complexity theory, a subfield of formal languages, dealing with size properties of language identifying devices. Some well-known size complexity measures are, for example, the number of nonterminals, the number of productions, and the total number of symbols used for describing the grammar.

¹Full version of an invited lecture presented at the First International Workshop on *Descriptive Complexity of Automata, Grammars and Related Structures* held in Magdeburg, Germany, July 20–23, 1999.

²Research supported by Hungarian Scientific Research Fund “OTKA” Grant no. T 029615.