

Cooperating Distributed Grammar Systems with Random Context Grammars as Components

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Abstract

In this paper, we discuss cooperating distributed grammar systems where components are (variants of) random context grammars. We give an overview of known results and open problems, and prove some further results.

Keywords: Cooperating distributed grammar system, random context grammar, left-random context grammar.

1 Introduction

Rewriting systems based on a simple form of productions play an important role in formal language theory. Therefore, it is no surprise that context-free grammars and their variants are frequently studied models. However, many systems describing real-life applications, such as parsers of natural and programming languages, require some additional mechanisms that allow to check for context dependencies. From that viewpoint, context-free grammars are not fully convenient for those applications because they are too simple to handle such dependencies.

A natural method of handling more context dependencies with rewriting systems is to compose systems of several components, and to define a cooperation protocol for these components to generate a common sentential form. Such devices are known as *cooperating distributed (CD) grammar systems* [2, 3, 12]. Components are represented by grammars or other rewriting devices, and the protocol for mutual cooperation describes (roughly speaking) the number of steps one component has to perform before allowing another component to work. For instance, the most interesting protocol is the so-called *terminal derivation mode* (*t-mode*, for short) making the component work until it is not able to perform another derivation step. It is well-known that the cooperation has a significant effect on context-free grammars. Namely, working in non-trivial modes, context-free CD grammar systems are more powerful than ordinary context-free grammars [3].

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