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ARRAY GRAMMAR SYSTEMS [1]

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ABSTRACT

The idea of co-operating agents has been incorporated in the theory of formal languages by introducing co-operating distributed grammar systems, where the different grammar components of the system do their work according to given start and stop conditions. As a natural extension of the concept of co-operation in grammar systems introduced for the string case, we consider co-operating distributed array grammar systems, where a component sequentially performs a fixed number, a number greater than a given threshold, or the maximal number of derivation steps when it is enabled. Moreover, we also give an overview on the generative power of array grammar systems with prescribed teams, where the array productions in a team are applied in parallel according to one of the derivation strategies listed before.

Keywords: Array grammar systems, co-operating distributed grammar systems, generative capacity.

1. Introduction

The co-operation of agents is a usual strategy for approaching complex problems and supposed to increase the total competence of the individual agents working together for solving a common task. In co-operating distributed (array) grammar systems a finite number of components, i. e. sets of (array) productions, co-operates guided by a specific strategy, e. g., an activated component can perform an arbitrary number of derivation steps, exactly k derivation steps, at least k derivation steps, or at most k derivation steps; in the maximal derivation mode, the activated component has to work as long as possible. The generative power of co-operating distributed grammar systems with many variants of co-operation strategies have been studied in a lot of papers (for details the reader is referred to [1, 2]). Co-operating distributed array grammar systems were investigated in [10], some results showing up to contradict the corresponding results of the string case: For example, systems with only two regular array components (and with the maximal derivation strategy) can generate sets of arrays which cannot be described by context-free array grammars; on the other hand, two components are enough to simulate any system with regular array components in

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