SOME VARIANTS IN COMMUNICATION OF PARALLEL COMMUNICATING PUSHDOWN AUTOMATA [1]

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ABSTRACT

We consider automata systems consisting of several pushdown automata working in parallel and communicating the contents of their stacks by request. We show that centralized non-returning parallel communicating pushdown automata systems with three components recognize all recursively enumerable languages. We also show that centralized returning pushdown automata systems accept non-*ET0L* languages. We study two variants of communication: one uses filters in communication and in the other only specified number of symbols are communicated. We prove that all these systems accept the family of recursively enumerable languages both in the centralized and in the non-centralized strategies and in both returning and non-returning communication modes with only two components.

Keywords: Parallel communicating automata, automata systems, grammar systems

1. Introduction

The study of cooperating automata systems with different kinds of coordination to perform computations has been of interest of late. Parallel communicating finite automata systems are finite collections of automata working independently but communicating their states to each other by request. The notion was introduced in [9] by C. Martín-Vide et al. In these systems, the components communicate with each other under protocols similar to those considered for parallel communicating grammar systems [10, 11]. Every component can request the state of any other component; the contacted component communicates its current state and remains in the same state (in the non-returning communication mode) or enters the initial state again (in the returning communication mode). In centralized systems only one component (the master of the system) is allowed to request a state from the other components.

Parallel communicating pushdown automata systems with communication via the stacks is studied by E. Csuhaj-Varjú et al. [3]. The components communicate through

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