Journal of Automata, Languages and Combinatorics **16** (2011) 2–4, 195–213

ON CD-SYSTEMS OF STATELESS DETERMINISTIC R(2)-AUTOMATA

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ABSTRACT

In this paper cooperated distributed (CD) systems of stateless deterministic restarting automata are shown where each component has window size 2 and finishes its process by accepting/declining or by deleting one or two letters currently under the window. We show that these systems are proper extensions of CD-systems of stateless deterministic R(1)-Automata; all linear context-free languages and some non semi-linear languages can be accepted. Closure of the accepted language class under set theoretical operations are also analysed.

Keywords: restarting automata, CD-systems, deterministic context-free languages, linear languages, non semi-linear languages

1. Introduction

The theory of finite state machines is one of the most basic and most important fields of theoretical computer science. The field is fairly old, the basic concept and results are from the middle of the last century (see, for instance, [4]). The restarting automata are introduced by linguistic motivation [5]. They accept words (sentences) via analysis by reduction. Several variations are known [17], among them R-automata are the simplest ones. Stateless R-automata were investigated in [6] and proved to have very limited power.

CD-systems of some simple formal computing devices are widely used to simulate cooperating systems and their power [2]. CD-systems of (stateless) restarting automata were investigated in [7, 8]. As expected CD-systems are much more expressive than their component automata themselves. Recently, CD-systems of stateless deterministic R(1)-automata are investigated and analysed [11, 16]. Actually, these systems can be interpreted as finite state machines with translucent letters [13]. These systems accept all rational trace languages, but only semi-linear languages are accepted by them. Moreover the accepting power does not exceed the set of semi-linear languages even though a pushdown store helps to chose the next component [12, 14]. Language families accepted by CD-systems of restarting automata are of interest in concurrency and modularity theory.