LOOKAHEAD HIERARCHIES OF RESTARTING AUTOMATA [1,2]

FRANTIŠEK MRÁZ

Department of Computer Science, Charles University
Malostranské nám. 25, CZ-118 00 Praha 1, Czech Republic
e-mail: `mraz@ksvi.ms.mff.cuni.cz`

ABSTRACT

The restarting automaton is a special kind of the linear bounded automaton with a read/write window of fixed length. It works in cycles, reducing the length of the actual word in each cycle. We study several versions of restarting automata and we show several hierarchies of language classes recognized by them with respect to the size of the read/write-window.

Keywords: restarting automaton, context-free languages, deterministic context-free languages, lookahead.

1. Introduction

This paper extends the investigations of restarting automata in [2, 4]. The restarting automaton (*RRWW*-automaton) can be roughly described as follows. It has a finite control unit, a head with a scanning window attached to a list (see Fig. 1), and it works in certain cycles. In a cycle, it moves the head from the left to the right along the word on the list; according to its instructions, it can, at some place, rewrite – once in a cycle – the contents of its lookahead (the scanning window) by a shorter string, continue by scanning some further symbols, and finally "restart" – i. e., reset the control unit into the initial state and place the head on the left end of the shortened word. The computation halts when the automaton enters an accepting or a rejecting state.

In general *RRWW*-automata can use auxiliary (working) symbols in rewriting. We consider also several subclasses of *RRWW*-automata which have no working symbols and even more restricted versions which cannot rewrite but only delete symbols.

Further, in [4], there were studied the so-called monotonic *RRWW*-automata. We say that a computation of an *RRWW*-automaton is monotonic if the sequence of distances of the places of rewriting (in the sequence of their cycles) from the right