

## SOME RESULTS ON RWW- AND RRWW-AUTOMATA AND THEIR RELATION TO THE CLASS OF GROWING CONTEXT-SENSITIVE LANGUAGES

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### ABSTRACT

It is shown that already the RWW-automata of Jančar et al (1998) accept the Gladkij language  $L_{GI} = \{w\#w^R\#w \mid w \in \{a,b\}^*\}$ , which implies that the class GCSL of growing context-sensitive languages is a proper subclass of the class  $\mathcal{L}(\text{RWW})$  of languages accepted by the RWW-automata. In addition, it is shown that  $\mathcal{L}(\text{RWW})$  contains an NP-complete language. Also a simple reduction from the class  $\mathcal{L}(\text{RRWW})$  of languages accepted by the RRWW-automata to the class  $\mathcal{L}(\text{RWW})$  is presented, which indicates that these two classes will be hard to separate if they are not identical. Finally, characterizations of the class GCSL in terms of restricted versions of the RWW- and the RRWW-automata are given.

*Keywords:* Restarting automata, Gladkij language, growing context-sensitive languages

### 1. Introduction

A *restarting automaton* as described by Jančar, Mráz, Plátek and Vogel [6] is a nondeterministic machine model that processes strings which are stored in a list (or a ‘rubber’ tape). It has a finite control, and it has a read/write head with a finite look-ahead working on the list of symbols. It performs two kinds of operations: move-right transitions, which shift the read/write head one position to the right changing the

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