Journal of Automata, Languages and Combinatorics **22** (2017) 1–3, 189 – 203

TWO RESULTS ON DISCONTINUOUS INPUT PROCESSING

Vojtěch Vorel

Faculty of Mathematics and Physics, Charles University
Malostranské nám. 25, Prague, Czech Republic
vorel@ktiml.mff.cuni.cz

ABSTRACT

First, we show that universality, regularity, and related properties of general jumping finite automata are undecidable, which answers questions asked by Meduna and Zemek in 2012. Second, we close a study started by Černo and Mráz in 2010 by proving that a clearing restarting automaton using contexts of length two can accept a binary non-context-free language.

1. Introduction

In 2012, Meduna and Zemek [12, 13] introduced *general jumping finite automata* as a model of discontinuous information processing in modern software. A general jumping finite automaton (GJFA) is described by a finite set Q of states, a finite alphabet Σ, a finite set R of *rules* from $Q \times \Sigma^* \times Q$, an initial state $q_0 \in Q$, and a set $F \subseteq Q$ of final states. In a step of computation, the automaton switches from a state r to a state s using a rule $(r, v, s) \in R$ and deletes a factor equal to v from any part of the input word. A rule (r, v, s) and an occurrence of the factor v are chosen nondeterministically (in other words, the read head can *jump* to any position). A word $w \in \Sigma^*$ is accepted if the GJFA can reduce w to the empty word while passing from the initial state to an accepting state. The boldface term **GJFA** refers to the class of languages accepted by GJFA. The initial work [12, 13] deals mainly with closure properties of **GJFA** and its relations to classical language classes (the publications [12] and [13] contain flaws, see [17]). It turns out that the class **GJFA** is not closed under operations related to continuous processing (concatenation, Kleene star, homomorphism, inverse homomorphism, shuffle) nor some Boolean closure operations (complementation, intersection). The class is incomparable with both regular and context-free languages. It is a proper subclass of both context-sensitive languages

Research supported by the Czech Science Foundation grant GA14-10799S and the GAUK grant No. 52215.