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ON THE DEGREE OF COMMUNICATION IN PARALLEL COMMUNICATING FINITE AUTOMATA SYSTEMS [1,2]

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ABSTRACT

A parallel communicating finite automata system consists of several finite automata working independently but communicating states with each other by request. We introduce a dynamical descriptional complexity measure for all variants of parallel communicating finite automata systems and discuss some computational aspects with respect to this measure. The degree of communication of a given automata system for a given word expresses the minimal number of communications necessary to recognize the word. The degree of communication of an automata system is taken as the maximal degree of communication for all words recognized by the system, if the degree of communication for every word is bounded by a constant, or infinite otherwise. We discuss here the possibility of algorithmically computing the degree of communication for a word, of an automata system or for a language.

Keywords: Parallel communicating finite automata, degree of communication, communication step.

1. Introduction

Systems of cooperating automata have been considered as models for some computing systems, but the strategies of coordinating their work in order to perform some computation were more or less different than those considered in grammar systems theory [3]. We mention here two such systems. A so-called *multiprocessor automaton* consists of several finite automata, called *processors* [1], coordinated by a central processing unit that decides which processor is to become active or "frozen" at a given step. Each processor works independently according to its internal transition function depending on its internal state and the input symbol seen only. The central processing unit inspects the states achieved by all processors (a frozen processor preserves its internal state and reading head position) and determines which processors are active

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