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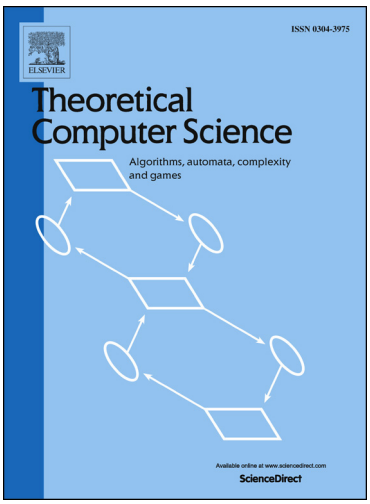

Languages with membership determined by single letter factors

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ACCEPTED MANUSCRIPT

Languages with membership determined by single letter factors

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Abstract

The *full scan condition* on a language L introduced in [1] ensures that a word w must be completely inspected in order to decide whether or not w lies in L. We strengthen the condition by replacing the factor words in that definition by single letters. After examining the general case for both arbitrary and regular languages, we investigate the two-letter alphabet to find a complete description of the corresponding languages, which may be coded as infinite binary strings. Regularity of these languages corresponds to the associated numbers being rational and we find the minimal automata in all cases, which may be pictured as a cylinder of tape with a protruding end, although this cylinder is replaced by a Möbius strip for a special class of rational languages.

Keywords: automata, regular languages, syntactic monoid, word scanning

1 Introduction

1.1 Definitions and elementary properties

In [1] the authors introduced five distinct conditions on a language $L \subseteq A^*$ that require a complete scan of a given word, in various senses, in order to

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