CONCISE REPRESENTATION OF REGULAR LANGUAGES

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We shall extend/generalize some classical notions such as: quotient of languages to *quotient of languages over a code*, DFAs to *EDFAs*, isomorphism of DFAs to *isomorphism of EDFAs* with the purpose of establishing a more concise way of representing regular languages. We shall also prove that for any given regular language one can effectively find/compute all the EDFAs over the elementary alphabets of L that recognize L. In the end we shall give an example to illustrate the new concepts.

Key words: combinatorial dimension, combinatorial alphabet, regular language, extended DFA, minimization.

1. Introduction

For all the basic/classical notations, definitions and results used in the paper the reader is referred for example to [YuS], [ChKa] and [HaKa].

To get a flavour of how difficult the problems related to combinatorial dimension are, the reader is referred to [Ne1], [Ne2], [Ne3] and [Ne4].

We shall also use in the present paper the following definitions, notations and results introduced/proved in [Voi] and [Voi2]:

• *A combinatorial alphabet of the language* L, see [Voi], is a subset A of Σ^* for which $L \subseteq A^*$ and $card(A) = d(L)$. The class of all the combinatorial alphabets of the language L is denoted by $\mathsf{CA}(L)$, therefore

$$\mathsf{CA}(L) = \{A \mid A \subseteq \Sigma^*, L \subseteq A^*, card(A) = d(L)\}$$

• *An elementary alphabet of the language* L, see [Voi2], is an elementary set E such that $L \subseteq E^*$ and $alph_E(L) = E$.

The class of all the elementary alphabets of the language L will be denoted by $\mathsf{EA}(L)$, therefore

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