

ITERATED PATTERN LANGUAGES

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ABSTRACT

A new way for describing languages, following patterns is considered. The position of these languages with respect to the Chomsky hierarchy and the language families in the L-area is investigated. The closure properties and some descriptonal complexity issues are also studied.

Keywords: patterns, descriptonal complexity, connectivity.

1. Introduction

In [1] a new way for defining a language is considered. Instead of identifying a language by a generative device as formal grammars or by a recognition device as automata, sometimes, it is useful to consider less strict definitions. A such definition is introduced in [1] where the notion of *pattern* is defined as a word containing variables and constants and then, the language defined by a pattern α consists of all words obtained from α by substituting a string of constants for each variable. The substitution has to be uniform: the multiple occurrences of a variable must be replaced by the same string.

In [1] the variables have to be replaced by nonempty strings. In [4] it is allowed the substitutions by empty strings which makes an essential difference.

The motivation of this approach is related to the process of inductive inference and theory of learning.

The paper [5] gives the answer to the decidability status of the inclusion problem between two pattern languages. This problem is of fundamental theoretical importance because many problems in the combinatorics on words can be reduced to it.

In [6] a natural generalization of pattern languages is considered. Instead of only one pattern a set of patterns (called *multi-pattern*) is considered. The language defined by a multi-pattern is the union of the pattern languages generated by each pattern.

In [2] a different strategy based on patterns, for describing languages, more usual in formal language theory, is adopted: start from a finite set of given strings, replace by them the variables in a given set of patterns, and the process goes on, all words obtained until now being available for further substitutions. All strings identified in this way constitute the associated language.