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ON A CLASS OF REGULAR-LIKE EXPRESSIONS FOR LINEAR LANGUAGES [1]

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ABSTRACT

Regular expressions define regular languages, so, there exist algorithms that can solve some important problems concerning regular languages such as finite automata synthesis or analysis by using regular expressions. In this work, we propose an extension of regular expressions to characterize a larger language class, linear languages. Linear languages form a class which is properly included in the context-free language class and which also properly includes the regular language class. From the definition proposed in this paper, an algorithm which obtains linear grammars from linear expressions (and vice versa) is formulated in a way similar to the one for regular expressions. We also review some problems concerning linear grammars such as the equivalence and the structural equivalence problem.

Keywords: Formal languages, linear languages, regular expressions, representation theorems.

1. Introduction

Conventionally, regular languages have been defined by finite automata, right (left) linear grammars or regular expressions as presented in any basic book on formal language theory such as [6]. Some of these concepts have been extended and/or modified in order to define larger classes of languages. Therefore, pushdown automata and context-free grammars are able to define context-free languages. New (regular-like) expressions have been proposed for different (regular and non regular) language classes, and some works have taken such direction. So, YOKOMORI [15] proposed an extension of regular expressions to define context-free languages for inductive inference purposes. HASHIGUCHI and YOO [4, 5, 16] proposed regular-like expressions to characterize bounded star degree languages. GRUSKA [3] introduced the operation of *symbol iteration* and defined the context-free class in terms of union, product and symbol iteration operations, he proposed context-free expressions by using the previous operators. YNTEMA [14] proposed the *cap* operator and introduced *cap expressions* to

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