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GRAMMARS WITH BOUNDED-LIFE RESOURCES[1]

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ABSTRACT

In the present paper we discuss a limitation of the resources activation (productions or nonterminals) of a Chomsky grammar. We associate a possible infinite natural number with each production/nonterminal of a grammar which restricts its possibility to participate arbitrarily many times in the string generation. This number may be viewed as the lifetime of that resource. We prove that this restriction does not lead to an increase in the computational power. A specific descriptional complexity criterion, namely the minimal number of immortal productions/nonterminals of a grammar and its extension to languages is investigated. Finally, we define grammars with bounded-frequency resources and prove that they are more powerful than grammars with bounded-life resources.

Keywords: Bounded-life nonterminal/production, immortal nonterminal/production, additive valence grammar, bounded-frequency nonterminal/production

1. Introduction

As one knows, all the productions of a grammar may be used as many times one wants in a derivation process. The same is valid for nonterminals. However, it is natural to consider that each resource (production or nonterminal) of a grammar has a lifetime and it cannot be used more than its lifetime is. Some productions or nonterminals are bounded-life ones and others can be used arbitrarily many times.

In the present paper we discuss a limitation of the resources activation of a Chomsky grammar. We associate a possible infinite natural number with each production/nonterminal of a grammar which restricts its possibility to participate arbitrarily

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