Topic 12: RGA - Elimination of Erasing Rules (Chapter 7)

VYPa - Compiler Construction
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It is possible to eliminate the erasing rules from the ordinary context-free grammars. The first method is based on the well-known technique while the second method is based on the new algorithm. If we decide to use the first one we can remove all erasing rules without affecting their generative power. It is based upon a predetermination of ε-nonterminals. First, it determines all ε-nonterminals in a given context-free grammar then, having determined these nonterminals, it performs the desired elimination. The new algorithm does the elimination without any predetermination of ε-nonterminals so it can be done in a just one-phase way.

After analyzing of these two algorithms there is a proof telling that we can't use them on regulated grammars. In spite of difficult modifications, it is impossible to propagate the grammar which is equivalent to the original one.

An analogical workspace theorem is demonstrated for regular-controlled grammars. An algorithm is shown that removes all erasing rules from any regular-controlled grammar that satisfies the workspace condition without affecting the generated language.

Scattered context grammars characterize the family of recursively enumerable languages and all the languages generated by propagating scattered context grammars, without erasing rules are non-context-sensitive. Some of them with erasing rules cannot be then converted to equivalent propagating scattered context grammars. Conversion is possible if a this kind of grammar erases its non-terminals in a generalized k-restricted way.

References:

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