

# Uniform Regulated Rewriting in Parallel

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## ABSTRACT

This presentation discusses the parallel generation of languages in a uniform way with respect to the rewritten strings. Just like sequential grammars, parallel grammars can generally produce big variety of producing strings during the generation of their languages. This variety is negatively affecting working with this kind of language family in theoretical and also practical informatics. In theoretical informatics this variety leads to unbearably long and tedious proofs, as in practice they are hard to analyze. Therefore we are discussing transformation of grammars that work in parallel and produce only strings with permutation-based form. More precisely, we will be discussing **transformation to semi-parallel language generation by scattered context grammars**, which belong to the most important type of regulated grammars and analogical **transformation of totally parallel generation of languages generated by EIL grammars**. We demonstrate that for every recursively enumerable language  $L$ , there exists a scatter context grammar  $G$  and two equally long strings  $z_1 \in \{A, B, C\}^*$  and  $z_2 \in \{A, B, D\}^*$ , where  $A$ ,  $B$ ,  $C$  and  $D$  are nonterminals of  $G$ , so  $G$  generates  $L$  and every string appearing in generation of sentence from  $L$  has the form  $y_1 \dots y_m u$ , where  $u$  is a string of terminals and each  $y_i$  is a permutation of  $z_j$ , where  $j \in \{1, 2\}$ . Analogical result is for  $u$  preceding  $y_1 \dots y_m$ . Next we demonstrate conversion of any EIL grammar  $G$  to an equivalent EIL grammar  $G' = (\{S, 0, 1\} \cup T, P, S)$  so that for every  $x \in F(G'), x \in T^* perm(w)^*$ , where  $w \in \{0, 1\}^*$ . Analogical result is for  $perm(x)^*$  preceding  $T^*$ . Every transformation presented in this article assumes that its input grammar contain neither pseudoterminals nor useless terminals. Open problem which still remains is, can we achieve uniform rewriting for grammars without erasing rules?

Keywords: Uniform grammatical rewriting in parallel, Rewritten strings of a uniform permutation-based form, Scattered context grammars, EIL grammars, Generative power, Computational power

## REFERENCES

Alexander Meduna, P. Z. (2014). *Regulated Grammars and Automata*, volume 1.