

PATTERN CONTROL ON DERIVATIONS IN CONTEXT-FREE REWRITING

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ABSTRACT

Starting from a grammatical approach to the task of producing variations of given music themes, where the patterns of the obtained themes are prescribed in advance, we define grammars with the derivation controlled by patterns. Usual context-free grammars and pure context-free grammars are considered, with various types of control: with patterns associated to each rule or only checking the last word in a derivation, with one pattern in each case or with several patterns which have to be simultaneously observed, etc. Mainly the generative power of the obtained grammars is examined. Some open problems naturally occurring in this framework are mentioned. (An intriguing one concerns the question whether or not the hierarchy of languages obtained as simultaneous interpretations of n patterns is infinite; we have only found that two patterns are stronger than one.)

Keywords: patterns, regulated rewriting, Chomsky hierarchy, pure grammars.

1. Introduction

Many areas of the reality, irrespective whether they are of a “natural”, “social”, “technical”, or of another type, can be approached in a satisfactory manner by syntactical means, hence by using tools provided by the formal language theory. However, “the world is not context-free”. Working in a context-free manner is in general easier from many points of view (decidability, complexity, the possibility of using derivation trees,