MODELING MUSICAL PATTERN PERCEPTION AS INDUCTION OF ANALOGIES INSIDE A SEMANTIC NETWORK

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Background

General methodologies for analyzing music — even structuralist ones — implicitly rely on perceptual principles. Indeed, music cannot be thoroughly understood without an appreciation of its communicative value. In fact, all limitations encountered by contemporary approaches of automated musical pattern discovery stem from an insufficient consideration for perception.

Aims

It would be of great benefit, therefore, to develop a computational approach of automated music analysis based on a cognitive modeling of music perception. This first step towards a cognitive understanding of musical pattern perception aims at conceiving a general cognitive system that is able to produce expected results without combinatorial explosion.

Main Contribution

This paper introduces a general computational model of music perception that relies on two main temporal characteristics of music: chronological direction and short-term selectivity. As a result, musical pattern is defined as an aggregation of successive local intervals. Patterns are induced by analogy between a current context and similar past contexts that are reactivated through associative memory. Here, patterns are conceived of as concepts that are actualized in the musical score. This score is represented as a network of notes, which are linked to pattern occurrences that themselves form meta-patterns of patterns. The computational model has to be regulated by general logical principles in order to avoid combinatorial explosion.

Implications

Such an understanding of music perception agrees with subjective experience. Such a computer modeling may offer to musicology a detailed and explicit understanding of music, and may suggest to cognitive science the necessary conditions for a virtual perception of musical pattern.

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