

Lartillot, Olivier. "Discovering Musical Patterns Through Perceptive Heuristics."

Lartillot proposes a new approach to attempt to solve the intricate difficulties of Musical Pattern Discovery (MPD), an emerging discipline that aims at offering automated motivic analyses of musical scores, by accounting for music as a perceptual object. This new approach focuses on the design of an automated system for motivic analysis without any reference to harmony or style. It focuses on repetition, since the concept of repeated motives seems more developed in traditional music theories and since the process of repetition discovery itself is ruled by local constraints. There is a constraint on too much repetition (for example, if a series of successive repetitions of a single elementary pattern features numerous geometrical repetitions that are not relevant) by considering the fact that patterns are conceptually inferred during the incremental listening of the piece.

Lartillot argues that what characterizes a pattern is less its intrinsic composition than the formal properties that are shared by its different repetitions; for example the local relationships between notes. Another point argued is that contour-based repeated pattern discovery algorithms easily produce irrelevant results, since too many false positive patterns are discovered. As for memories and representations, the new approaches' pattern discovery process focuses on long-term memory and perceptual considerations related to time. There are two subcognitive mechanisms of pattern recognition: 1) Associative Memory – cognitive capabilities seem to rely on the general characteristics of associative memory in which patterns may be defined as successions of local similarities; and, 2) Interval Distances – formalized by a very peculiar equation equating the perceptual distance between two intervals as a weighted product of a pitch interval distance and an inter-onset distance (which is weighted to the power of 0.7; how this number was derived is curious). Each pitch interval is associated with an occurrence through a hash-table of previously analyzed score. Pattern Classes (PC) and Pattern Occurrences (PO) create a clustering system where a PC is a chain of states that represent the shared characteristic of the associated note and a PO is a chain of states that interfaces a particular note in the score with its corresponding state in the associated PC. This system discovers modified occurrences, avoids redundancy, and accounts for pattern association and expectation using pattern occurrence extension, pattern class extension, and pattern class initiation. To avoid combinatorial explosion, meta-patterns of patterns emerge through recursion of the main routine each time a new PO is discovered.

This approach is implemented in the Common Lisp language as a library in OpenMusic, in a version called Omknthus of which Lartillot admits is difficult to understand. The implementation analyzed Bach's Prelude in C, BWV 846 of which an 8-note meta-pattern was discovered as well as a meta-pattern of the meta-pattern. Irrelevant patterns were also found.

When Lartillot admitted that this model "should be considered more as a very experimental prototype that attempts to simulate some aspects of pattern perception than as a complete and robust automated music analyzer," my reaction was "DUH." I haven't decided whether or not I think this "new approach" is viable because though it seems to recognize patterns, it seems to do so inefficiently with too many unnecessary computations. It is also incapable of distinguishing relevant from irrelevant information. Maybe all of this might be easier with larger foundations such as those omitted but mentioned in sections 1-3.