Automatic music composition based on the emergent systems paradigm

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Academics in both the music and Computer Science fields have been very keen to learn exactly how human composers compose music. Automatic Music Composition (AMC) has, hence, become a field of much significance and interest. Many scientists have pursued the AMC in an effort to come up with a human-free, real-time music composing system. Also, due to its evident commercial potential, industrialists in the cellular phone and video game industry have been keenly monitoring developments in this area. There have been several attempts at AMC using novel AI related techniques. Out of these, "Emergent Computing" techniques have shown much potential. This is principally because it is possible to draw close parallels between "emergence" and human composing technique. Nonetheless, attempts so far have been hampered by several problems. This is probably because most emergent AMC systems tend to use a single technique - a single, centralised emergent system that attempts generating all the material required.

This paper attempts to solve these problems by replacing the traditional single technique approach with TIES - A Tree of Interacting Emergent Systems. TIES is a tree-like macro-structure made up of several interacting emergent systems. It is a context-independent framework and is applicable to many applications, including AMC.

In our work, the hierarchy of TIES consisted of natural algorithms mapped to the conventional layers of music generation. For example, motifs, rhythms and dynamic generation use iterated function system calls (or fractals), whereas chord generation was done by cellular automata. Phrase generation was by genetic algorithms. The lowest levels of the hierarchy fed their outputs to the next higher level natural algorithm. As such the higher level metaconstructs reflected the emergent properties of the interacting lower level natural algorithms.

AMCTIES has been evaluated by experts in the musical field. They are confident about the musical merits of its output, and rate its computational ability favourably. Music produced by AMCTIES was found to be expressive, naturally structured and interesting.

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