

Music composition is a highly interdisciplinary process. To understand it deeply, a number of approaches have been used from different fields, such as musicology, music theory, music cognition and philosophy. During recent decades, numerous techniques based on Artificial Intelligence (AI) have been proposed for dealing with music composition. In particular, many AI systems focus on automatic melodic composition. Most of these systems try to generate melodies enjoyable by a human, but they completely ignore the way in which humans actually compose. The best example of this is the use of genetic algorithms, which rely only on the heavy computational power of computers. On the other hand, humans compose by exploiting a mixed top-down bottom-up approach, characterized by high-level cognition processes and rules.

In this paper, we propose a computational system for generating melodies that aims to simulate the human compositional process. This is achieved by a two-step algorithm. Firstly, a top-down approach is used for defining the overall structure of a melody. Secondly, the given structure is filled with musical content, following a bottom-up strategy that fosters emergent behaviour. The system is based on a cognitive model divided into rules, content and an evaluation function. Rules are used to manipulate and organize musical content, which is the raw material of melodies. Musical content is knowledge stored in the form of small musical phrases. The evaluation function assesses the quality of melodies, by using notions related to musical universals and cultural constraints. Furthermore, the proposed algorithm is the first system we are aware of which can evolve its own compositional style. Style change is achieved by modifying rules, musical content and the evaluation function according to received feedback and inputs. Finally, the paper provides an extensive analysis of generated melodies and their evolutionary trajectory.