Algorithmic Composition with Pure Data

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Algorithmic Composition is the use of algorithms and parameters in order to generate music. The purpose of this project is to use Pure Data to create a self-sufficient computer program, which self-generates unique music audio, through implementation of various concepts of Algorithmic Composition. Pure Data is a visual data flow programming language that allows for the use of Markov chains and stochastic probability to create patches with the ability to output parametric audio. The idea is to implement various ideas of music theory, mathematics, computer science, and algorithmic composition to construct a patch, which successfully generates an infinite and unique musical product within set parameters.

The methods used to accomplish this task began with identifying a myriad of ‘scientific qualities in music theory’, which calls for reverse engineering musical compositions, and observing patterns in musical theory in order to determine a variety of potential implementations. These aspects, including note variation, musical randomization, frequency parameters, limited step size, musical scales, dynamics, duration, polyphony, and silence, were then systematically and individually incorporated into the program using their associated algorithms.

The success of this project was determined through the number of and the extent to which these aspects were applied. The qualitative results of this project concluded that although the patch was successful in creating music with depth and harmonic aesthetics, the ‘over-perfection’ and lack of ‘inspired’ elements in its stream-like delivery was evident. Quantitative results were taken regarding the three main components of musical state: pitch frequency, velocity, and duration. These three fundamentals, constantly recorded through the progression of the patch, were compared and juxtaposed to various other programs with similar goals as well as human compositions in the same key to yield satisfactory results. However, the project yields infinite future prospects in order to tweak or replace certain algorithms to better the final product and to add additional aspects to ‘humanize’ the outcome.

The practical contributions of this project are numerous. With the era of computerized music expanding, this research and application offer constructions to better its stature. Furthermore, Algorithmic Composition’s success may usher in computer-made compositions over human, or at least an alternate style of musical production. To add, because computer generation is infinite, it would lead to the proliferation of musical production. These studies will also further common knowledge regarding music theory and its relationship with mathematical models for increased efficiency in the field.