Adaptive Aspects of Rhythmic Composition: Genetic Music

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Abstract

The model for musical composition presented here creates rhythmic patterns, using a system of genetic algorithms that is directed by the aesthetic of the user. The present artificial composition systems are improved by this model, which is better adjusted to the process of human composition.

1 INTRODUCTION

In order to create this composition system, we have looked at the first stages of musical evolution in human beings in which the purely percussive music is created by the community. We have applied the dynamics of genetic algorithms to a problem that could not be solved by classic computational theories or conventional Artificial Intelligence techniques [PAZO-96].

2 MODEL

The proposed model creates rhythmic patterns interacting with the user, who directs the system on an aesthetic basis. The model presents a double abstraction level. The first one considers a population or group of several artificial musicians (AMG from now on). Each musician have different roles, and the result of their work is the final musical composition, maintaining the music's choral approach. The second one is integrated by a fixed AMG population, being each of them associated to a musical theme. A unidimensional binary grid structure registers each musician's information independently. This structure contains a rhythmic pattern of sounds and silences.

In the first stages, the modal generates a random AMG population that will constitute the basis of composition. Afterwards, the user must assess each theme, assigning to them a score from 0 to 100. At this point, a new AMG generation is created by the system, using crossover and mutation operators. Those AMGs whose scores verify a learning quotient in the interval defined between the minimum and the maximum scores, are the only ones chosen for elimination in order to create a new AMG. The choice of parents for a new AMG is made at random, by pondering the scores. Once each couple of parent tribes has been selected, the crossing is made musician by musician, defining a crossing point at random and using only one of the created individuals. Mutation modifies one individual's binary element depending on a mutation quotient. The same process is applied to the new AMGs, obtaining thus artificial composers of a better quality in each cycle. The user is leading and giving an aesthetic evaluation to the system, which creates new musical themes.

3 RESULTS

In order to assess the efficiency of the system, we have tested three groups of users with various degrees of musical competence. In the three cases, considering a total number of generations ranging from three to five, a 0.2 mutation quotient and a 0.3 learning quotient, users have assigned to the last generations an average value of 90, starting with an average score of 40.

4 CONCLUSIONS

The system may be used by people from different backgrounds, so that we may obtain different results suitable to different aesthetics. It works in a very natural way, and it does not require a great musical competence in the user. These characteristics make the system very versatile. The obtained results show the system's ability to create music according to the user's aesthetic.

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References

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