Music Box: Composing and Performing Visual Music

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ABSTRACT

Music Box is an artistic implementation of emergent behavior and its use to create music. Music Box employs Craig Reynold's flocking algorithm to display animated notes that rise from a written score, then move to create a distinctive flock-lead musical arrangement. The result is emergent sound; a musical arrangement directed by the visual representation of flocking.

The goal of this creative exploration is to free the musical score from the prevalent model of composer, performer and listener supported by standard models. Instead the experience is more democratic. Here the composer suggests, the performer follows a few loose rules, and the listener plays with the composition.

This is accomplished through the development of artificial intelligence software that applies the visual rules of flocking behaviors to the algorithmic arrangement of musical pitches. Importantly, these visual rules are manipulated by the software user resulting in a dual performance and composition. The result is musical authoring based on the user model of computer video games.

Categories and Subject Descriptors

J.5 [**Arts and Humanities**]: Arts Fine and Performing – computer games as educational spaces

General Terms

Design, Experimentation, Theory

Keywords

Artificial intelligence, music games, computer game art, music performance

1. INTRODUCTION

The work endeavors to pursue one theme - the more you try to structure specific tasks, the more untenable they become. Traditional graphical forms for communicating musical scores seem to work against the beauty of nature. In nature, order and arrangement are held together not by the single ordered arrangement of elements, but by the harmony of millions of rules coalescing in a balance of power.

The piece begins when musical notations ascend from two dimensions to three. In pursuit of an analogical representation of contemporary compositional rules, the notes follow their clefs in a predator-prey relationship. The notes resound as they race around the clefs, seeking them out, but never actually catching them. The dance ends when the prey descend back to their two-dimensional world and the predators follow.

2. Design

The software system is executed in real-time and implemented using Microsoft's DirectX technology. Each note plays a predetermined pitch at regular intervals. Each tone's volume is processed through a 3D spatial algorithm to imitate the behavior of the 3D spatial audio. Each bass clef carries a single rhythm randomly chosen at the start of the simulation and repeated during the performance.

The rules that comprise the system can be controlled before and during run time based on the basic patterns of behavior set forth by Craig Reynolds[1]. Factors include the number of notes, the musical pitches within the performance, the visual range of the simulation, tempo of the performance, and the mathematic equation used to simulate emergent behavior.

During the performance, users can manage a variety of factors that change the quality of both the visual and musical composition. The varied stages of the performance are displayed in Figure 3.
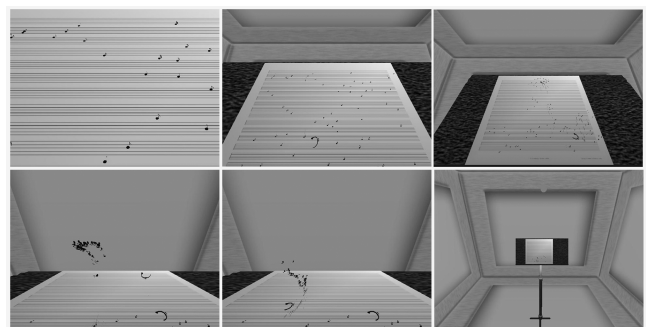

Figure 3. Music Box run-time

3. REFERENCES

[1] Reynolds, C. W. 1999. Steering behaviors for autonomous characters, in Proceedings of the Game Developer's Conference, pp. 763–782