Musical Flocks

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1 Introduction

Musical Flocks is a project in the field of music visualization. It produces animations by simulating the behavior of agents that react to the sound of music. Additionally, swarm-like behavior is attained by following the rules of separation, alignment and cohesion (Reynolds, 1987). This process produces reactive animations and static artifacts that constitute abstract representations of the pieces, with different genres resulting in artifacts with distinctive visual properties (see Figure 1).

2 Approach

Each agent, or boid, senses specific frequency intervals, reacting to the volume level of those frequencies and to the average volume level of all frequencies in the hearing range. The application reads the music file and performs a real-time analysis of the sound spectrum. The analysis of the spectrum’s frequencies is performed using the external library ‘beads’ (Bown, 2008), with the implemented Fast Fourier Transform function. The processed spectrum consists of an array of 256 samples, each one having an associated volume value, being represented on screen by 256 boids. During playback, the flock moves inside the application’s window and reacts to the volume of the sound, leaving movement tracks. The variation of the properties of each boid represents the volume frequencies of the music being played. In silence, the behavioral changes of the flock cease to exist and the group stops moving.

3 Results

The visual results depend on various aspects, such as the genre and the tempo of the music, the intensity of the sound, and the instruments played. These aspects modify the temporal evolution of the music and its frequency spectrum at every frame, resulting in differentiated visual artifacts. Slow music makes the flock react gently and move slowly, while a fast music tempo results in fast movement and abrupt changes of direction. Sounds with high volume and rich frequency spectrum affect the majority of the boids, while low volume level and less quantity of active frequencies produce subtle visual variations and a slower graphic evolution. Music with a rich and uninterrupted sound patterns creates continuous black paths accompanied by large red blots. Music with pauses and frequent variations generates discontiguous and scattered black and red stains. The final artifacts generated by music of different genres vary in accordance with the changes in behavior of each agent and of the entire group, resulting in distinctive artifacts for each genre.

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References
