Chapter 57
Representing Music as Work in Progress

Gerard Roma
Universitat Pompeu Fabra, Spain

Perfecto Herrera
Universitat Pompeu Fabra, Spain

ABSTRACT

In this chapter, the authors discuss an approach to music representation that supports collaborative composition given current practices based on digital audio. A music work is represented as a directed graph that encodes sequences and layers of sound samples. The authors discuss graph grammars as a general framework for this representation. From a grammar perspective, they analyze the use of XML for storing production rules, music structures, and references to audio files. The authors describe an example implementation of this approach.

INTRODUCTION

The widespread adoption of Internet access has raised great expectations with respect to music creation. On one hand, networks extend the possibilities for collaborative composition using computer-based tools by allowing intermediate objects to be shared. On the other, these tools can be accessed by a larger audience, and designed to be used by people with little or no musical training.

The recent focus on media sharing by Internet users is reinforcing such expectations. The habit of sharing multimedia objects has facilitated an explosion in the culture of creative repurposement and recombination. Specifically in the case of sound recordings, there is a long tradition in sharing files for creative reutilization. Content in sites such as freesound.org, soundsnap.com, or sampleswap.org is typically downloaded to be reused in music and multimedia products. This trend in the use of sound samples can be seen as an expression of an audio culture (Cox & Warner, 2004), influenced by a number of aesthetic traditions that have exploited the specific constraints of sound recordings, such as Musique Concrète, Plunderphonics, soundscape composition and acoustic ecology, or Hip Hop. The wide use of digital technologies has thus allowed using digital audio as matter for musical discourse, in a way that can no longer be represented using traditional

DOI: 10.4018/978-1-4666-6042-7.ch057

music notation. Since understanding sound files is now part of the standard computer literacy, this kind of discourse can now be used as a means for expression by many computer users without the need of formal music training. As computers keep invading different areas of music production, sound files have become prevalent as a way to represent musical events. Samplers and sample-based synthesizers are among the most commonly used tools, offering simplicity and realism over other types of synthesis. On the other hand, most music is at some point edited in some sort of audio sequencer or multi-track editor as an organized ensemble of sound files.

Some tools have appeared that attempt to relate the use of audio sequencers with the explosion of social networking and social media. Companies such as SoundCloud (http://www.soundcloud.com) are offering Web hosting of audio tracks, and sites such as Indaba Music (http://www.indabamusic.com) are already offering online tools for basic audio mixing and sequencing. The makers of one of the most popular programs for audio sequencing, Ableton Live (http://www.ableton.com), currently offer a collaboration feature based on progressive uploading and downloading of audio clips.

While these movements toward the use of network servers for storing audio are promoting greater degrees of collaboration, current tools and their interfaces are still focused on single user operation, in many cases under the influence of classic western music notation. Currently, popular programs do little to represent deep music structure, especially for practices based on digital audio manipulation. Moreover, most music is stored in proprietary formats and cannot be moved from one program to another.

The difficulties of understanding music, and especially musical structure, when using sound recordings were largely explained in Schaeffer's Traité des Objets Musicaux (Schaeffer, 1966). Given the impossibility to describe the practices that magnetic tapes made possible from the established music theory, Schaeffer frequently borrowed concepts from the linguistic theories of Saussure and Jackobson (an analysis of the relationships between music and language in the Traité can be found in Chion [1983]). In the 1970s, pioneers of computer music like Curtis Roads and Otto Laske proposed the adaptation of formal grammars to the practice of composing music with sound objects. While the use of grammars has been established in fields such as computational musicology, the early use of grammars for sample-base music composition provides a ground for current needs with respect to collaborative recombination of shared media.

The separation of musical structure from audio signals allows the use of hosting services and shared databases for the audio, while musical structure can be represented and exchanged using text markup formats such as XML (Figure 1). In composition activities, music structure can be typically stored in lightweight documents that may change frequently, and transmitted through established text communication channels such as email. Each music document may make reference to a number of bigger sized audio files. Transmission and local caching of these files can be dealt independently between each participant and the remote location through standard Web technologies and services, which avoids the need of potentially complex specialized p2p tools for the synchronization of audio collections among different participants.

In collaborative composition, though, the exchange of music documents does not need to be reduced to a single document representing a complete work: much of this activity works through sharing and reusing lower level building blocks. Formal grammars provide a framework for the representation of different structural levels in music composition. Formal languages already allow high levels of cooperation in computer music. For example, Music-N style languages and environments are very often driven by lively communities that continuously exchange code