Chapter 13
Adaptive Indexing for Semantic Music Information Retrieval

Clement H.C. Leung
Hong Kong Baptist University, Hong Kong

Jiming Liu
Hong Kong Baptist University, Hong Kong

Alfredo Milani
University of Perugia, Italy & Hong Kong Baptist University, Hong Kong

Alice W.S. Chan
Hong Kong Baptist University, Hong Kong

ABSTRACT
With the rapid advancement of music compression and storage technologies, digital music can be easily created, shared and distributed, not only in computers, but also in numerous portable digital devices. Music often constitutes a key component in many multimedia databases, and as they grow in size and complexity, their meaningful search and retrieval become important and necessary. Music Information Retrieval (MIR) is a relatively young and challenging research area started since the late 1990s. Although some form of music retrieval is available on the Internet, these tend to be inflexible and have significant limitations. Currently, most of these music retrieval systems only rely on low-level music information contents (e.g., metadata, album title, lyrics, etc.), and in this chapter, the authors present an adaptive indexing approach to search and discover music information. Experimental results show that through such an indexing architecture, high-level music semantics may be incorporated into search strategies.

INTRODUCTION
Multimedia is any combination of text, art, sound, animation, and video delivered by computer or other electronic or digitally manipulated means (Vaughan, 2006). Through the rapid growth of multimedia technology, multimedia content can be created, shared and distributed easily. The amount of available digital music is continuously increasing, promoted by a growing interest of users and by the development...
Adaptive Indexing for Semantic Music Information Retrieval

of new technology for the ubiquitous enjoyment of music (Orio, 2006). According to Vaughan (2006), “Sound is perhaps the most sensuous element of multimedia”. While music is an art form of sound organized in time, Orio (2006) also points out that the pervasiveness of music information is due to the fact that the enjoyment of music does not require the need for translation. Thus, unlike text-oriented web documents, it crosses the barriers of national languages and cultural backgrounds. Therefore, meaningful music retrieval is important and necessary.

Currently, searching information from multimedia content is still very challenging. According to Goth (2004), “Most of the multimedia content out there right now is not really very searchable”, and this situation has not improved significantly since. Since multimedia content can be represented in various forms in numerous formats and in different dimensions, compared with text-based information retrieval (IR), multimedia retrieval is far more difficult since its content cannot be extracted automatically due to current technology limitations (Leung & Liu, 2007). Also, Sebe & Tian (2007) state that we need robust techniques to index/retrieve multimedia information in accessing huge multimedia databases, as well as semantic visual interfaces integrating the above components into unified multimedia browsing and retrieval systems.

BACKGROUND

Music information retrieval (MIR) is a relatively young research area, emerged in the late 1990s (Crawford, 2005; Downie, 2003; Fingerhut, 2004), devoted to fulfill users’ music information needs (Orio, 2006). The ultimate task of a MIRS is the accurate transfer of musical information from a database to a user (Lesaffre, 2006). Since music can have different characteristics and its content can be represented in various ways and formats, it is not easy to deal with the retrieval problem in a large music database. In an effective “concept-based” multimedia retrieval system, efficient and meaningful indexing is necessary (Go’mez & Vicedo, 2007; Goth, 2004). Due to current technological limitations, it is impossible to extract the semantic content of music data objects automatically (Snoek et. al., 2006; Yang & Hurson, 2005). Meanwhile, the discovery and insertion of new indexing terms are always costly and time-consuming. Therefore, novel indexing mechanisms are required to support flexible music search and retrieval. Here, we present an innovative method which enables the retrieval of music information by a novel indexing approach.

CURRENT MIR APPROACHES

Music Information Representations

In the digital world, music information can be represented in various forms and different formats. Different formats can only capture limited information in different dimension about the music (Futrelle & Downie, 2002). Typically, the most common music information representation approaches consist of symbolic, audio, visual, and metadata.

Symbolic music representation describes musical notation information by musical symbols. Audio music representation records raw audio data by sampling music which can be uncompressed, losslessly compressed, or lossy compressed. Visual music representation presents music information in visual im-
Related Content

Neural-Symbolic Processing in Business Applications: Credit Card Fraud Detection
[www.igi-global.com/chapter/neural-symbolic-processing-business-applications/49238?camid=4v1a](www.igi-global.com/chapter/neural-symbolic-processing-business-applications/49238?camid=4v1a)

3D Modelling and Artificial Intelligence: A Descriptive Overview
[www.igi-global.com/chapter/modelling-artificial-intelligence/56131?camid=4v1a](www.igi-global.com/chapter/modelling-artificial-intelligence/56131?camid=4v1a)

Hybrid Term-Similarity-Based Clustering Approach and Its Applications
[www.igi-global.com/chapter/hybrid-term-similarity-based-clustering-approach-and-its-applications/207213?camid=4v1a](www.igi-global.com/chapter/hybrid-term-similarity-based-clustering-approach-and-its-applications/207213?camid=4v1a)

Dynamic Monitoring of Forest Volumes by a Feature Extraction Method
[www.igi-global.com/article/dynamic-monitoring-of-forest-volumes-by-a-feature-extraction-method/207745?camid=4v1a](www.igi-global.com/article/dynamic-monitoring-of-forest-volumes-by-a-feature-extraction-method/207745?camid=4v1a)