

MCML - Music Contents Markup Language

Abstract

We present an XML-based description interface for various types of musical contents - *MCML*, *Music Contents Markup Language*. An application of MCML currently developed within our group is a music browser system which enables a content based navigation in digital music files. Another major application of a music contents annotation interface is the description and handling of query results to digital music libraries.

Motivation and Goals

The main goal of the MCML project was to specify a description language useful for both the presentation of results to content based queries to a music database (in particular the database developed within the MiDiLiB-project [1]) and a content based navigation in digital music files. Although this includes structuring of musical information on a score-like level, we did not intend to develop a language with the capabilities of a complete music notation system. Instead, we focused on a universal, easy to use and to process language for supporting the former applications.

Research Contributions

In developing MCML, the following research topics had to be addressed:

- Which classes of musical contents and information are important for the above applications such as navigation and which are not?
- How to describe the contents on which navigation will be performed?
- How can a reasonable content based navigation in music files be realized?
- Is it reasonable to use state-of-the-art content description interfaces such as XML to realize music contents description?
- How can a linking concept improve navigation?

Introduction to MCML

In the following, we shall give a brief overview on MCML's main concepts.

Concepts

MCML describes the contents of one or more digital instances of a particular piece of music. Those instances may be given in several different file formats (e.g. WAV, MIDI, MP3 etc.). While not being an extension of one of those file formats, MCML provides meta-information related to both the contents of the single music files as well as to relations between several of those files. As a data format, MCML uses textual XML-files.

Besides some global information on a particular piece of music, each MCML file contains several <PIECEOFMUSIC>-structures, each of which contains all of the information related to one particular instance of this piece of music. E.g., there could exist one structure containing all information about a WAV-file of a live recording of The Beatles *Yesterday* and another structure for a MIDI file of someone interpreting the same piece. As an important concept, MCML's content descriptions are directly linked to the timeline of the underlying music file.

The various types of a piece's content-related information (e.g. score, structure or mood) mostly have very different structures and properties and thus require different description schemes. Therefore, we defined different content categories (realized by the so called *contents tracks*). The current version of MCML provides contents tracks for score, structure, mood, textual, and index

information. The set of content categories may however be extended according to application-dependent demands.

An important concept is the usage of links. MCML provides special structures to describe relationships among different content elements. Such links may be *relational*, i.e., define groups of elements (undirected links) or *functional*, i.e., serve as pointers to related elements (e.g. variations, similar pieces). Links are an important tool for targeted browsing in music files.

What MCML is not

As already mentioned above, MCML is not intended to be a complete and powerful notation and music description system. Within MCML, musical contents can only be described to a certain level of detail. Although even more detailed notation structures may be described by extending MCML, there is a trade off between the detail of the described information and the complexity of the MCML data.

Why XML?

XML, a recommendation of the W3 group for the description of structured information [2], provides functionality which does not perfectly but sufficiently meet the requirements induced by the above concepts for a music contents description. (For example in modeling score based information, there is frequently a need for grouping notes, e.g. to represent melodies, chords, or bars. As XML naturally only supports tree-like grouping structures, it is not appropriate to allow for an elegant realization of a general grouping concept.) XML is widely accepted and has recently been used with various applications. Moreover, it is platform independent and a large number of XML processing tools are already available. Even more important, MPEG-7, a future standard for description of multimedia contents [3], which is currently under development, will most likely be based on an XML- (or XML schema-) like description definition language (DDL).

Conclusions and Ongoing Work

At the point of writing, some preliminary experiments have been carried out using a prototypic MCML-based browsing system. A more elaborate version of the system is about to be finished within the next months. Extensive tests including design and implementation of visualization and auralization methods will be important topics of our future work. Those tests will give deeper insights and lead to further improvements of MCML.

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Suggested Readings

[1] MiDiLiB-Project, Department of Computer Science, University of Bonn, Germany,
<http://leon.cs.uni-bonn.de/forschungprojekte/midilib/english/>

[2] XML, Extensible Markup Language, World Wide Web Consortium, <http://www.w3.org/XML/>

[3] MPEG7, Motion Pictures Experts Group, <http://www.darmstadt.gmd.de/mobile/MPEG7/>