A Conceptualization of Music Sound Recordings and Its Representation in an Ontology

Marcelo de O. Albuquerque, Federal University of the State of Rio de Janeiro (UNIRIO), Rio de Janeiro, Brazil
Sean Wolfgang M. Siqueira, Federal University of the State of Rio de Janeiro (UNIRIO), Rio de Janeiro, Brazil
Maria Helena Lima Baptista Braz, Technical University of Lisbon, Lisbon, Portugal

ABSTRACT

Music is a domain with several dimensions and some specific characteristics. When different types of music are considered, modeling this domain becomes even more challenging. This paper presents some of the characteristics that make music such an interesting domain to model and summarizes a conceptualization process based on the Dahlberg conceptual triangle for guiding the construction of an ontology proposal for representing music sound recordings. This ontology can provide a global representation that might be used to support music information systems’ interoperability as well as data integration, contributing to worldwide music dissemination in nowadays knowledge society. Some possible mappings to other representational schemes for music sound recordings are identified to enable interoperability and integration with other similar systems. An interview with domain specialists indicates the right coverage of the necessary concepts, and evidences the importance of the proposal.

Keywords: Dahlberg Conceptual Triangle, Metadata, Model, Music, Music Sound Recordings, Ontology

INTRODUCTION

With the increase in the number of music information sources available on the Web, the problems related to representing, querying and sharing this kind of data became more evident (Lai et al., 2007). This happens because music domain has some specific characteristics that are not perceived by cataloguers and information systems developers that usually deal with the domain of traditional bibliographic records. As pointed out by the IFLA Study Group on the Functional Requirements for Bibliographic Records (2008), metadata sets that are frequently used in the music information systems are similar to those used in bibliographic materials, with only a few elements specifically related to music and weak relationships between fields.

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When looking at existing metadata standards there are some examples of use in the music field but it is possible to understand their inability to fulfil the needs of the area. One example is Dublin Core (International Organization for Standardization, 2009) that has been designed for the description of electronic and web resources. As mentioned in (Park & Childress, 2009), applying Dublin Core metadata elements is considered a difficult task by cataloguers and metadata professionals mainly due to semantic overlaps and conceptual ambiguities of the metadata elements. MARC (Machine-Readable Cataloguing) (The Library of Congress, 2012) is another example of metadata standard used in music information systems that is widely used in digital libraries, such as the catalogue of the Library of Congress (LC) in USA, which is discussed in the “Mapping the Proposed Ontology and Metadata Structures of Existing Proposals” section.

Records, cassettes, CD’s, and other music recordings come under a general category, in this work called music sound recordings. Usually, each institution having a collection of music sound recordings adopts an existing metadata standard or builds its own model based on existing ones to offer access to its collection. However, different sets of metadata describe different things (Corthaut et al., 2008) and the use of different sets/standards contributes to the structural and semantic heterogeneity in data sources. Therefore, the formal definition of concepts related to the field of music is essential to represent information in music catalogues that can be understood by users and by machines.

In order to formalize the knowledge representation in Computer Science, theories and techniques of Information Science have gained importance. One example is the Concept Theory of Dahlberg (Dahlberg, 1988), in which a concept is a unit of knowledge used to describe a category or class of entities, events or relations. This theory is used in this work to define related concepts.

As the music area has ambiguity in different concepts (Lai & Fujinaga, 2006), such as classification by genre, instrumentation, cataloguing granularity of work and the formation for performing a musical composition, the use of ontology is being proposed with the aim of formalizing the definition of relevant concepts to represent information in the music domain, ensuring their semantics.

The representation model for music sound recordings aims at improving the interoperability of such resources and related systems, thus disseminating musical compositions and culture while contributing to improve music knowledge. It is also important to notice that music can contribute in other scenarios such as learning and health, while the ontology approach can enable machine understanding of the resources’ semantics.

The remaining of this paper is organized as follows: the next section presents related works, the following section describes the construction of the ontology proposal for music sound recordings, the section after that outlines the mapping of the ontology concepts to metadata attributes used in the LC, then the section that analyses the results obtained from interviews with domain specialists, and the final section presents some final considerations.

RELATED WORKS

Riley and Dalmau (2007) consider the diversity (of styles, cultures, formats and uses) in the music domain as a factor that makes the representation of music information difficult. Examples of this diversity are: the ambiguity of the word “work” and its granularity; the representation of musical instruments; the specification of a formation for performing a musical composition; and the musical genre classification. Moreover, another factor that increases the heterogeneity between data sources is that each institution and user has specific needs and, therefore, it is necessary to find the most suitable metadata sets for each case.

There are some proposals for representing music information, but they are too focused on a specific characteristic (as the proposal of a thesaurus of instrumental/vocal formation
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