Knowledge Organization and the Conceptual Basis for Building Classification Systems for Complex Documents: An Application on the Brazilian Popular Song Domain

Rodrigo De Santis

Information Science Postgraduate Program, Brazilian Institute of Information Science and Technology (IBICT) and Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil
rodrigo@aquelamusica.com.br

Abstract. Knowledge Organization (KO) is one of the main activities of the Information Science field.

The theoretical and epistemological inputs from Information Science have proved themselves crucial for the construction of new classification systems – the applied dimension of KO – which take into account the multidisciplinarity inherent to complex documents and which are capable of expressing their multidimensional nature.

This article discusses the theoretical grounding for the classification of popular songs and also presents the construction of an ontology-based system for this kind of complex document.

Keywords: Knowledge Organization, classification, ontology, popular songs, ontology-based system.

1   Introduction

The classification of complex artistic documents – such as the popular song – presents major challenges to the Knowledge Organization (KO) field. The main difficulties are related to consistently accounting for the multidisciplinary aspects and the multidimensionality of this kind of document.

The multidisciplinarity refers to the contributions of different areas that help in constructing the knowledge contained in an artistic document, taking into account its historical, social and cultural context [1].

The multidimensionality refers to the existence of several layers of meaning within the same document. While the classification may never be fully free from choices that will favor a certain aspect of the document to the detriment of other possible aspects, it should be considered from a consistent theoretical framework. The consistency will be as great as the ability of the classification to consider the different dimensions of the documents, in order to allow "perspective" views of knowledge [2].

From the relationship between the multidisciplinarity and multidimensionality arises the third challenge for the classification of artistic documents: the polysemy. Because it involves different disciplines and due to the fact that it can be appreciated

from different perspectives, a complex artistic document has multiple meanings and may yield different "meaning effects"[1] depending on how it is used.

The research on Knowledge Organization, within the realm of Information Science, seeks to address these challenges, collaborating in the investigation of an epistemological grounding that may work as a basis for the classification of complex documents, such as popular songs.

The establishment of these epistemological groundings subsidizes the construction of classification systems – applied dimension of KO – able to respond to these challenges.

This paper presents the problems of classification of popular songs and shows the first results about the definition of an epistemological grounding specific to the field of popular songs and its application through building an ontology-based classification system.

2   Classification of Popular Songs

2.1   The Popular Song as a Complex Document

The recognition of the popular song as an object of scientific study is recent. Until the early 1990s, the popular song had only been partially studied, inasmuch as the lyrics were sometimes taken as literary and historic objects, and sometimes the musical elements were considered apart from the lyrics [4].

This way of thinking, i.e., "subdivided, compartmentalized, monodisciplinary, quantifier" is identified by Morin as opposite to the "true knowledge" or "act of knowing" that must be based on contextualization, in an "unbroken spiral", in which there are movements of "separating in order to analyze, and of reconnecting in order to synthetize or render complex" [5].

Only after it started to be considered as a syncretic object and no longer "poetry set to music" or "music over a literary text" did the popular song reach the status of a language on its own and had its multidisciplinarity appropriately understood [6].

The Brazilian popular song – object of the research presented in this paper – is presented as an object which is also relevant outside the context of Brazilian culture, not only for its international influence, but mainly because it confirms the characteristics of multidisciplinarity and multidimensionality that are common to the popular songs made in other parts of the world [4].

2.2   Classification by Descriptive Metadata and by Musical Genre

Although presently the popular song is already understood as an autonomous document, carrier of its own language, it was and continues to be classified mostly based on some descriptive metadata (such as title, name of songwriter, date of

---

[1] "Meaning effect" is a concept borrowed from psychoanalysis to describe the effect produced by the meaning, not the meaning by itself [3].

recording etc.) and on a category inherited from traditional musicology: the musical genre.

The genres of classical music originated from the grouping of several elements, such as the song structure, its instrumentation, or its social function (e.g.: sonata, concerto, and mass, respectively). In classical music, the genre-defining elements are considerably stable, which makes it possible to arrange them in a fairly precise fashion in order to coherently define a musical genre[2].

Initially, "popular song" was one more taxonomy item of genres used by classical music, which already possessed a genre "song" to designate classical vocal works which imparted "musicality" to poetry [7]. However, due to the heterogeneity of popular song manifestations, the breakdown of the "popular song" genre soon became necessary, seeking to accommodate the variations being identified. Yet, contrary to what happens in classical music, in popular song the constitutive elements are inherently unstable [8], and, in practice, musical genres inform little about its structure, instrumentation, or social function [9].

The Mass Culture Industries have belatedly recognized popular music as a commercial product [10]. For several years, popular songs were, in most parts of the West, relegated to a position of inferiority compared to classical music [11]. Nevertheless, once its role over popular music had been established, the Mass Culture Industries availed of the assortment into musical genres used, until then, in an ad hoc manner by songwriters and performers, who classified their songs freely, and sought to simplify it, redefining the genre taxonomy into a more limited and objective formulation. The goal was to classify the consumer public, and not the works, thus decreasing the risks of its commercial operation [12]. This redefinition of musical genres for popular songs gave rise to denominations that expresses little or nothing about the contents to which they were associated for marketing reasons, as is the case of "World Music" or "Latin Music".

Internally, popular songs are composed of a great range of elements, such as, the rhythmic, harmonic and melodic components; the themes addressed in the lyrics; the narrative structures with its projections of person, time, and space [13]; the interpretative nuances; the variations deriving from the arrangement; the modalizations involved in the discourse; their historical and social conjuncture etc.

The construction of the meaning effects produced by the songs occurs through mixtures of their constitutive elements [8]. These mixtures, however, do not obey pre-established rules, which generates the typical instability of popular songs and increases the complexity of the multiple dimensions contained therein. All of this indicates, therefore, that the classification of songs based on a set of descriptive metadata and on the category of musical genre is, at best, insufficient. For a deeper investigation concerning the existent knowledge in a popular song and the possible ways to capture and organize this knowledge through an efficient classification system, it is imperative to adopt techniques based on a multidisciplinary approach.

---

[2] Even in classical music, the mentioned stability no longer exists since the twentieth century with the changes brought by contemporary music, serial music and electronic music.

3   Popular Songs Classification Systems

3.1   Paradigmatic Changes in the Classification of Songs

Despite its late recognition, the popular music market quickly proved to be promising and profitable, which led record labels and other players of the phonographic industry to invest heavily in mechanisms which would allow them to gather even more consumers interested in the same type of music, and consequently increase the record sale [14]. By the end of the 1970s, when the first classification systems emerged with the goal of recommending products to users based on similarity criteria – the so called Recommender Systems – the first object was popular music [15][3].

With the advent of the web and the transformations of the consumer market that took place by the end of the twentieth century, popular music was once again one of the main exponents of the new order that was being established. With the decrease in record sales and the increase of digital reproduction mechanisms, phonographic industries began abandoning the conception of music as a product to think of it as information and service [12].

This paradigmatic shift has fundamental implications in the conception of the popular song as a knowledge object inside classification systems. If it was already important to consider the song as a complex object from the artistic point of view, this perspective also derives support from the commercial standpoint, reinforcing the need to build classification systems which take into consideration the multiple dimensions contained in the songs.

3.2   Classification System Models

The classification schemas used for music recommendation are grouped in three models according to their type of operation: content-based, collaborative and hybrid [17] [18] [19].

The content-based ones consider the descriptions of objects (their descriptive metadata) or the results of analyzes of the audio content or score (frequencies, keys, pitches, durations, etc.).

The collaborative ones consider the opinions and classifications made by other users of the system, identifying the objects that fit into similar use profiles.

The hybrid ones, as the name suggests, combine the collaborative method with the content-based method.

Aspects of the collaborative model
Last.fm [20] – an important web music recommender system – adopts the hybrid model. In the content-based aspect, Last.fm categorizes music through a conventional set of metadata (title, album, songwriter, performer and recording date); in the collaborative aspect it allows users to classify songs using personalized tags to label

---

[3] For a historical view of the development of the classification systems of music recommendation, it is recommended to read ADOMAVICIUS & TUZHILIN [16].

artists and songs, also creating communities to group profiles that have like musical interests.

Several works have been dedicated to analyzing the use of tags in collaborative systems of popular music classification [11] [12] [21] [22].

These studies reveal that the number of tags created by users in collaborative models tends to be significantly large, since the adoption of a non-controlled vocabulary ends up multiplying the uses and ends attributed to classifications [23].

Another finding of the studies regarding the use of tags in collaborative systems points towards the practical difficulty in using tags at the moment of information retrieval. Because they are not hierarchized, tags created by users often are not understood by other users. And, despite the amount of tags grows indefinitely, there is a tendency of concentrating the use of tags for a smaller set of items. In practice, the most popular items receive many identical classifications while most of the items receives no classification at all, which leads to a tendency of clustering of classifications [23].

Importance of the content-based model

The onset of classification systems based on collaborative models in the web has caused an initial enthusiasm resulting from the expectation that it would be possible to promote the democratization of access to musical content. However, although it does promote indisputable advances concerning the manifestation of users' opinions, as could be seen, the classification based on collaborative methods is not able to solve the problem of massification and unbalance of classifications which, in the end, are applied to some few items that fit in hegemonic categories.

From these findings, the content-based aspect has gained new thrust. A confirmation of this is the concern manifested in one of the main study groups related to musical information, the ISMIR - The International Society for Music Information Retrieval [24]. In 2009, one of its founders, J. Stephen Downie, expressed the group's concern for increasing the number of researches that consider the symbolic and metadata aspects of musical objects [25].

The problem, however, lies, once again, in the lack of epistemological grounding for the definition of categories which are both effective and suitable for the analysis and resulting classification of existent content in popular songs.

3.3   Discourse Formation as Conceptual Basis for Content Analysis

A possible perspective, offered within the realm of Social Sciences, for determining a conceptual basis destined for the analysis of knowledge existent in complex documents is the concept of "discourse formation" proposed by Foucault.

According to Foucault, the rules that constitute discourse as a coherent unit are always presented from a system of relations. These would be the relations between the constitutive elements of the objects, apparently disperse in discourse, which make it possible for regularities and recurrences to be identified. These relations present themselves in a system of dependencies that can be organized hierarchically. Foucault believes, therefore, that inasmuch as relations form regularities amidst apparent dispersion, they refer to a system of specific rules which, in turn, govern discourse formation [26].

Table 1. Rules and elements identified in popular songs

Element	Content type	Fill type	Related elements
Title	Metadata	descriptive	
Songwriter	People domain	descriptive	
Creation date	Metadata	descriptive	
Destination	Taxonomy	descriptive	
Lyrics	Metadata	descriptive	
Language	Taxonomy	descriptive	
Person	Taxonomy	formation rule	Lyrics
Time	Taxonomy	formation rule	Lyrics
Space	Taxonomy	formation rule	Lyrics
Modalization	Taxonomy	formation rule	Person; Time; Space
Theme	Taxonomy	formation rule	Modalization; Destination
Emotion	Taxonomy	formation rule	Theme; Melodic Profile; Rhythmic profile
Narrative Structure	Taxonomy	formation rule	Modalization; Melodic Profile
Performer	People domain	descriptive	
Musician	People domain	descriptive	
Instrument	Taxonomy	descriptive	
Instrumentation	Taxonomy	formation rule	Instrument; Destination
Label	Metadata	descriptive	
Album	Metadata	descriptive	
Recording Date	Metadata	descriptive	
Recording place	Places domain	descriptive	
Musical genre	Taxonomy	descriptive	
Tessitura	Metadata	descriptive	
Tempo	Taxonomy	descriptive	
Mode	Taxonomy	descriptive	
Key	Taxonomy	descriptive	
Dynamics	Taxonomy	descriptive	
Rhythmic profile	Taxonomy	formation rule	Instrumentation; Mode; Key, Dynamics
Melodic profile	Taxonomy	formation rule	Tessitura, Tempo, Mode, Key
Harmonic profile	Taxonomy	formation rule	Melodic profile, Rhythmic profile

Deconstructing popular songs, using the analogy proposed by Foucault of the work of an "archaeologist of knowledge", aims at the identification of the constitutive elements of a song, of how the rules are set from which knowledge is built, and of what are the systems of relations that manifest themselves recurrently.

The multiple aspects of knowledge involved in popular songs require different tools of analysis (for the melodic profiles, for the narrative and discoursive aspects, for the linguistic aspects, for the modeling of emotions and mood etc.).

By applying this multidisciplinary approach, recurrent rules and elements of Brazilian popular songs, summarized in table 1, were identified.

Although some of the identified elements are descriptive metadata already commonly employed in classifications (such as Title, Album, Year of recording etc.), this type of approach promotes the emerging of new categories originated from the recurrence of these elements (such as Modalization, and Instrumentation) and allows formation rules of to be identified, which govern the emerging of other inherently unstable categories, such as rhythmic, melodic, and harmonic profiles.

The construction of a classification system from the results obtained with this type of analytical approach needs to take into consideration, therefore, in addition to the terms and concepts involved, the complex system of dependency and relations between them. This type of representation is achieved through the use of thesauri or classification tables, but it has proven to be promising when presented in ontology, where it is possible to define explicitly each type of relation [28].

4 Application on an Ontology-Based Classification System

4.1 What's That Song?

The project "Aquela Música" (That Song) received this name due to its initial intention: to answer this routinely asked question when one tries to remember (or find out) a song about which there is little or fragmented information: "What's That Song? The one that talks about that subject, the one sang by that person and that has that other guy playing the flute", for example [29].

Departing from fragments of songs and rebuilding them from the identified relations and rules, according to the theory of discourse formation, an ontology-based system was elaborated and aims at organizing and classifying knowledge contained in popular songs and allowing its retrieval through an interactive interface[4].

4.2 Ontologies-Based System

The ontology of the Aquela Música project is written in RDF (Resource Description Framework). One of the concerns during its development was to make it compatible with the established patterns through the W3C consortium so, in the future, it would be possible to integrate it with the semantic web initiatives, such as the Linked Data Platform Working Group – whose goal is to define patterns which are reusable and applicable to the description of resources available in the web [30].

Also with the goal of associating itself to the currently ongoing actions, the ontology created for the Aquela Música project started at the integration of three already established ontologies, extending to accommodate the elements innate to the sphere of popular songs, as well as the rules identified from the effected analyses. The ontologies that serve as a basis for Aquela Música are: Music Ontology [31], Friend of a Friend Ontology (FOAF) [32], and COMUS Ontology (Context-based Music Recommendation) [33].

---

[4] The prototype can be used on the website `http://www.aquelamusica.com.br`

The Music Ontology

Designed specifically for the description of phonograms, artists and albums, the Music Ontology is an important part of the DBTune project, whose purpose is to semantically map, in RDF language, the records of phonograms and albums from the collections of MySpace, MusicBrainz and BBC radio websites [35].

The Music Ontology can be divided into three levels of expressiveness – from the simplest one to more complex ones. The first level aims at providing a vocabulary for editorial information (tracks/artists/releases etc). The second level aims at providing a vocabulary for expressing the music creation workflow (composition, arrangement, recording etc). The third level aims at providing a vocabulary for complex event decomposition, to express, for example, what happened during a particular performance, what is the melody line of a particular work etc. [37]

The first two levels of the Music Ontology are rather stable and have been used in the Aquela Música project to accommodate their descriptive metadata. The third level could not be availed since it is not capable of properly accommodating the data derived from the decomposition of the popular song through the discursive formation technique.

The FOAF Ontology

The FOAF ontology is used for describing people, their activities and relationships with other people and objects.

The FOAF is also divided in three levels. The first level - Core - describes characteristics of people and social groups that are independent of time and technology; as such, they can be used to describe basic information about people in present day, historical, cultural heritage and digital library contexts. The second level - Social Web - contains the terms that may be used when describing Internet accounts, address books and other Web-based activities. The third level, Linked Data utilities, is part of the effort of fitting the FOAF into the Linked Data Platform.

Within the Aquela Música project, only the first level has been used to describe the Songwriters, Performers and Musicians and the relationships between themselves and the musical piece.

The COMUS Ontology

The COMUS Ontology is the most specific domain-oriented ontology found for the music classification field. It is composed of 862 classes and 61 properties that reflect several aspects – from the basic elements which are contained in the musical pieces (such as mode, key and pitch) to some elements derived from analyses such as emotions and mood [33] [36].

Throughout the development of Aquela Música ontology it hasn't been possible to access the sources of the COMUS Ontology. This ontology had to be rebuilt from the descriptions contained in the academic papers cited above. Thereby, the Aquela Música made use of the concepts defined by the COMUS Ontology project, but reproduced them internally, thus making them part of the core of the Aquela Música ontology itself.

4.3   Information System for Classification and Retrieval

The ontology of Aquela Música was instantiated with data originated from the analysis of a set of songs by Brazilian songwriter Noel Rosa. This choice was due to a few objective criteria, such as: the relevance of this repertoire to Brazilian culture; the fact that the work of aforementioned songwriter is found in public domain, which allows the free use of the songs' lyrics, as well as of the original audio recordings; the diversity and multiplicity of styles and forms existent in this artist's compositions.

Another important aspect behind this choice, although specific of Brazilian culture, is that many of the works by Noel Rosa present an intense trait of social and political chronicle. The representation of such information through the complex category of "themes" made it possible to validate the viability of using the concept of discourse formation to reflect social and cultural aspects. Another important validation was the representation of melodic profiles and of narrative structures, two especially complex categories, for being dependent on one another and also on several other elements of the song, as presented on table 4.

One of the concerns of the construction of the prototype while information system was to make the application of the rules transparent to the final user. By accessing the prototype, the user visualizes the categories and its values indistinctively. With the goal of representing the multidimensional vision of complex thinking, the user can begin browsing from any element or from any song. When attributing value to the desired songs, the system calculates which are the songs that meet more precisely the informed values and presents them prominently. Another concern, in the sense of representing the multidimensional aspect, was to allow the user, from the selection of a determined song, to consult the complete analysis file and combine aspects of the results of these analyses with any other categories of choice.

This way, the user himself simulates the reconstruction path of the songs from the fragments expressed in each of the available elements, which makes it possible to answer the question "What's that song?" formulated in the origin of the project.

4.4   Limitations and Future Works

Due to the fact that it is still a prototype in development, some simplifications were used in the implemented model with respect to the entirety of elements and rules identified in Table 4.

However, the results achieved in the preparation of analyses that take into account the multidisciplinary objects of the songs and the construction of a system capable of expressing the multidimensional nature of a complex reasoning may be considered quite satisfactory and promising.

An important limitation is the method of manual analysis of the songs, which makes it quite laborious to produce content in order to simultaneously feed all dimensions of analysis considered. However, even if applied to a limited repertoire of works by the same songwriter, the results obtained seem auspicious in indicating the feasibility of integrating Aquela Música with other ontology-based information systems, in order to allow the results of the analyzes to be availed and complemented.

Thus, even partial analyzes may be useful when supplemented with the set of information derived from other systems, such as music catalogs or web-based radio applications.

5   Final Considerations

The major challenge on popular music research is mapping the layers of meaning embedded in a musical work, as well as their forms ways of insertion into society and history, avoiding simplifications and analytic mechanisms that may misrepresent their polysemic and complex nature [14].

Therefore, the challenge of constructing popular music classification systems is reflecting the multidimensionality of complex reasoning and encompassing its multiple dimensions.

The research in the Knowledge Organization field, by means of advances in investigations related to the classification systems, points towards considering and integrating the different disciplines involved in the study of the popular song in order to contribute in addressing these challenges by establishing a solid epistemological grounding.

Although it is still a prototype, the Aquele Música system enables to perceive actual perspectives for the building of ontology-based classification systems for complex artistic documents that allow organizing knowledge in a semantic and dynamic way.

References

1. Hjørland, B.: Arguments for philosophical realism in library and information science. Library Trends 52, 488–506 (2004)
2. Gomes, H.E.: Tendências da pesquisa em Organização do Conhecimento. Pesquisa Brasileira em Ciência da Informação 2, 60–88 (2009)
3. Lacan, J.: The four fundamental concepts of psycho-analysis. WW Norton & Company (1998)
4. Nestrovski, A.: Lendo música: 10 ensaios sobre 10 canções, pp. 3–7. Publifolha, São Paulo (2007)
5. Morin, E.: Réforme de pensée, transdisciplinarité, réforme de l'Université. In: Congrès International Quelle Université pour demain (1997)
6. Tatit, L.A.M.: Semiótica da Canção: Melodia e Letra. Escuta, São Paulo (1994)
7. Blom, E.: Grove's Dictionary of Music and Musicians. St. Martin's Press, New York (1996)
8. Tatit, L.A.M.: Musicando a semiótica. Annablume, São Paulo (1998)

9. Mckay, C., Fujinaga, I.: Musical genre classification: Is it worth pursuing and how can it be improved? In: Proceeding of Seventh International Conference on Music Information Retrieval, pp. 101–106 (2006)
10. Ortiz, R.: A moderna tradição brasileira. Brasiliense, São Paulo (1988)
11. Thompson, A.E.: Playing Tag: An Analysis of Vocabulary Patterns and Relationships Within a Popular Music Folksonomy. University of North Carolina, Chapel Hill (2008)
12. Santini, R.M.: Os usuários e a desorganização da cultura: Os Sistemas de Recomendação e as conseqüências da classificação para os usos sociais da música na Internet. PhD Thesis in Information Science - Universidade Federal Fluminense (Instituto de Arte e Comunicação Social) e Instituto Brasileiro de Informação em Ciência e Tecnologia, Niterói (2010)
13. Fiorin, J.L.: As astúcias da enunciação. Ática, São Paulo (1999)
14. Napolitano, M.: História e Música - história cultural da música popular. Autêntica, Belo Horizonte (2002)
15. Resnick, P.: Recommender Systems. Interview in IOTA. University of Michigan School of Information (1999)
16. Adomavicius, G., Tuzhilin, A.: Toward the next generation of Recommender Systems: A Survey of the State-of-Art and Possible Extension. IEEE Transaction on Knowledge and Data Engeneering 17(6), 734–748 (2005)
17. Resnick, P., Iacovou, N., Suchak, M., Bergstrom, P., Riedl, J.: GroupLens: an open architecture for collaborative filtering of Netnews. In: ACM Conference of Computer Supported Cooperative Work, pp. 175–186 (1994)
18. Hill, W., Stead, L., Rosenstein, M., Furnas, G.: Recommending and Evaluating Choices in a Virtual Community of Use. In: Proceedings of Conference Human Factors in Computing Systems (1995)
19. Maes, P., Shardanand, U.: Social Information filtering: algorithms for automating "word of mouth". Human Factors in Computing Systems, 210–217 (1995)
20. LAST.FM. (2013), http://www.last.fm
21. Aucouturier, J.-J., Pampalk, E.: From Genres to Tags: a little epistemology of Music Information Retrieval. In: Proceedings of the 9th International Society for Music Information Retrieval Conference, pp. 1–10 (2008)
22. Bosteels, K., Kerre, E., Pampalk, E.: Music Retrieval Based on Social Tags: A Case Study. In: Procceding in ISMIR 2008, Vienna, Austria (2008)
23. LAST.FM. Message from the Last.fm founders - Felix, R. and Martin J. (June 2009), http://blog.last.fm/
24. ISMIR. The International Society for Music Information Retrieval (2013), http://www.ismir.net
25. Downie, J.S., Byrd, D., Crawford, T.: Ten years of ISMIR: Reflections on challenges and opportunities. In: Proceedings of the 10th International Society for Music Information Retrieval Conference (2009)
26. Foucault, M.: The archaeology of knowledge. Vintage (2012)
27. Tatit, L.A.M.: Analysing popular song. In: Popular Music Studies, pp. 33–50. Arnold, London (2002)
28. Gnoli, C., Bosch, M., Mazzocchi, F.: A new relationship for multidisciplinary knowledge organization systems: dependence. In: Interdisciplinarity and Transdisciplinarity in the Organization of Scientific Knowledge, pp. 399–410 (2007)
29. De Santis, R.: Aquela Música - navegação interativa por canções populares brasileiras. In: Anais do, I. (ed.) Encontro Funarte de políticas para as artes. Funarte, Rio de Janeiro (2011)

30. W3C LDP. Linked Data Platform (LDP) Working Group (2013),
    `http://www.w3.org/2012/ldp/`
31. Raimond, Y., Abdallah, S., Sandler, M., Giasson, F.: The music ontology. In: Proceedings
    of the International Conference on Music Information Retrieval, pp. 417–422 (2007)
32. Brickley, D., Miller, L.: FOAF vocabulary specification 0.98. Namespace Document 9
    (2010)
33. Song, S., Minkoo, K., Seungmin, R., Eenjun, H.: Music Ontology for Mood and Situation
    Reasoning to Support Music Retrieval and Recommendation. In: Third International
    Conference on Digital Society, pp. 304–309 (2009)
34. Seungmin, R., Byeong-jun, H., Eenjun, H.: SVR-based music mood classification and
    context-based music recommendation. In: Proceedings of the 17th ACM International
    Conference on Multimedia, pp. 713–716 (2009)
35. DBTUNE. Music-Related RDF (2013), `http://www.dbtune.org`