Semantic Interaction with Music Content using FOAF

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Abstract. SIMAC (*Semantic Interaction with Music Audio Contents*) is an European Commission project (IST-2.3.1.7, Semantic-based knowledge systems) which aims to develop a set of prototypes to describe, semi-automatically, music audio content. SIMAC is about music metadata, about what you can say of a piece of music, on what is hidden in a music file, in a collection of music files, and in the collective knowledge of a community of music lovers. This document proposes to enhance/extend the FOAF definition to model user musical tastes. One of the goals of the project is to explore music content discovery, based on both user profiling and content-based descriptions.

1   Introduction

The main goal of SIMAC[1] is doing research on semantic descriptors of music contents, in order to use them, by means of a set of prototypes, for providing song collection exploration, retrieval and recommendation services. These services are meant for "home" users, music content producers and distributors and academic users. One special feature is that these descriptions are composed by *semantic descriptors*. Music will be tagged using a language close to the user's own way of describing its contents —moving the focus from low-level to higher-level (i.e. semantic) descriptions.

SIMAC is about music metadata. We assume that metadata is all what one can say about a single music piece or a collection of music pieces. The collective knowledge of a community of people interested in music is meant also to be handled as "metadata".

2   The Semantic Web and Music Metadata

The World Wide Web has become the host and distribution channel of a broad variety of digital multimedia "documents". Although the Internet infrastructure

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[1] http://www.semanticaudio.org

allows simple, straight-forward acquisition, the value of these resources suffers from a lack of powerful content management, retrieval and visualization tools. Music content is no exception: although there is a sizeable amount of text-based information about music (album reviews, artist biographies, etc.) this information is hardly associated to the objects they refer to, that is music pieces.

In the context of the Semantic Web, there is a clear interest to create a Web of machine-readable homepages describing people, the links between them and the things they create and do. The FOAF (*Friend Of A Friend*) project[2] provides conventions and a language "to tell" a machine the sort of things a user says about herself in her homepage. FOAF is based on the RDF/XML[3] vocabulary. As we noted before, the knowledge hold by a community of "peers" about music is also a source of valuable metadata and FOAF nicely allows users to speak about whatever they fancy. Music is an important vehicle for telling other people something relevant about our personality, history, etc.

There already exist some approaches[4] to modeling music in the FOAF context. A simple way is to depict interests in an artists' works as shown in example 2.1.

```
<foaf:interest
  rdf:resource="http://www.norahjones.com"
  dc:title="Norah Jones" />
```

Example 2.1: Using FOAF to express interest of an artist

In this example, Dublin Core definitions are used to express the artist's "title". A simple question arise: "What is *Norah Jones*?". Is it a book title? Obviously, a country and bluesy music fan will not mistake the "Norah Jones" *term* as a title of a book, but a software agent will. The dc:title tag definition is being overloaded. In other words, a machine would not understand that the user is interested in a well-known singer and composer.

Already built-in within FOAF, there are ways to say that a user is interested in a topic (see example 2.2). Even though there is no taxonomy of topics, this example gives more general information than the one shown in example 2.1.

There is an interesting project, SongBuddy[5], that offers a way to find music available on the Internet by browsing people's FOAF profiles. By finding songs on bands' and labels' sites and sharing the URLs of those songs with other users, music discovery becomes possible. Apart from the usual FOAF information, it is required to specify a set of songs as RDF resources. SongBuddy describes this kind of resources using the MusicBrainz[6] RDF definition. Associated metadata

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[2] http://www.foaf-project.org
[3] http://www.w3.org/RDF
[4] All examples shown here have been gathered from the web
[5] http://www.songbuddy.com
[6] http://www.musicbrainz.org

```
<foaf:topic_interest>
  <rdf:Description>
    <dc:subject>Music</dc:subject>
    <dc:description>Pop</dc:description>
  </rdf:Description>
</foaf:topic_interest>
```

Example 2.2: Using FOAF to express interest in a topic

```
<foaf:Person rdf:nodeID="nickname">
  <foaf:mbox_sha1sum>
    ce24ca1400c2f511c6s4b015a1f064dda8356f9a
  </foaf:mbox_sha1sum>
  <mm:trackList>
    <rdf:Seq>
      <rdf:li
        rdf:resource="http://www.agivensite.org/holeinmysoul.mp3"/>
      <rdf:li
        rdf:resource="http://www.anothersite.com/music/Thirteen.mp3"/>
    </rdf:Seq>
  </mm:trackList>
</foaf:Person>
<mm:Track
  rdf:about="http://www.agivensite.org/holeinmysoul.mp3">
  <dc:title>Hole in my Soul</dc:title>
  <dc:creator
   rdf:resource="http://www.songbuddy.com/lc/soaf/artist/name=Aerosmith"/>
</mm:Track>
<mm:Track rdf:about="http://www.anothersite.com/music/Thirteen.mp3">
  <dc:title>Thirteen</dc:title>
  <dc:creator
    rdf:resource="http://www.songbuddy.com/lc/soaf/artist/name=Amy+McKenna"/>
</mm:Track>
<mm:Artist rdf:about="http://www.songbuddy.com/lc/soaf/artist/name=Aerosmith">
  <dc:title>Aerosmith</dc:title>
</mm:Artist>
<mm:Artist rdf:about="http://www.songbuddy.com/lc/soaf/artist/name=Amy+McKenna">
  <dc:title>Amy McKenna</dc:title>
</mm:Artist>
(...)
```

Example 2.3: Using FOAF in SongBuddy project

for a song are *track* and *artist* name. An example of a Songbuddy's FOAF definition is shown in example 2.3. Unfortunately, SongBuddy does not offer any automated system that can propose new musical assets a user could be interested in.

3   Our proposal

As we said in the introduction, SIMAC's primary concern is the development of effective music content discovery tools. We are already accumulating a significant wealth of knowledge about music —not only trivial editorial data, but knowledge such as relationships between artists, musical works and also song descriptions automatically extracted by means of signal processing and machine learning techniques. On the other hand, we are conscious that practical content discovery systems must also have some knowledge about users. We see FOAF as an excellent candidate for becoming a framework to model people's musical taste.

Currently, we are devising our own music ontology in OWL[7]. We can foresee that embedding/integrating these musical concepts within FOAF will allow our system to better understand user questions. Example 3.1 shows an hypothetical FOAF profile using our approach. This approach allows to express what a user likes or dislikes regarding to music items, with fine-grained detail —from a genre, artist, album to a track level. A user can also annotate reviews about a song or an album. The system will process all this information when discovering new music content. Figure 1 shows an overview of the system.

It is likely that a selection of relevant items that are purely based on content descriptors —such as pitch, tempo, etc.— will either return too many "hits" or "silly" answers. Hence, transforming the data about the user (these data become information once they have been processed) defines what makes sense and what does not, from that user's point of view.

3.1   Expected results

Merging (or embedding) a music ontology within FOAF will allow us to "understand" a user in two complementary ways; psychological factors extracted from the normal FOAF profile —personality, demographic, socio-economics, situation— and explicit musical preferences. Using this enhanced FOAF profile, the system will be able to filter and to contextualize users' queries.

This approach opens a wide range of possible usages and applications, such as:

- Recommendation of new musical pieces, supported by both content-based and context-based similarity criteria
- Recommendation of unknown artists —playing close to a user's location— whose works are similar to user's music taste
- Finding, automatically, new mates that have similar musical tastes, building an adaptive, evolving and ever-growing social network

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[7] http://www.w3.org/TR/owl-features

```
<foaf:Person rdf:nodeID="nickname">
  <foaf:mbox_sha1sum>
    ce24ca1400c2f511c652b015a1k76f9sa13dk6f9a
  </foaf:mbox_sha1sum>
  <simo:dislikes>
    <simo:genre simo:name="Classical Music" />
    <simo:soundslike>
      <simo:object>
         <simo:artist simo:name="Aerosmith" />
      </simo:object>
    </simo:soundslike>
    <simo:soundslike>
      <simo:object>
        <simo:track simo:title="Heart of glass">
           <simo:artist simo:name="Blondie" />
        </simo:track>
      </simo:object>
    </simo:soundslike>
  </simo:dislikes>
  <simo:likes>
    <simo:artist simo:name="P.J. Harvey" />
    <simo:album simo:title="More unchartered heights of disgrace">
      <simo:artist simo:name="The Dogs D'Amour" />
    </simo:album>
  </simo:likes>
  <simo:review>
    <simo:Patient simo:type="track" simo:name="Missed" simo:rating="9" />
    <simo:Text lang="en">
    I like very much this PJ Harvey's song because guitars sound wild (...)
    </simo:Text>
  </simo:review>
</foaf:Person>
```

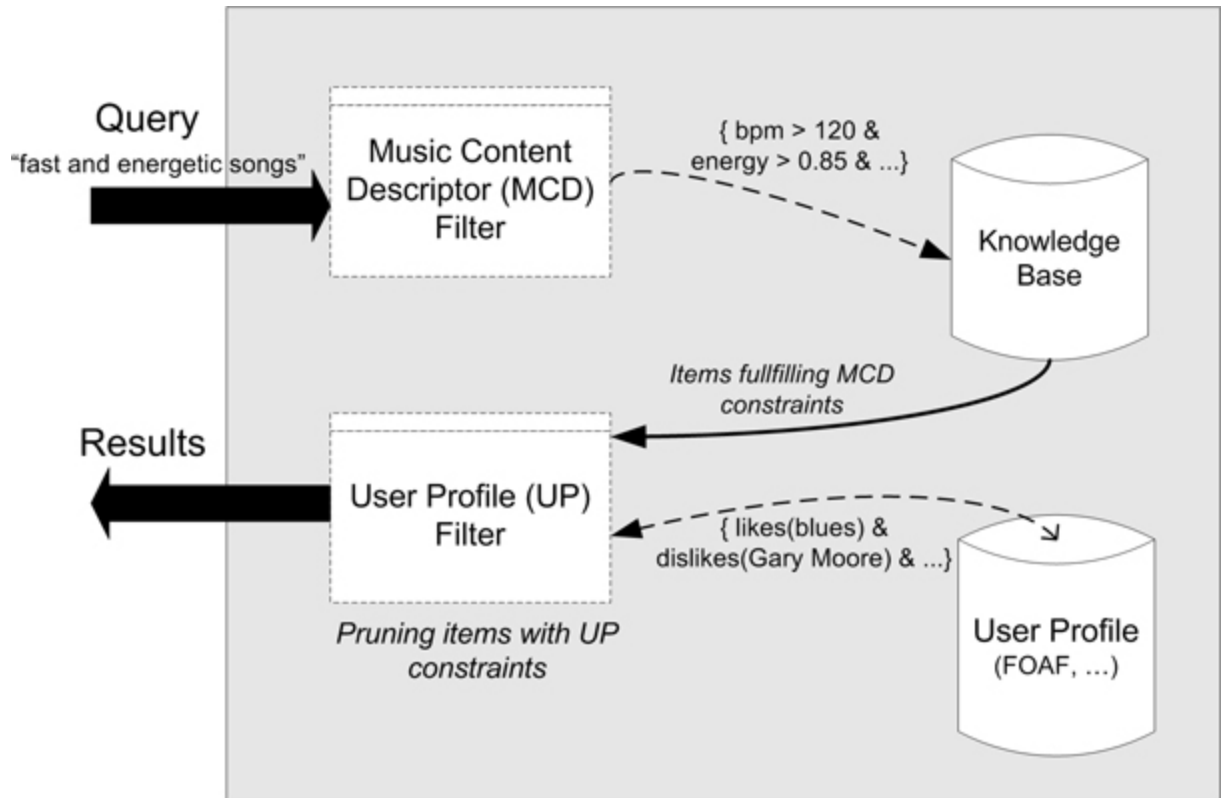Example 3.1: Simac project approach. Hypothetical FOAF profile

Fig. 1. System overview using FOAF profile.