Shared Open Vocabulary for Audio Research and Retrieval

György Fazekas, Alo Allik, Simon Dixon, Mark Sandler

1. Background and aims

- Audio researchers increasingly use common sets of feature extraction techniques to characterise audio material, while large data sets of features are released for scientific use.
- Most data sets and research tools do not use shared open vocabularies or common data structures, but rely on ad-hoc file formats and information management solutions, chosen without considering interoperability, sustainability and research reproducibility.
- **The Shared Open Vocabulary for Audio Research and Retrieval (SOVARR) project aims to investigate:**
  (1) **how communities would benefit** from using interoperable file formats, vocabularies and ontologies,
  (2) **what are the primary user needs** in the music informatics area,
  (3) **what are the main barriers of uptake** of shared ontologies.
- We will update existing ontologies and research tools after reflecting on our findings, and present tutorials.

2. Problems

- Although several open research tools, web services and data sets exist, they typically use task or tool specific formats selected for representational convenience or other narrowly defined criteria. This raises several issues, including:

  (1) the need for adapting research code and research environments for a variety of different formats,
  (2) the difficulty of combining similar data sets to form larger data sets,
  (3) the difficulty of linking complementary data sets, and
  (4) the lack of interoperability between research tools.
- Our preliminary investigations in Music Information Retrieval (MIR) use cases show that this leads to limited sustainability of research code, and difficulties in reproducing results partly due to inefficient research workflows.

3. Semantic Web Ontologies and Research Tools

3.1 Ontologies

- Semantic Web technologies provide a viable solution to some of the above problems. Ontologies can be used to represent shared knowledge about a domain.
- A set of ontologies were created as part of the Music Ontology, including the Audio Features Ontology.

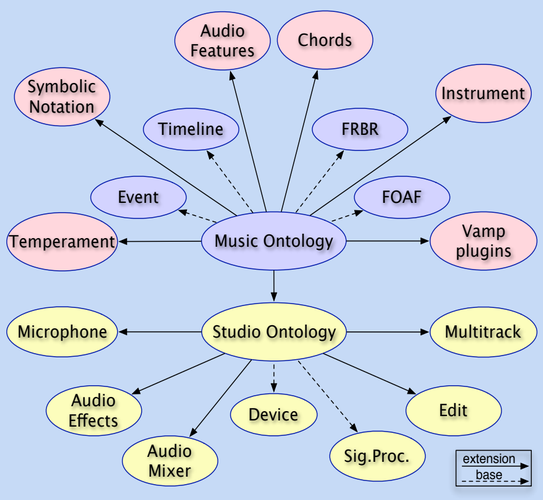

Fig. 1. Existing ontology frameworks

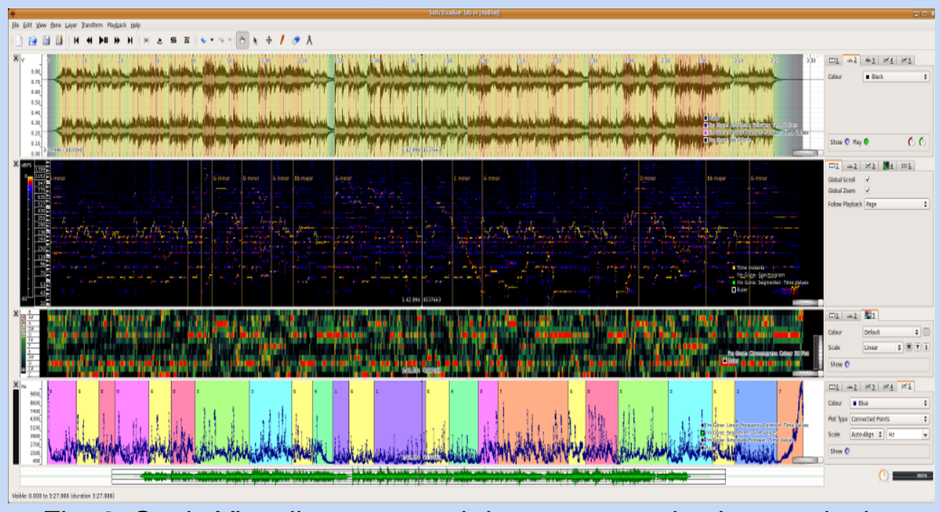

Fig. 2. Sonic Visualiser can read data expressed using ontologies

3.2 Research tools

Research tools that use ontologies include:

- Sonic Visualiser (graphical desktop application)
- Sonic Annotator (batch feature extractor)
- Sonic Annotator Web Application (SAWA)

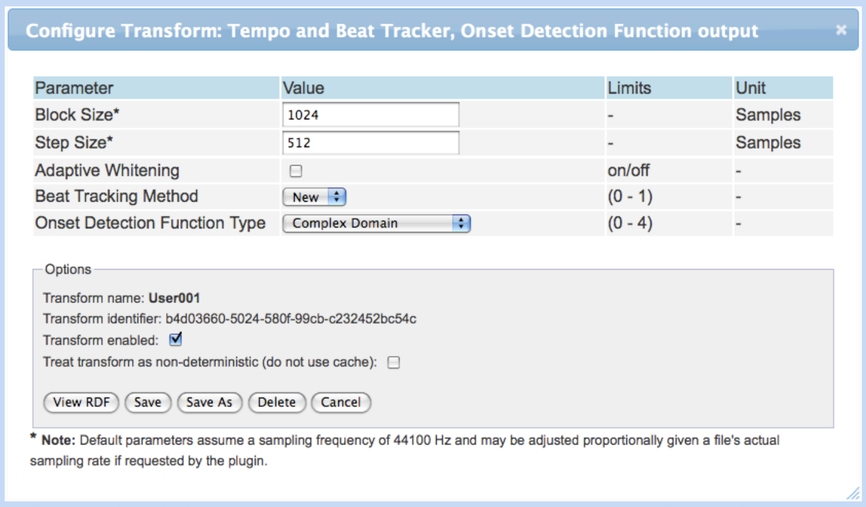

Fig. 3. SAWA uses ontologies for output and configuration data

4. Methodology

4.1 Identifying users and needs

To identify how to improve existing tools, we aim to:

(1) **engage with the MIR community** using blogs and forums and identify primary user needs,

(2) **catalogue and compare existing research tools, services and data sets** such as the Million Song Dataset, the Structural Analysis of Large Amounts of Music Information dataset, or the EchoNest Analyze web API,

(3) **synthesise the results in an updated ontology of audio features** with community agreement, and

(4) **update existing research tools**.

4.2 Identifying barriers

Some real-world constraints that present barriers to the uptake of ontologies need to be investigated, including:

- The use of binary formats when publishing large amounts of data, and how they may be linked with existing Semantic Web technologies.
- Researchers aim at publishing quickly and frequently therefore seek “quick and dirty” solutions in their daily workflows, however time gained during development is often lost in data preparation.
- Understanding shared formats can be complex and may be seen as waste of time.
- Researchers use a variety of programming languages and choose data structures that are most transparently handled by the language of their choice.

Queen Mary University of London
centre for digital music

Centre for Digital Music
Queen Mary University of London
http://www.elec.qmul.ac.uk/digitalmusic/
gyorgy.fazekas@eecs.qmul.ac.uk

JISC
Joint Information Systems Committee