Emerging Tools for Digital Sound

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JISC

Accessing Digital Audio

- How can a user find relevant media documents in a digital collection?
  - Bibliographic (structured) metadata
  - Unstructured metadata (tags, free text)
  - Content-based search (Query by ...) $\longrightarrow$ Semantic Audio
  - Recommendation / suggestion $\longrightarrow$ Music Similarity
- How should a system present query results for time-based media?
  - What is the audio equivalent of a page of thumbnail images?
  - How can an audio collection be browsed efficiently?
  - How can an audio file be browsed efficiently?
  - Are there better means of navigating within documents than: play / pause / stop / forward / rewind?
- Is this what users want?
  RCUK-funded *Musicology for the Masses* project (2010-2012): ethnographic study of tools for music education and research

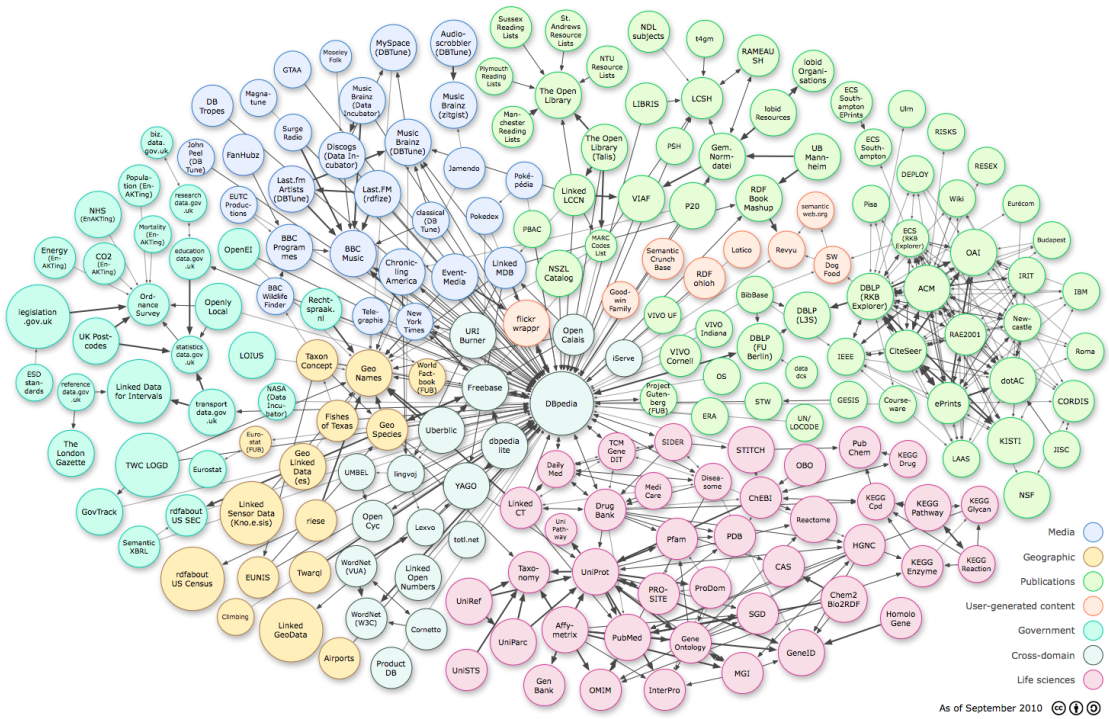
Semantic Audio

- Extraction of symbolic “meaning” from audio signals:
  How would a person describe the audio?
  - Solo violin, D minor, slow tempo, Baroque period
  - Bar 12 starts at 0:21.961
  - 2nd verse starts at 1:43.388
  - 5th comma meantone temperament
- Annotation of audio
  - Onset detection
  - Beat tracking
  - Segmentation (structural, ...)
  - Instrument identification
  - Temperament and inharmonicity analysis
  - Automatic transcription
- Automatically generated annotations are stored as metadata
  - Matched against content-based queries
  - Also useful for navigation within a document

Semantic Web and Music Knowledge Representation

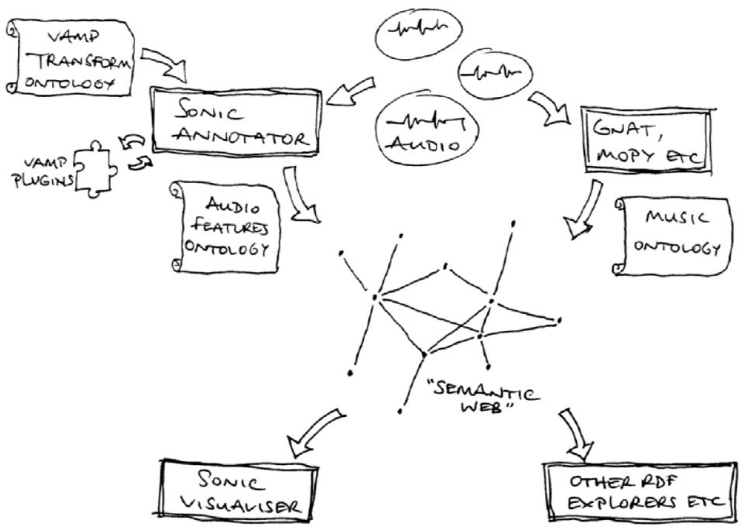
Music Ontology (musicontology.com)

- Standardized description of on-line music metadata
- Extended with ontologies for Programmes (BBC), Music Similarity, Audio Features, Chords, Temperament, Studio Workflow (soon)
- MusicBrainz metadatabase (9M recordings), BBC playcount data, John Peel Sessions, Magnatune and Jamendo labels, Last.fm



The OMRAS2 Project

- EPSRC-funded (2007–2010, QMUL and Goldsmiths) project to change Music Informatics and Computational Musicology research (**www.omras2.org**)
- Move beyond individual components to integrated, distributed, heterogeneous system
- Vision changed from Service Oriented to Resource Oriented
- Semantic Web, Resource Description Framework (RDF), ontologies: applications "speak the same language"



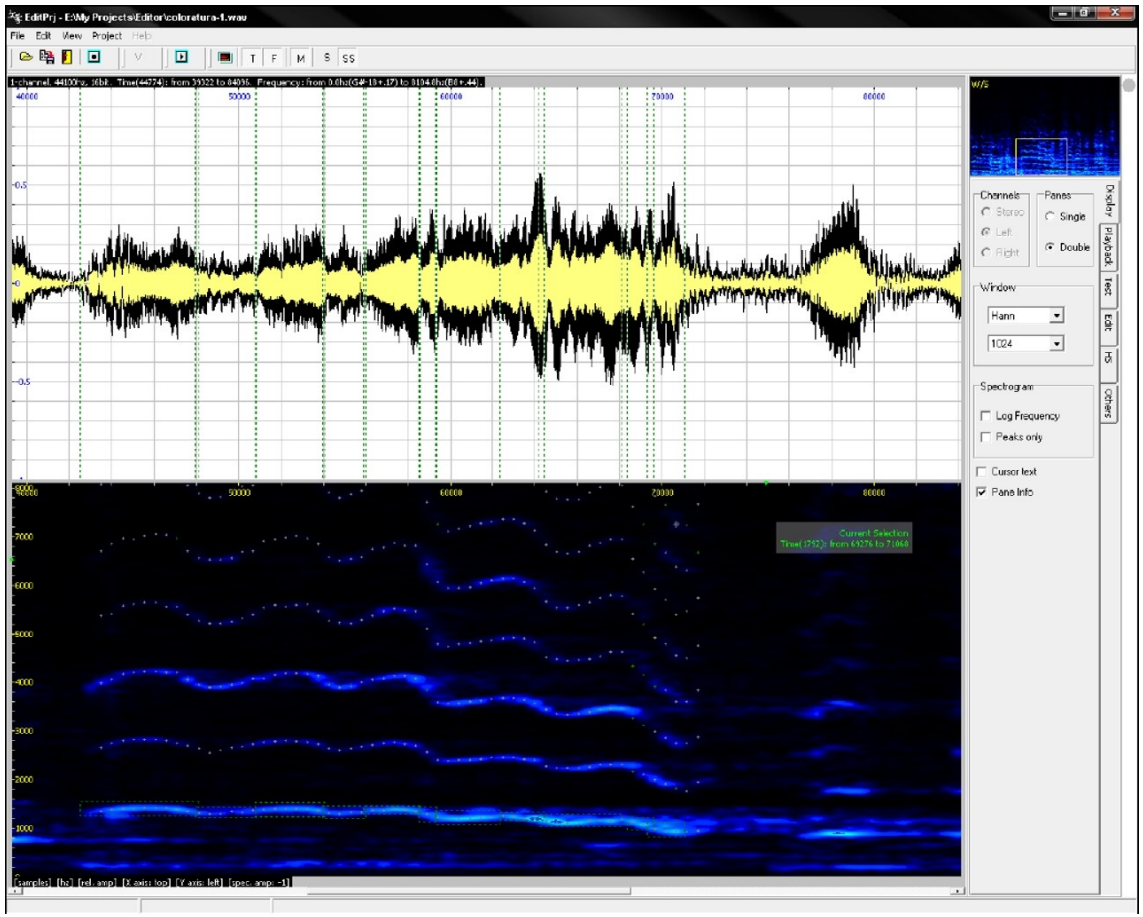
Annotation and Visualisation Tools

Sonic Visualiser (www.sonicvisualiser.org)

- Cross-platform, open source application for viewing and editing content-derived metadata
- VAMP plugin interface for feature extractors
  - plugins exist for e.g. tempo, beats, key, chord, onsets, structure, etc.
- "Speaks" RDF: contribute and consume Linked Open Data
- Over 120000 downloads
- User base includes technical users (e.g. MIR researchers) and semi-/non-technical users (e.g. professional musicologists, home users)
- *Musicology for the Masses* project aiming to deploy a version of Sonic Visualiser in BL Reading Rooms

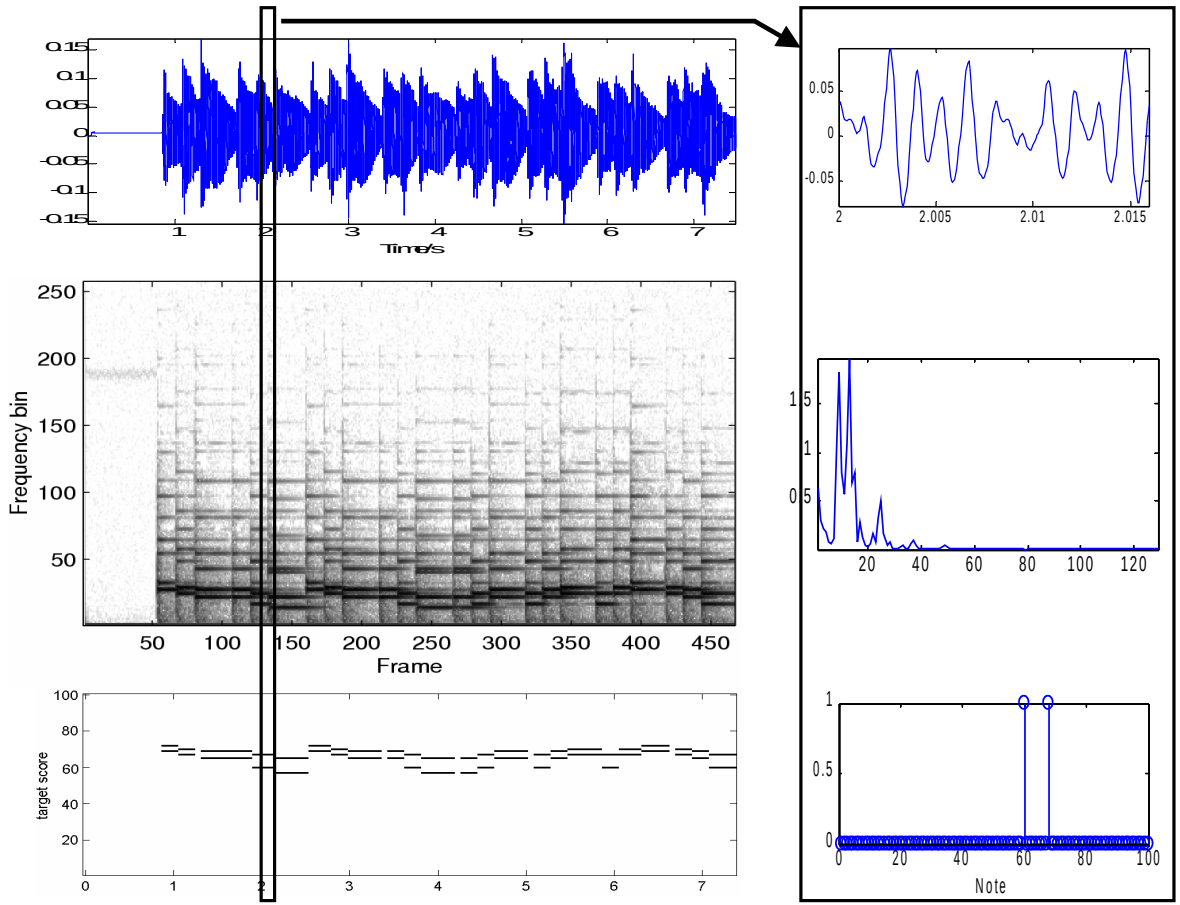
Harmonic Visualiser

- Sinusoidal modelling of musical notes
- Models inharmonicity, vibrato, allowing measurement and modification (studio editing, “what-if” analysis)



Music Transcription

- Many approaches: signal processing, statistical modelling, machine learning, non-negative matrix factorisation, sparse methods



Musical Similarity

SoundBite (www.isophonics.net)

- Free plugin for iTunes on Mac and PC platforms (also SongBird)
- Automatic playlist generation from personal collections
- Also for recommendation, browsing large collections