

Finding the 'meta' of digital audio

Software that can be used by search engines to extract musical features from sound files is beginning to attract the interest of the music industry.

While researchers started the software design seven years ago, it is only now that the music world is beginning to meet the conditions for exploiting what Hugues Vinet, the research coordinator, bills as the "first of its kind" large-scale research project for automatically extracting and classifying audio signals.

Such metadata, as it is called, can be used to tag audio files so they can be more accurately picked up by search engines equipped to handle this kind of information. Standardising the metadata for various audiovisual media is the goal of the new Mpeg-7 specification, in which the project partners participated and provided some input for descriptors, such as musical timbre.

The software could be the next big step in boosting online music sales, as it could allow companies to exploit their archives more thoroughly and help consumers dig out tracks they might not have discovered otherwise.

"We are in concrete discussions with a number of interested companies on using some of the developments from our project," Vinet says. "We are finally starting to collaborate with companies to market these resources. Such software still does not exist in any way."

Vinet, who is scientific director at the Paris-based Institute for Music/Acoustic Research and Coordination (Ircam), was part of a team that included researchers from universities in Spain and Israel, along with companies such as Oracle and Sony. The EU-funded project was called Cuidado.

The packages they developed – consisting of a music browser, an online sound palette and sound authoring software – can analyse and index sound according to the digital patterns displayed by each particular song. To do this, the researchers developed a number of techniques for capturing specific qualities from audio files, such as timbre, energy and rhythm.

This system goes far beyond the methods used online by the music industry, which is slowly warming up to selling music over the internet.





Currently, music download sites are heavily dependent on the manual input of the basic text metadata needed to generate the kind of suggestions that might hook consumers into making a purchase. The Cuidado packages produce complementary metadata based on audio descriptors, making any search engine equipped to handle such information much more accurate in taking into account the actual sonic content of the tracks.

Of particular interest is the ability of the software to make automatic connections to music tracks that cross over into other categories a listener might not have thought of, and enable new discoveries.

This ability would allow music companies to exploit their vast back catalogues, a lot of which are unavailable at the local music store.

Business tuning into the potential

The techniques have started to prick up the ears of music companies, search engines, and researchers interested in developing the software and techniques further.

For example, researchers at Ecoute, a France-based project, are using some of the techniques developed by the Cuidado team to create a portal for electronic music distribution.

Ircam is also working on audio sample management based on Cuidado indexing and content-based management and retrieval techniques.

The research results obtained by Ircam are currently being further developed and applied as part of France's national Sample Orchestrator project. This project is designing a new-generation audio-software sampler, a software instrument based on a database of recorded sounds.

According to Vinet, such techniques would be useful not only for delivering a new generation of musical instruments, but also for designing special effects for cinema and TV, or for the management of databases in specific applications, such as sounds of animals, engines and boats.

The sampler will include advanced content-based search features, built around different approaches initiated by the Cuidado team, including search by perceptual similarity, says Vinet.

What comes to pass

Some of the partners previously involved with Cuidado, including Sony, are also part of a recently completed multimedia development project, Semantic HiFi. Vinet, who is also coordinator of the EU-funded Semantic HiFi, said the new project applied results from Cuidado to develop software that allows users to manipulate and mix music and sounds.

Sony notes on its internet site that its interest in Cuidado, which ran from January 2001 to December 2003, is related to the development of techniques that would allow the sharing of musical tastes and information within online communities.

"The Cuidado project enabled us to gather a core of experts together to develop a vision and a new set of audio extraction technologies," Vinet says. "It helped establish us as international leaders with multidisciplinary competences in this area. It is evident that what we foresaw, the evolution of the music industry to full digital distribution, is coming to pass."

If so, full digital distribution of the music industry's vast archives, coupled with powerful search engines based on Cuidado's techniques, could put the power of the beat into listeners' hands.

Project name: Content-based Unified Interfaces and Descriptors for Audio/music Databases available Online (Cuidado)

Start-end date: 1 January 2001 – 31 December 2003

EU funding: €2.5 million

Policy area: Information society and media, research and technology, culture and arts

EU initiative: Media representation and access: new models and standards

Cuidado website: [http://www.ircam.fr/projets_europeens.html?&tx_ircam_pi1\[showUid\]=1&cHash=d2](http://www.ircam.fr/projets_europeens.html?&tx_ircam_pi1[showUid]=1&cHash=d2)