Browsing Multimedia Libraries by Similarity

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Overview
This poster presents a prototype tool for browsing through multimedia libraries using content-based multimedia information retrieval techniques. It is composed of several groups of components for multimedia analysis, data mining, interactive visualization, as well as connection with external hardware controllers.

MediaCycle Architecture

Possible Applications
- Musicians / Remixers / DJs
  - organize and browse music content libraries, sound replacement
- Video artists
  - live sequencing and improvising with pre-recorded material

Browsing
a) Exploration by Interactive Clustering
- Organization of media according to groups of similar nature, possibly in a hierarchical fashion similar to a directory structure, but dynamically created.
- Visualization of those. Possible approaches: dimensionality reduction using PCA, graph visualization and multi-dimensional scaling, hierarchical clustering.
- Clustering is used here. A media is positioned in a radial map:
  • its distance in feature space from a reference media (random one or else query-by-example) used to set its radial coordinate,
  • its distance in feature space from its cluster centroïd use to set its polar coordinate.

b) Similarity Browsing
- Retrieval of similar media from an example, possibly in an iterative fashion.
- Visualization showing the sequence of browsing steps.
- Retrieval based on:
  • distance (euclidian) in feature space, according to a subset of descriptors
  • identification of Pareto front, allowing to retrieve similar sounds according to a variety of criteria.

Rendering
- Exploring both 2D and 3D visualizations and real-time audio control.
- Based on:
  • Open Scene Graph (OSG) library for representing and rendering 3D visuals
  • Open Audio Language (OpenAL) for generating audio tightly coupled with visual representations

Conclusions and Perspectives
- MediaCycle:
  • Client server architecture (used for instance in DANCERS! project),
  • Further work on user interaction, scalability, ...

Features Extraction
- Audio: Rhythm, Timbre, Harmony
- Image: Color, Texture, Shape
- Video: Audio + Image + Speed, …

Features Plugins
- Feature database
- Mediacycle Kernel
- Controllers
- GUI