



FASTLab
220 Santa Anita Rd.
Santa Barbara, CA, 93105, USA
E: <http://FASTLabInc.com>
T: (805) 895-6353

Company Overview

FASTLab is a technology company whose activities focus on state-of-the-art software for musical signal analysis, sound/music databases, and digital signal processing. Depending on the application area, the technology might be called data mining, music information retrieval, signal classification, or media stream segmentation. We have designed and developed a wide variety of applications over the past 12 years, and have provided our technology to third parties for several other domains. A typical application of our technology is one that requires a combination of sound signal analysis, large-scale databases, digital audio signal processing, and graphical user interfaces. Our business model incorporates both the licensing of our IP and software artifacts, and providing consulting and contract software development services.

Background and Technology

The partners and affiliates of FASTLab develop software for the areas of sound and music databases, multimedia data mining, and sound/music signal processing. We provide contract development, development support and applications consulting, as well as licensing several of our software tool kits.

The core of FASTLab's technological IP (and copyrighted source code) is the FASTLab Music Analysis Kernel (FMAK), a cross-platform C++ library and API for music/sound analysis, segmentation, clustering, and classification. FMAK uses a number of different analysis techniques to extract both low-level and high-level features from musical selections, and then to locate the section boundaries in the content and perform data reduction. The FMAK components can be used to build and to refine large-scale music/sound databases.

Our approach to sound/music content analysis is characterized by several unique features:

- Fine-grained analysis: in the first-stage analysis, FMAK derives a very detailed feature vector at very short time-steps.
- Sophisticated signal statistics: FMAK adds many additional features derived from the low-level analysis (e.g., spectral flatness, noisiness, spaciousness).
- Beat, tempo, and time-domain analysis: we derive detailed time-domain features and track beat and tempo changes.
- Segmentation and data reduction: FMAK segments a sound into sections, and selects the most representative feature vector for each section, reducing the data volume by a large factor, and providing the section-length data as an additional (important) component of the analysis.
- State-of-the-art clustering: given the segmented and time-keyed feature vectors, the clusterer can group even very huge song databases effectively, and allow the user to label clusters as genres.

- Database pruning, genre classification: for run-time systems, a database can be pruned to reduce its size by selecting a representative element from each cluster, and replacing the cluster with that single item (augmented by the weighting of each element of the feature vector that defines the cluster).
- Run-time classification: A run-time application can perform a reduced version of the analysis and segmentation, and the classification system uses a customizable distance metric to make its selection.

Clients can use the components of the FMAK framework in several ways, e.g., as database development aids, or as run-time libraries for applications.

Applications

The FASTLab analysis, segmentation, clustering, and classification technology can be used for a wide variety of music information retrieval applications. The following is a sampling of systems in which FASTLab was used.

- SoLaTi MusicRecommender System: a large-scale music database and machine-learning tool for making music recommendations.
- Locus Automatic Animation System: an animation program that maps analysis properties of individual instruments in a musical piece to the graphical properties of 3D objects in an animation.
- Expert Mastering Assistant (EMA): artificial-intelligence-based mastering tool with signal processing modules that perform equalization, compression, reverberation, etc.
- MusicMagic: analysis engine for an on-line user preference matching database.
- Paleo Database: a large-scale multimedia database for music scores and expressive performance data.
- NOLib: digital audio signal analysis library supporting large and flexible feature vectors.
- CSP: constraint-based expert system for harmonic analysis of keyboard performances.
- 8S Speech Segmenter: robust fine-grained sound segmenter for large speech databases.
- Opera Browser: hyper-media score/sound browser for large-scale musical structures.

There are several other product areas that require advanced musical feature extraction. Most prominent among these are sound content finger-printing, automatic thumb-nailing of music and sample libraries, and smart segmentation of multimedia material. We have investigated these areas, but have not yet prepared concrete product demonstrations.

FASTLab LLC is a technology company; we are currently looking for partnerships with product companies interested in licensing our technologies, or in promoting and delivering our products.

Contact Information

Stephen Travis Pope
FASTLab
220 Santa Anita Rd.
Santa Barbara, California, 93105 USA
Tel: (805) 895-6252
Email: stephen@FASTLabInc.com