Essentia development proposal

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Duration:

1st March - 30th July 2014

Dedication:

12h / week

Content:

The project is focused on the improvement of existing tonal descriptors and their documentation as well as the implementation of additional extractors.

Specific tasks listed in order of priority:

- Documentation: Each descriptor should be adequately documented within the source code as well as on the web documentation. This includes a brief description of the algorithm, references to related publications and, most importantly, all adjustable algorithm parameters should be explained sufficiently so that the user does not need to resort to external references.
- MELODIA: Users have reported differences between the vamp plug-in implementation and the Essentia module and given specific examples. These should be investigated by comparing the output of each step. Possible differences might be caused by the FFT implementation, the peak detection algorithm and the choice of parameters which are non-adjustable in the plug-in version. Furthermore, the algorithm can be modified for monophonic f0 estimation. A Python source code for this task has already be developed in the CompMusic project and can be ported to Essentia.
- Vocal melody extraction: Several tasks related to the analysis of the singing voice in polyphonic music requires the extraction of vocal melody contours. Until now, mainly the predominant melody extraction was used for this task, assuming the singing voice to be the dominant element. Such estimations usually contain false

positive contours originating from dominant accompaniment instruments. Currently, there is a vocal / non-vocal segmented implemented in Essentia, which can potentially be combined with MELODIA to reduce the voicing false alarm rate.

- Vibrato extraction: Currently, Essentia does not include a module for extracting vibrato descriptors from melodic contours. A very rough vibrato detection is implemented in Melodia. It needs to be tested and if necessary improved and implemented as a stand-alone extractor, giving frame-based information on the existence of vibrato and its parameters (rate, extend).
- Note segmentation: (optional) Implementation of a simple module which segments melodic contours into single note events. Possible algorithm include contour fitting, island building and pitch difference based detection functions.
- Multiple f0 estimation: (optional) Implementation (or if possible porting) of a state-of-the-art multiple f0 estimation algorithms, including testing and documentation.