CSC475/575 MIR Assignment 5, Spring 2017
(10 pts)

The goal of this assignment is to familiarize you with existing tools and framework for perfoming MIR tasks and how to evaluate their performance. The emphasis is on learning how to put together processing and evaluation using existing tools rather than understanding the techniques themselves.

Hope you find it interesting, George Tzanetakis

1 Structure Segmentation (5/4 points)

Vamp is an audio processing plugin system for plugins that extract descriptive information from audio data typically referred to as audio analysis plugins or audio feature extraction plugins. It supports multiple types of outputs and output types and there are a variety of tools for using (and making VAMP plugins, something we won't do). More information about VAMP plugins, the associated tools, and design can be found at: `http://www.vamp-plugins.org/`.

The goal of this question is to apply structure segmentation using two plugins: the Segmentino plugin, and the Segmenter from the Queen Mary plugin set. Both plugins can be obtained from: `http://www.vamp-plugins.org/download.html`.

- Using the Sonic Visualizer tools, visulaize the segmentation results of the two plugins for two audio files of your choice. Provide screenshots of the segmentation results **(2 points)**.
- Using the Sonic Annotator tool, show how you can process the same two files from the commend line. Show the commands you used **(2/1 points)**.
- Using any tool do a structural segmentation of the audio yourself. For example you can use Audacity and a label track to annotate the segments. Convert your manual segentation and the two automatic segmentations for each song to the same format and compare them by listening. Describe in words what are the differences **(1 point)**.

2 Evaluation of Segmentation (5/4 points)

MIREX is the annual Music Information Retrieval Evaluation Exchange. You can read about it at: `http://www.music-ir.org/mirex/wiki/MIREX_HOME`. *mir_eval* is a great Python package that implements many of the evaluation metrics for the various MIR tasks. The objective of this question is to use *mir_eval* to perform a more formal computer evaluation of the segmentation results from the previous question. You can read about the segmentation evaluation metrics at: `https://craffel.github.io/mir_eval/#module-mir_eval.segment`

- Use the *vampy* host to run the segmentation plugins from the previous question inside Python for the two files you processed. You can find the code at: `https://code.soundsoftware.ac.uk/projects/vampy-host`. **(2 points)**.
- Connect the *vampy* code for computing the segmentation with the *mir_eval* code for evaluation. Print the pair-wise F-measure for all 4 combinations of track and segmentation plugin using your manual structure segmentation as the ground truth. Discuss whether the pair-wise F-measure corresponds to your listening perception of segmentation quality **(3/2 points)**.

3 Beat tracking (ONLY FOR CSC575 STUDENTS) (2 points)

Repeat the same process: manual annotation, running a vamp plugin, and then evaluating using *mir_eval* for the same two tracks but for the task of beat tracking. You can use the Bar and Beat tracker plugin from the Queen Mary set.