Modifications in the Analysis Script of the Sinusoidal Track Database

This document describes the modifications in the analysis script of the new version of the Sinusoidal Track Database (TDB). Below one can find a brief description of both the bug fixes and improvements made in the scripts. More information about each processing stage can be found in the paper and in the analysis scripts themselves (available along with the Accordion example in `www.gpa.lps.ufrj/tdb.html`).

Bug Fixes

- Time-Frequency Mapping: fixed a bug in the normalization of the spectrogram.
- Peak Detection: fixed a bug that caused the estimated noise floors to be frquency-shifted relative to the spectrum. Also, safeguards were added to ensure that the first and last bins are not detected as spectral peaks.
- Missing data interpolation: fixed a bug that caused the q[1] first and q last samples to not be correctly interpolated. Added a linear interpolator for the phase information, which was not interpolated in the previous version of the code. The phase is unwrapped prior to interpolation.

[1] q is the order of the AR interpolation algorithm employed.

Improvements

- Sub-band Division

  A modified Laplacian Pyramid is now used to divide the input signal into N sub-bands. Fig. 1 shows the modified structure used in the decomposition. The full-band signal is now used instead of a high-frequency complement of $x_l[n]$.

  The filter $h[n]$ has also been modified and is now implemented as a non-causal zero-phase filter through the Matlab function `filtfilt.m`. Filter order, pass-band, and stop-band specifications were not modified.

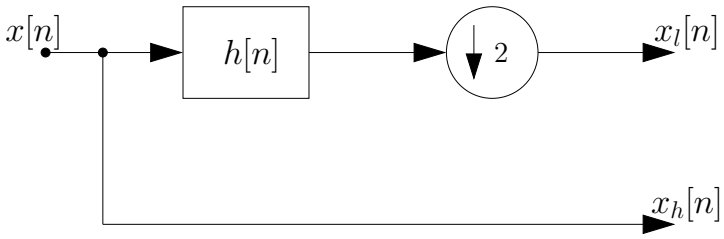

Figure 1: Modified Laplacian Pyramid scheme used in the new version of the TDB.

- Peak Detection

  Before the proceeding to the peak detection phase described in the paper, the spectrogram of each sub-band of the signal is cropped in order to remove the information already represented in lower-frequency sub-bands.

- Frequency Estimation

  The frequency estimation is still performed through a quadratic interpolation, but operates on the log-magnitude spectrogram instead of the magnitude spectrogram.

- Magnitude and Phase Estimation

  The peak magnitude is now estimated as the maximum assumed by the fitted parabola of the frequency estimation method. The phase is estimated through a linear interpolation.