Using the SpeechMark MATLAB Toolbox for Syllabic Cluster Analysis

SpeechMark MATLAB Toolbox

The SpeechMark MATLAB Toolbox is a platform-independent add-in to the MATLAB® language and computation environment, developed by MathWorks. This Toolbox adds acoustic landmark detection and visualization tools, functions, and scripts to MATLAB.

Note: If you haven't already installed SpeechMark, see the Installation section at the bottom.

Syllabic Cluster Analysis

A special feature of the SpeechMark MATLAB Toolbox is a function that groups landmarks into clusters of acoustic patterns marking the individual syllabic speech units as produced. This function is named *syl_lms*.

Syllabic Cluster Analysis uses ten of the 14 abrupt landmarks detected: +g, +b, +s, +f, +v. (The other abrupt types, +p and +j, are laryngeal and are ignored here.) The algorithm identifies the landmark types and groups the sequences into syllabic clusters. The recognized syllabic cluster sequences are based on rules for the order of landmarks (for example, a -b cannot be the first landmark of a cluster, and all clusters must contain a voiced interval) and for the timing of events (e.g., a +s or -v breaks a syllabic cluster except if it occurs immediately after a +g).

The *syl_lms* function is used for several built-in measures: the number of non-"stray" landmarks, the number of syllabic clusters, the number of landmarks per syllable cluster, syllable clusters per utterance, as well as the duration of each utterance. It may also be incorporated into user-written MATLAB functions to provide derived measures, such as the speech rate: number of clusters/duration.

To analyze a wave file:

> ➢ Run "smdemo2" from the MATLAB command line.
>
> ➢ In the GUI, press the "…" button to locate a wavefile: In the File Explorer window, locate and select the "spx1.wav" file in the "smdemos" folder of the SMMLToolbox installation directory.
>
> ➢ Select "Infant" from the "Age/Gender" dropdown.
>
> ➢ Click the "Compute Landmarks" button.

You should now see a figure with the waveform and its spectrogram. Landmarks and their grouping into clusters are shown on the waveform. Its F0 contour is shown on the spectrogram.

Installation

If you have not already installed SpeechMark, you can follow these manual steps.

Downloading

This product is a standard MATLAB toolbox. To use it, a valid instance of MATLAB (version R2012a or newer) must be installed, as well as a valid version of the MATLAB Signal Processing Toolbox.

- ➢ The SpeechMark MATLAB Toolbox can be downloaded from the SpeechMark website https://speechmrk.com/products/.

- ➢ The download link will be sent to your e-mail address. Check your spam/junk e-mail if you do not see an e-mail for 'donotreply@speechmrk.com' in your inbox.

- ➢ The file will be downloaded as a zipped file 'SMMLToolBox_vxxx', where xxx is the version number.

- ➢ Find the SMMLToolBox_vxxx folder in your Downloads folder. You may choose to move this to your Desktop or another preferred directory.

- ➢ Unzip the SpeechMark MATLAB toolbox folder and the zipped 'Contents' folder within.

Setting the Path

To add the SpeechMark MATLAB toolbox to MATLAB you will need to set the path in MATLAB:

File > Set Path > Add with Subfolders > Browse for Folder > Select 'SMMLToolBox_vxxx' > Save.