ASSIGNMENT 4

processing acoustic features

1. Extract RMS and Pulse Clarity using the MIRToolbox using a frame-based approach for the stimulus titled *fmri_music_stimulus.mp3*.
   a. RMS parameters: 25ms window with 50% overlap
   b. Pulse Clarity parameters: 3s window with 2s overlap
2. Convolve the feature with the hemodynamic response function (HRF) followed by a detrensing operation. (use *fmri_doublegamma*, *fmri_detrend*). Make sure that the temporal resolution of the HRF matches the feature's before convolving.
3. Plot the unconvolved, convolved, and detrended and comment on it.
4. Downsample them to match the sampling rate of the fMRI data (TR = 2 sec).
5. What perceptual changes in the audio occur during peaks (when compared to the valleys) of each of the features? Is the feature perceptually relevant?

musicians vs non-musicians
a. mean ISC

1. Download fmri data of any 5 musicians and 5 non-musicians from https://drive.google.com/drive/folders/1_S2dPUNoPtll3tnL4cmA_XXrVfaj7rX8.
2. For each participant group, perform voxel-wise inter-subject correlation (ISC) analysis (use *fmri_corrvoldata*). Calculate mean ISC per group and display the results using *fmri_show3d*. Display the most significant correlations by thresholding (ex: mean r >0.3 or 0.4). Which regions have the highest mean ISC for the groups?

b. neural correlates of acoustic features

1. Download *musicalfeatures.mat.* Store the features for the concatenated stimuli (i.e., *feat{1,1}*) in a separate variable. This is a matrix of size *t* x *n* where *t* refers to time-points and *n* refers to acoustic component. They are ordered as mentioned in the variable *featlbl.*
2. At an individual level, perform voxel-wise correlation with the following features: *Brightness* & *Pulse Clarity (*Use function *fmri_corregressor).* Plot the results for each participant by showing the highest (and lowest) correlations (e.g: fmri_show3d(c>0.25), fmri_show3d(c< -0.25)).
3. Which feature demonstrates similarities across participant groups? Comment on your observations.

Submit your code along with the pdf of answers to the above.