

Tutorial 7

Audio Features : Frequency Features

BT3017

Due date: 21st March 2022 (Monday) 2359 hrs

Semester 2, AY21/22, School of Computing, National University of Singapore

IMPORTANT:

For this tutorial, you are supposed to submit your project file to LUMINUS.

Instruction for submission:

- *Create a folder using the following naming convention:*
StudentNumber_yourName_Tut7
- *Put your python file and also the results in this folder.*
- *Zip your folder. Name your zip file using the following convention:*

StudentNumber_yourName_Tut7.zip

For example, if your student number is A1234567B, and your name is Chow Yuen Fatt, for this tutorial, your file name should be A1234567B_ChowYuenFatt_Tut7.zip

- *Submit the zip file in the "Tutorial-7 Submit Here" folder in Luminus.*

Question 1

Visit the following website using your mobile phone or another computer other than the one that you are using to do this tutorial:

<https://www.szynalski.com/tone-generator/>

Note: Alternatively, you can also find a free tone generator app for your mobile phone. For iOS, you can download "Tone Generator". It is free. You should not need to pay for the app.

Play a tone of 1000Hz using either your mobile phone or a second computer (i.e. not the one that you are using to develop and run your program for this tutorial).

Using a sampling frequency of 44.1kHz, record the tone for 5 second and store the audio recording in a file. Name the file "tone1000Hz.wav".

Repeat the above for tones of 2000Hz, 5000Hz, 10000Hz. Name the files "tone2000Hz.wav", "tone5000Hz.wav" and "tone10000Hz.wav" respectively when you save the recorded audio signals.

Hint for Question 1:

import sounddevice

Question 2

- (i) Read "tone1000Hz.wav".
- (ii) Perform FFT on the audio signal.
- (iii) Plot the absolute value of the FFT results.
- (iv) Identify the index i.e. location of the two peaks in the FFT results from the figure plotted above.
- (v) Compute the frequency resolution.
- (vi) Verify that the peaks happened at the correct frequencies in Hz as expected.
- (vii) Repeat (i) to (vi) for the other 3 audio files created in Question 1.

Hint for Question 2:

from scipy.fft **import** fft