## Contents

1. **wiener_filt.py**: Applies a wiener filter on an input audio signal
2. **amplifysig.py**: Amplifies the input audio signal using FFT
3. **spectrogram.py**: Generates spectrogram of an input audio signal
4. **bworth_filter.py**: Applies a Butterworth filter on an input audio signal
5. **Data**: Contains input data (.m4a & .wav files)
6. **Outputs**: Contains output files (.m4a, .wav and .jpg files)

## Requirements:

The following modules must be installed in-order to successfully run the .py files

1. numpy
2. scipy
3. matplotlib
4. pydub
5. os

## Steps to run any file 1-4 listed above:

1. Choose a file from the Data/Outputs folder (neglect extension) eg: Penn1 from Data folder
2. Assign *input_path = 'Data'* and *audio_file_name = 'Penn1'*
3. Run

Note: The files used for generating plots in the report are namely: *72st, ColumbiaUniversity2, ColumbiaUniversity5, SalaThai2a, Penn1 and SubwayShort* from the *Data* folder. The corresponding audio outputs can be found in the *Outputs* folder eg: *h_600_Penn1.wav* (output of the high-pass filter), *wiener_11_h_600_Penn1.m4a* (output of the wiener filter).

## References:

Implementations of the spectrogram and butterworth filters were referred from the following sources:


1. **spectrogram.py**:

   https://ursinus-cs372-s2023.github.io/Modules/Module11/Video1

2. **bworth_filter.py**:

   https://medium.com/@ChanakaDev/low-pass-high-pass-and-band-pass-filters-with-scipy-python-a87b2332ce25