Punahamoa Walker and Ning Yang

MUSI6202 Assignment 2

Generating a Sinusoid

First, we wrote a function which generates a sinusoid given input parameters of amplitude, sampling rate, frequency, length and phase. The plot of the first 5ms of a 400hz sine wave with a 44100Hz sampling frequency and a phase shift of half pi is shown below.

A screenshot of a cell phone

Description automatically generated

Generating a Square Wave

We then wrote a function generateSquare() that generates a square wave given input parameters of amplitude, sampling rate, frequency, length and phase. The plot of the first 5ms of a 400hz sine wave with a 44100Hz sampling frequency and a phase shift of zero is shown below. This has been overlaid over the plot of the previous section

A close up of a map

Description automatically generated

The sinusoid and the square wave approximation are pi/2 radians out of phase.

Fourier Transform

We wrote a function computeSpectrum() which outputs the phase and magnitude information of an input signal. The plots below show the magnitude and phase for both the sine wave from the first part and the square wave approximation generated in the second part.

A close up of a piece of paper

Description automatically generatedA screenshot of a cell phone

Description automatically generated

The frequency resolution of this is spectrum is 4Hz as the signal is 0.5 seconds long with a sampling frequency of 44100Hz.

When the signal is zero padded to a length of 1 second, the frequency resolution becomes 1Hz.

Spectrogram