DSP Lab

ASSIGNMENT 6 — Fixed Point Decimation and Interpolation

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Problem

To get best Q Format for Decimation and Interpolation operations performed on sinusoidal and audio signal (with spectrogram outputs) &

Fixed Point Decimation & Interpolation Flow

For each Q :

1. Conversion of signal to fixed point Q format : x
2. Conversion of filter coefficients to fixed point Q format : h
3. Fixed point convolutions on x and h while performing decimation & interpolation operations
4. Finally converting fixed point output samples back to floating point

Observation Plots

Sinusoidal Signal

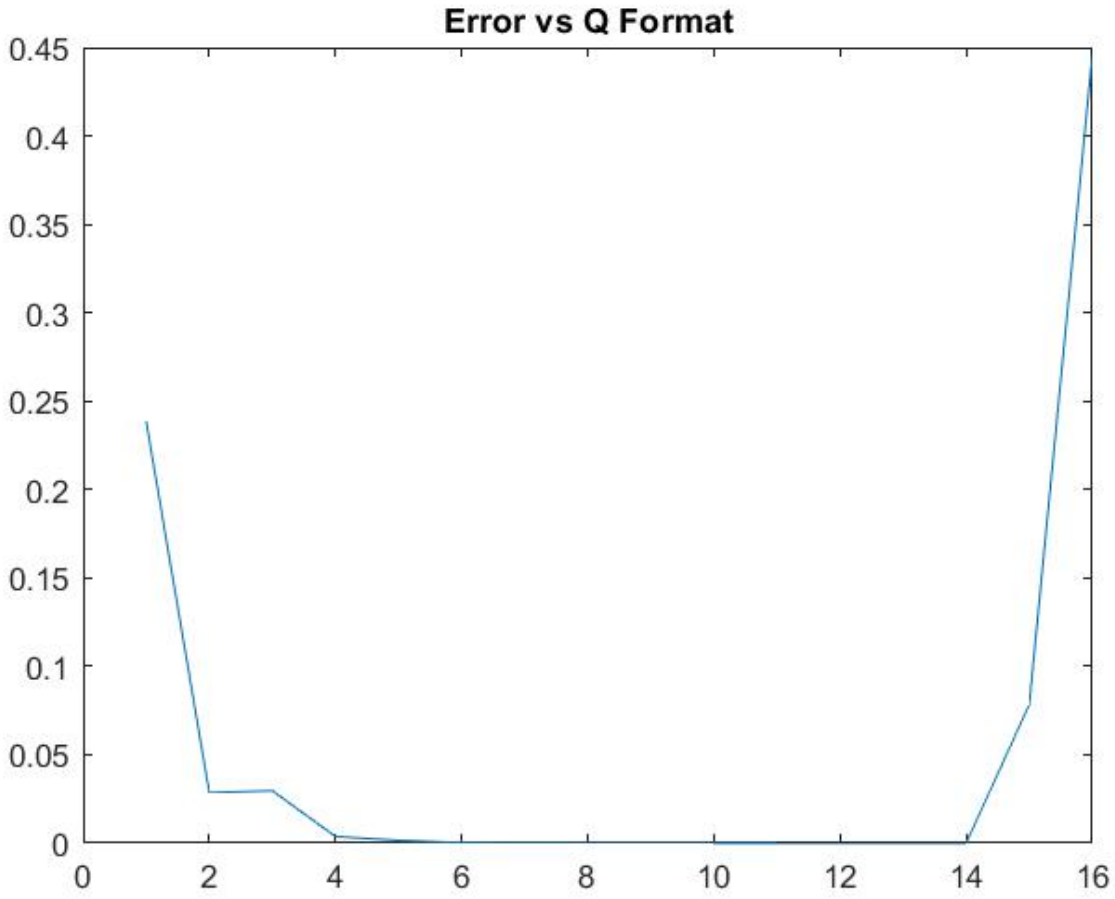

Figure 1: Error vs Q Format

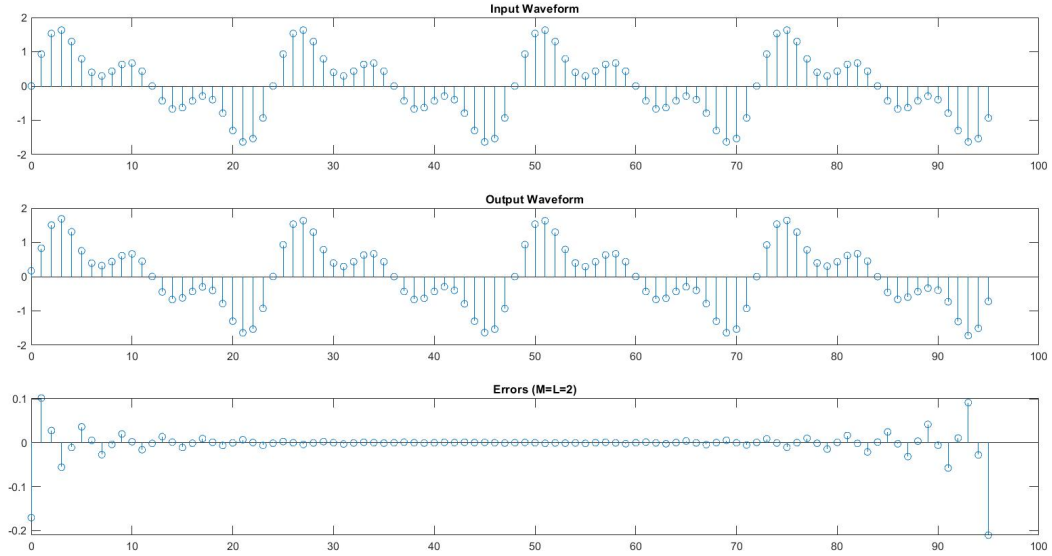

Figure 2: Output for M=L=2

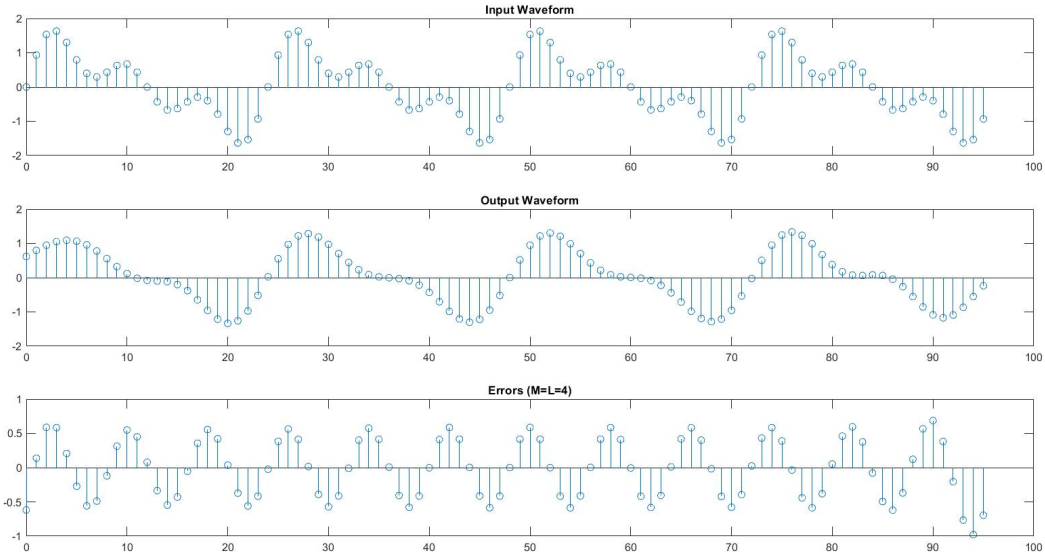

Figure 3: Output for M=L=4

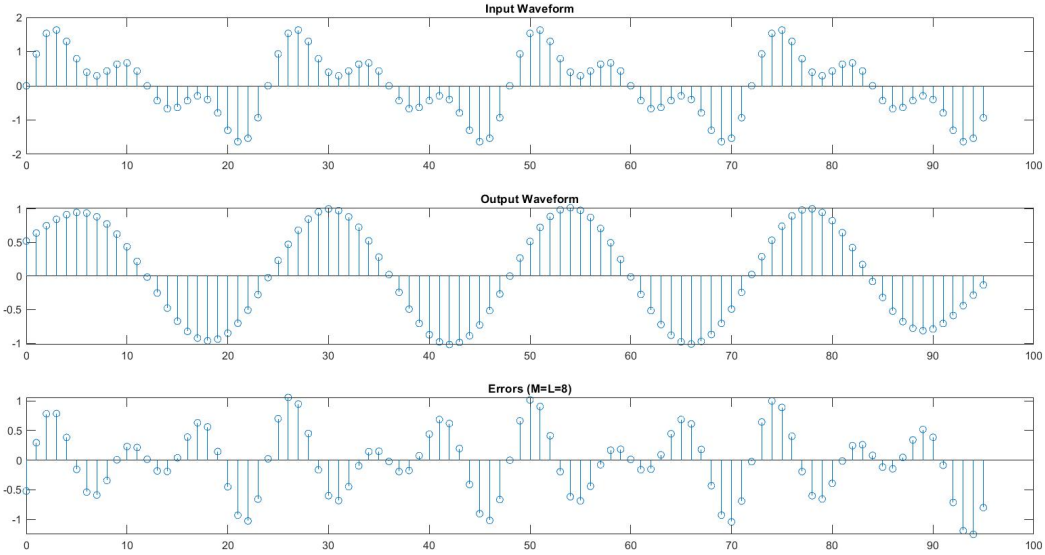

Figure 4: Output for M=L=8

Audio Signals

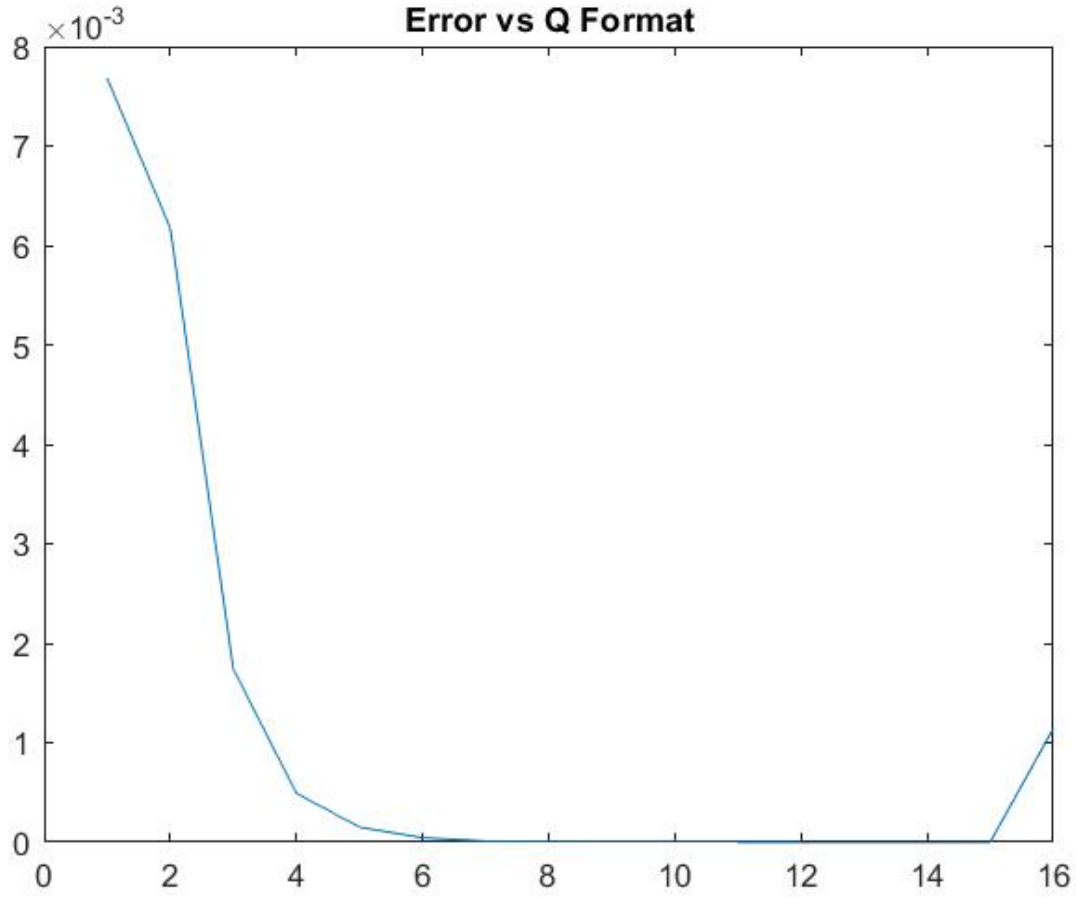

Figure 5: Error vs Q Format

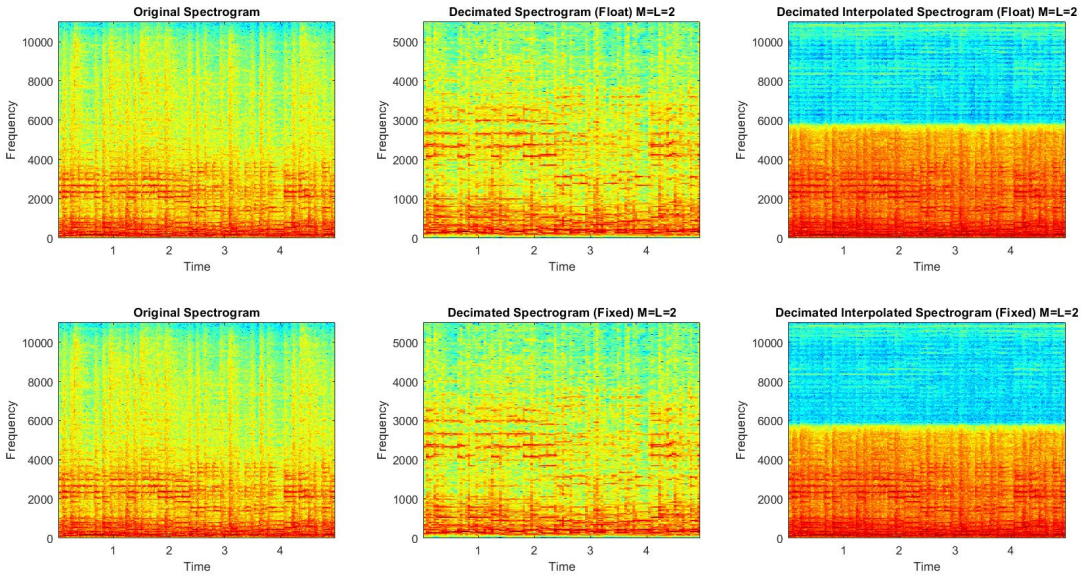

Figure 6: Output for M=L=2

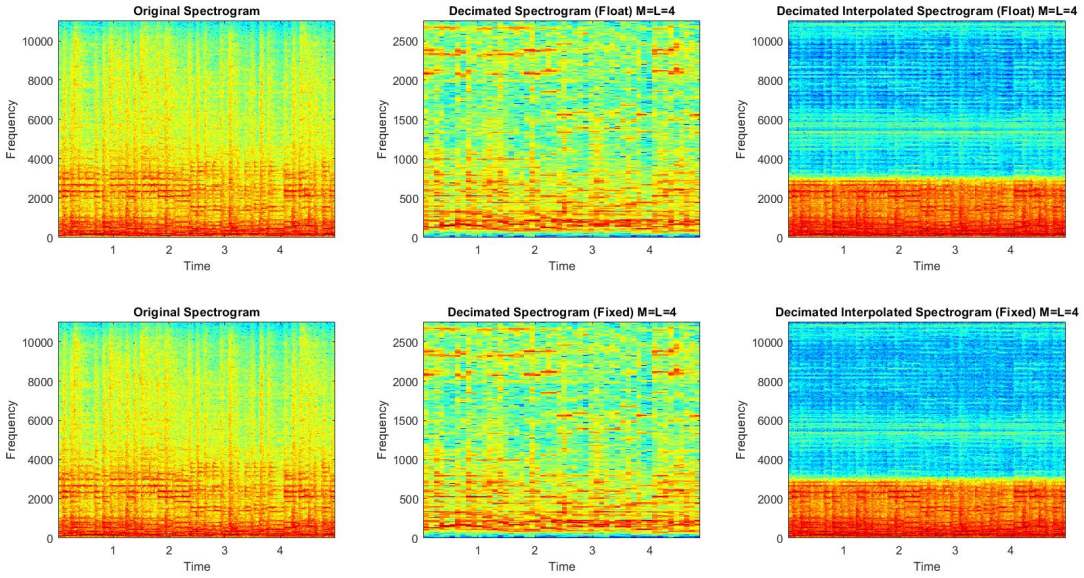

Figure 7: Output for M=L=4

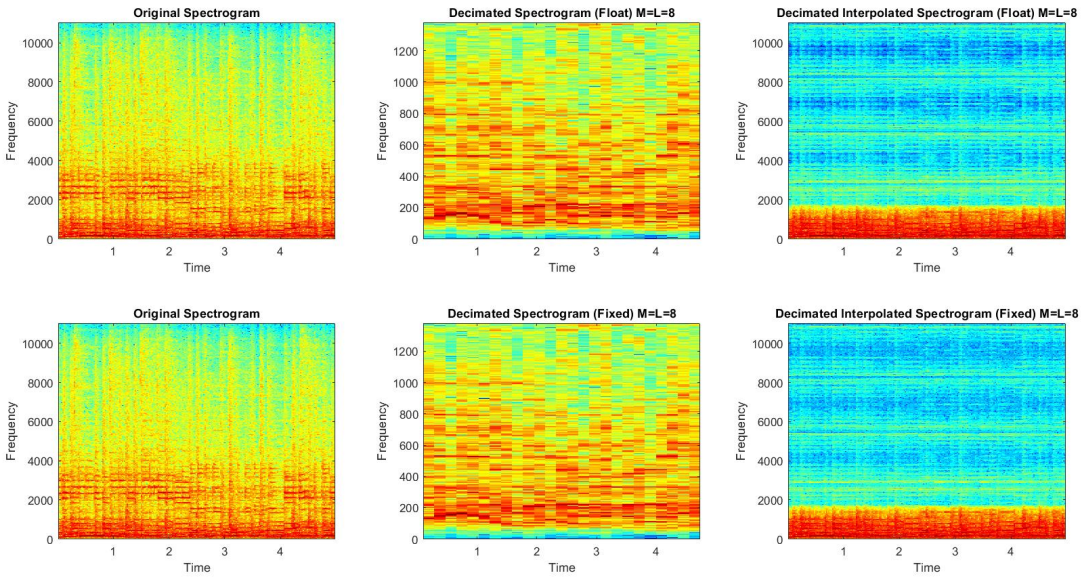

Figure 8: Output for M=L=8