CMPE 362 HW4

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In this project I embeded data to a multimedia file without affecting host multimedia file much. I implemented a watermarking system on time domain, wavelet domain and frequency domain respectively.

*I used previously sent mike.wav in order to test my algorithms because my pc couldn't handle testing the 31 mb son.wav

1) Watermark on Time Domain

I followed the instructions and embedded data to audiobytes array. I listened to the watermarked audio; there was some noise at the background. I followed the extraction process and I represented the resulting 2D matrix as a gray scale image and saved it as "lenaTime.bmp".

MOS value: 3
SNR   : 17.21

2) Watermark on Wavelet Domain

I followed the instructions, applied necessary tranforms and embedded data to audiobytes array. I listened to the watermarked audio; there was some noise at the background. I followed the extraction process and I represented the resulting 2D matrix as a gray scale image and saved it as "lenaDWT.bmp".

MOS value: 3
SNR   : 15.87

3) Watermark on Frequency Domain

I applied fft to audio data. Stored their phase angles and amplitudes. I followed the first two steps. After that I looked for elements with maximum amplitudes, got their index, added pixel value to their amplitudes and constructed a new complex number with new amplitude and known phase angle at that index. I applied ifft afterwards and listened to the watermarked audio.

MOS value: 2
SNR   : -3.0

Relationship between MOS and SNR values came up as expected. For the first two questions there was a slight rustle at the background and for the last one there was a constant wuthering at the background