HW5

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Write Up

hw5.m is the script, and the rest is all functions.

Comment + References

I did project based off of the standard. (ISO11172-3) However, when I got to perceptual model stage, my code stopped working. I went online and found encoder code in MATLAB to have some guidance. I followed a significant amount of perceptual model from the source. Hence, my perceptual model is exactly the model 1 that the standard discusses. The tonality detection algorithm and masking algorithm follows exactly as the standard suggests. I modified it by removing unnecessary components and made it more useful.

I tested my code using two wav files: guitar\_C\_major.wav, sax\_riff.wav. The result shown to be fine.

I haven’t played around much with the data rate. When I set the cb (available number of bits per frame) to 3296, I could not hear any differences. This resulted in a data rate of about 164.39kbps. When I cut the cb to 1760, the data rate fell to 164.29kbps. I went further down in cb, (cb = 1000), the data rate fell to 113.6kbps, but I could not hear major distortions. I think the reason why even with major reduction in available bits, my thing didn’t sound too bad is because I set the minimum masking to noise ratio to be 10dB in the first place. Hence, my 164kbps, which seems to be a saturation point, is way above the masking just above the noise floor.

I got curious and changed the masking to noise ratio to be 0dB. The data rate this time was 132kbps. Hence I could say that (cb=1000) was risky.

When I do not compress, but allow the encoder to use maximum number of bits, the data rate is about 687kbps. Hence, my compression saves significant amount of data rate. The data rate was calculated by counting number of bits that I have used throughout the whole song, and divided by number of seconds.

I show the spectrum of the resulting sounds, and they all look identical to me.

Because I designed my own decoder, I decided not to flip the MSB of the sample data that is being “sent”. That is one thing that I deviated from the standard. Because my psychoacoustics model includes everything that model 1 has and I started with model 1 in the first place, I could not make the comparison between just “quiet threshold” and additional psychoacoustics.