

HW 1 Writeup

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I didn't complete this assignment. I finished part 1 (audio compression), but my sound files were distorted after decompression. I spent many hours trying to debug this, but I couldn't see what I was doing wrong. As far as I can tell, my DCT algorithms match the formulas given in class and in the assignments but they don't work.

Implementing everything except the scaling constant, $c(u)$, was pretty straightforward. I just translated the math notation in the assignment into c++ code.

Here's what I did to figure out the scaling constant:

In this video (<https://www.youtube.com/watch?v=5ot33E4NQH4>) posted in the discussions, Prof. Kavan says that the scaling constant exists to make each column vector in the matrix Q have a magnitude of 1, to be unit vectors. So, I just went and calculated out the matrix Q using the equation given in class and determined which constant would be required to scale each column to unit length. After doing this, I saw that the constants for each column are approximately the same, they're all around 0.36. So, I just multiply each DCT coefficient by this number (this is legal since constants can be pulled out of summations).

Using this DCT algorithm without compression, the two audio files vary somewhat, but the loss is unnoticeable. But the assignment says they should be the same without compression. I'm guessing I did something wrong in computing the scaling constant to make this happen. When compression is enabled, then the audio file gets very distorted.

At this point I'm just trying to get some partial credit.