Arith Assignment #4

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We received help from Professor Daniels during his office hours as well as Ayman's office hours where he helped us out with round-trip testing. We approximately spent 5 hours analyzing the problems posed in this assignment, and around 15 hours attempting to solve them. Our program is split up into multiple modules for the purpose of clean testing. This allows us to break down the process step by step. It contains a module to convert our array2 to f32's and another module to convert to component video. After that, it enters a module to quantize our values and ensure they are ready to be bitpacked. The functions are then called from the bitpack module to pack the required values into one u32 codeword. The process is then flipped for decompression. A module named "codec" is utilized to call all the necessary functions for both compression and decompression. The main module is what handles the command line arguments. However, there are parts of the data that will be lost and never recovered throughout these processes. The one-time losses occur when trimming dimensions to even dimensions and any averaging of values (you can not un-average a value). Then there is the data loss that occurs each time through compression and decompression. When going through the quantization process, data loss occurs each time it is compressed and decompressed. This is occurring during the bit-packing process when we are trying to pack all of these values into a 32-bit word. We have to convert the values b,c, and ~d to five-bit signed values assuming they will lie from -0.3-0.3. However, there may be values from -0.5-0.5. These cases are rare but we have to be willing to throw these pieces of information away in order to compress. This will allow for more precision for the common cases.