

Final Project: Bilinear Interpolation of Images

Computational Physics PHY 5020

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Required files: beekmansj_final.c, libtiff library (sudo apt-get install libtiff5-dev), and any reasonably sized .TIFF file, examples included!

This C program is capable of taking in a user input .TIFF file of x by y size and outputting a new .TIFF image with dimensions $(x*2) - 1$ by $(y*2) - 1$ with the power of bilinear interpolation. It makes use of the libtiff library to both read and write files. This data is read in as a raster vector of 32 bit unsigned integers. Each element of the raster contains pixel information in the form $0x(\text{Opacity})(\text{Green})(\text{Blue})(\text{Red})$. For example the value 4278190335 is equivalent to $0xFF0000FF$, in which opacity and red channels are at maximum values of 255, creating a fully red pixel. With knowledge of the channel bit locations, we can use C's bitwise shift and AND operations to isolate these channels, as this is necessary for averaging color values. Beekmansj_final.c reads this input from the TIFF and creates a new array with the data stretched to occupy every other pixel. The array is then iterated through 3 times, to linearly interpolate the missing pixels on the horizontal axes, vertical axes, and finally bilinearly interpolate the central pixels. Lastly, the new raster is created from the array to output a final .TIFF through libtiff functions.