# CSC 412 - Programming Assignment 03, Fall 2019

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*Abstract*— **The objective of this assignment is to write C 1D/2D arrays, use small libraries, simple image processing, bash scripting, and Doxygen.**

## I. INTRODUCTION

This project was built around TGA image manipulation. The goals were to make four programs: Dimensions, Split, Rotate, and Crop. Ultimately this was a very interesting project to work on, it showed me a lot of things I have yet to have experience working with in my past classes.

## II. RASTERIMAGE

The first obstacle to tackle for this assignment was creating the RasterImage struct.

```
typedef struct RasterImage
{
unsigned int imgSize;
unsigned char *theData;
unsigned int numCols;
unsigned int numRows;
int bytesPerPixel;
int bytesPerRow;
ImageType theType;
} RasterImage;
```

I decided to have my struct include the total size of the image, the pixel contents of the image in an array, the number of columns and rows, the bytesPerPixel and bytesPerRow to calculate the size of each Pixel in the array, and finally what type of image it is. For imgSize, numCols, and numRows I went with unsigned ints as these values should only need to be positive.

## III. DIMENSIONS

The dimensions program is very simple in that it takes in a TGA input and returns the width and height. As we pass images onto the RasterImage struct we gain this exact data from the numCols and numRows values. From there it was deciding how to get the extra options to work. After looking around a few C tutorials I came across "getopt." This seemed like the perfect function for this usage, as it will scan the arguments and look for particular ones, in this case 'v', 'w', and 'h'. By using a switch statement inside a while getopt loop I was able to trigger flags that would tell the program what to input at the end or to return default instructions on how to use the program.

## IV. SPLIT COLORS

The split colors program takes a TGA image input and returns the red, green, and blue channels separated into an output folder. As the original "main.c." file provided had most of the channel code I focused instead on string manipulation to get the filename to use for the output. To do so was to take both arguments and place them in their own char arrays. From there I found the "libgen.h" function "basename" that will find the filename at the end of an array. From that I would take the filename and subtract the last four characters while moving it to a new char array. This would of course remove the .TGA from the end so it is left with just the filename. After removing the channel I would then save the file with the added "_x.TGA", where x is the color initial. This is repeated for the other two channels.

I decided since I was making a log file I should go ahead and actually have split tell the user in the terminal what it is doing. So the program will write to the log file a very similar amount of information so the user can pinpoint what might be causing an issue. I rewrote imageIO_TGA files to use the logs in case the error was with opening the file.

## V. ROTATION AND CROP

Unfortunately I wasn't able to get the Crop or Rotation parts of the assignment to function. While I had a sort of cropping mechanic worked out and showing some results it would never complete the assignment as expected. Due to my schedule and a few unseen obstacles for this week I could not devote as much time as I wished to this so it is entirely my fault.

## VI. BASH SCRIPT

The bash scripts function is to compile the apps and run each of them on the files in a folder. For my version it does accomplish the color split but as I wasn't able to finish rotation and crop it does lack those. However I believe the code is similar enough that it proves that it would have been done had I finished them otherwise.

## VII. CONCLUSIONS

This was a challenging program to write with my limited experience with C, as such I relied a lot on the knowledge of others with various C tutorials. As such this taught me a lot of things I wouldn't have known just from class usage. For the next assignment I will be going to office hours more so I can get the project done faster and won't have a repeat of this one.