

Assignment 6 – Color Blindness Simulator

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Purpose

The purpose of this assignment is to simulate a form of red-green color blindness, *deuteranopia*. The program we create will show an image in the eyes of someone with this form of color blindness. To do this we will create a program that does this by reading and writing a binary file of an image.

How to Use the Program

To use this program the user must run the executable with `./colorb`. The user also must pass the argument `-i` in the command line for the input file which should be the file for an image. `-o` is also needed for the output file the new colorblind simulated image will be made in. `-h` prints out a help message for the usage.

After running the program with the necessary arguments the program will make a new output file that is the image of the input file but with colorblind simulation.

Program Design

This program contains 2 object files and a main program.

`io.h/io.c:`

This contains the functions necessary to read and write binary files. To read binary files with different byte sequences we use deserialization. This allows us to read a byte sequence from the computer into a different byte sequence. To write binary files with different byte sequences we do the opposite which is serialization which allows us to write a byte sequence into a different byte sequence.

`bmp.h/bmp.c:`

This object file is used to use a BMP image file and write a new BMP image file with the new information needed to create the image with color blind simulation. The functions and structs in this file are used to write a bmp file.

`colorb.c:`

This is the executable file that uses both `bmp` and `io` to create the colorblind simulated image. It uses the functions from `io` to read the original image file and uses `bmp` to write the new file.

Data Structures

The `bmp` object file uses 2 structs:

`color:`

This contains the 3 `uint8_t` variables “red”, “blue”, and “green” which are the rgb values for a BMP image

file.

bmp:

This structure contains two `uint32_t` variables: "height" and "width" which are for the height and width of the image. Also contains the variable of struct Color "palette[MAX_COLORS]. MAX_COLORS is defined to 256. The last variable is an `uint8_t` array "a".