COLORIZING GRAYSCALE IMAGES

Jason R.

Project Overview

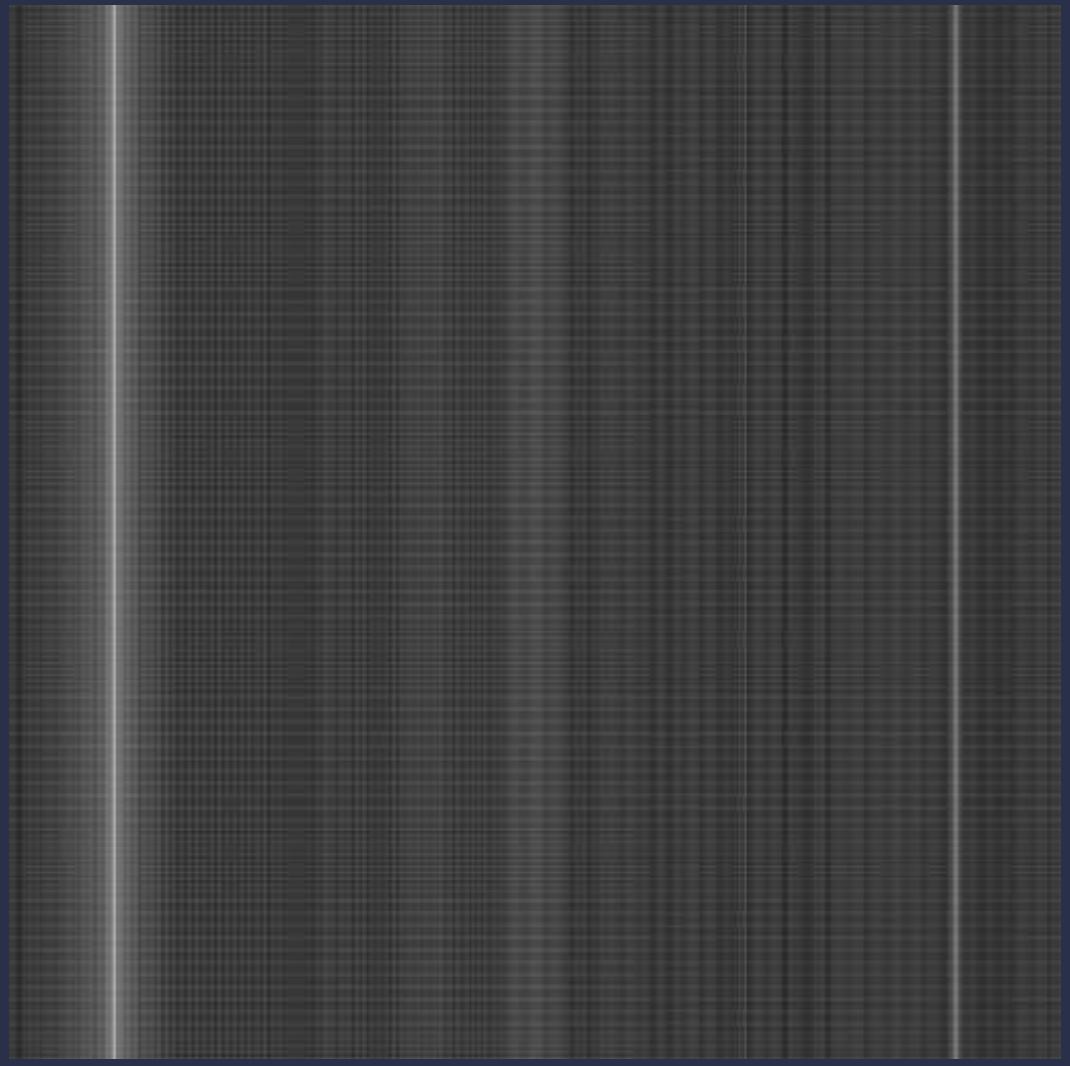
Project Background

Project Status

Challenges

Education

PROJECT BACKGROUND



Why?

- Receive grayscale tiles as 8-bit single channel grayscale images
- Useful to computers
- Need to be colorized as "heatmaps" for useful human observation
- Focus on stronger signals

ImageMagick

- Image Processing Software
- Direct Pixel Access and Manipulation
- Magick++ API – Object-Oriented C++ API

jremy

File Edit View Search Terminal Help

```
[redacted]@[redacted] ~]$ magick identify -verbose  /home/[redacted]/Downloads/tiles/large_1.jpeg
Image:
 Filename: /home/[redacted]/Downloads/tiles/large_1.jpeg
 Format: JPEG (Joint Photographic Experts Group JFIF format)
 Mime type: image/jpeg
 Class: PseudoClass
 Geometry: 512x512+0+0
 Units: Undefined
 Colorspace: Gray
 Type: Grayscale
 Base type: Undefined
 Endianness: Undefined
 Depth: 8-bit
 Channel depth:
   Gray: 8-bit
 Channel statistics:
   Pixels: 262144
   Gray:
     min: 34  (0.133333)
     max: 184 (0.721569)
     mean: 61.8672 (0.242616)
     median: 58 (0.227451)
     standard deviation: 14.1521 (0.0554983)
     kurtosis: 13.2856
     skewness: 2.6749
     entropy: 0.796276
 Colors: 117
 Histogram:
   22: (34,34,34) #222222 gray(34)
   20: (35,35,35) #232323 gray(35)
   78: (36,36,36) #242424 gray(36)
   302: (37,37,37) #252525 gray(37)
   221: (38,38,38) #262626 gray(38)
   433: (39,39,39) #272727 gray(39)
   428: (40,40,40) #282828 gray(40)
   805: (41,41,41) #292929 gray(41)
   1142: (42,42,42) #2A2A2A gray(42)
   1817: (43,43,43) #2B2B2B gray(43)
   2403: (44,44,44) #2C2C2C gray(44)
   3343: (45,45,45) #2D2D2D gray(45)
   3687: (46,46,46) #2E2E2E gray(46)
   5068: (47,47,47) #2F2F2F gray(47)
   4756: (48,48,48) #303030 gray(48)
   6342: (49,49,49) #313131 gray(49)
   6594: (50,50,50) #323232 gray(50)
   8264: (51,51,51) #333333 gray(51)
   8455: (52,52,52) #343434 gray(52)
   9125: (53,53,53) #353535 gray(53)
   10715: (54,54,54) #363636 gray(54)
   11818: (55,55,55) #373737 gray(55)
   11809: (56,56,56) #383838 gray(56)
   12209: (57,57,57) #393939 gray(57)
   13071: (58,58,58) #3A3A3A gray(58)
   12311: (59,59,59) #3B3B3B gray(59)
   10946: (60,60,60) #3C3C3C gray(60)
   10620: (61,61,61) #3D3D3D gray(61)
```

The Project

- Generate colorized "heatmaps" of grayscale tiles
- Convert type grayscale images to sRGB
  - 8-bit channel -> 24-bit channel

PROJECT STATUS

Current Status

- Colorize single image or directory of images
- 670 available colors
- Build via Make
- Customize contrast values and CLUT colors

PROGRAM STRUCTURE // Classes (basic summary) & Screenshots

- Color Look Up Table
  - Scrnsht of prototype_clut
  - Scrnshot of final clut
- Utilize boost program_options

BASIC PROGRAM STRUCTURE // Classes (basic summary) & Screenshots

- Screenshot of tiles colorized with default options
- Screenshot of tile colorized with default and contrast (56)
- Screenshot of tiles colorized with custom colors (navy , green, turquoise)
- Screenshot of tiles colorized with custom colors and contrast (75 or 100)

Future Development

CD/CI Integration & Tests

Appropriate Documentation

Intermediary MakeFiles for compilation

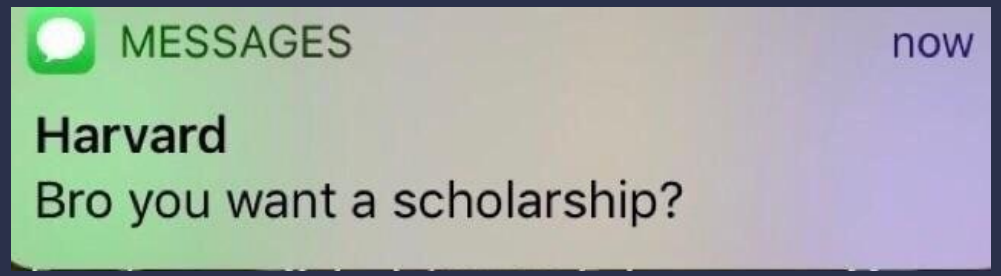
Overall Project Completion: ~85% completion

CHALLENGES

Challenges

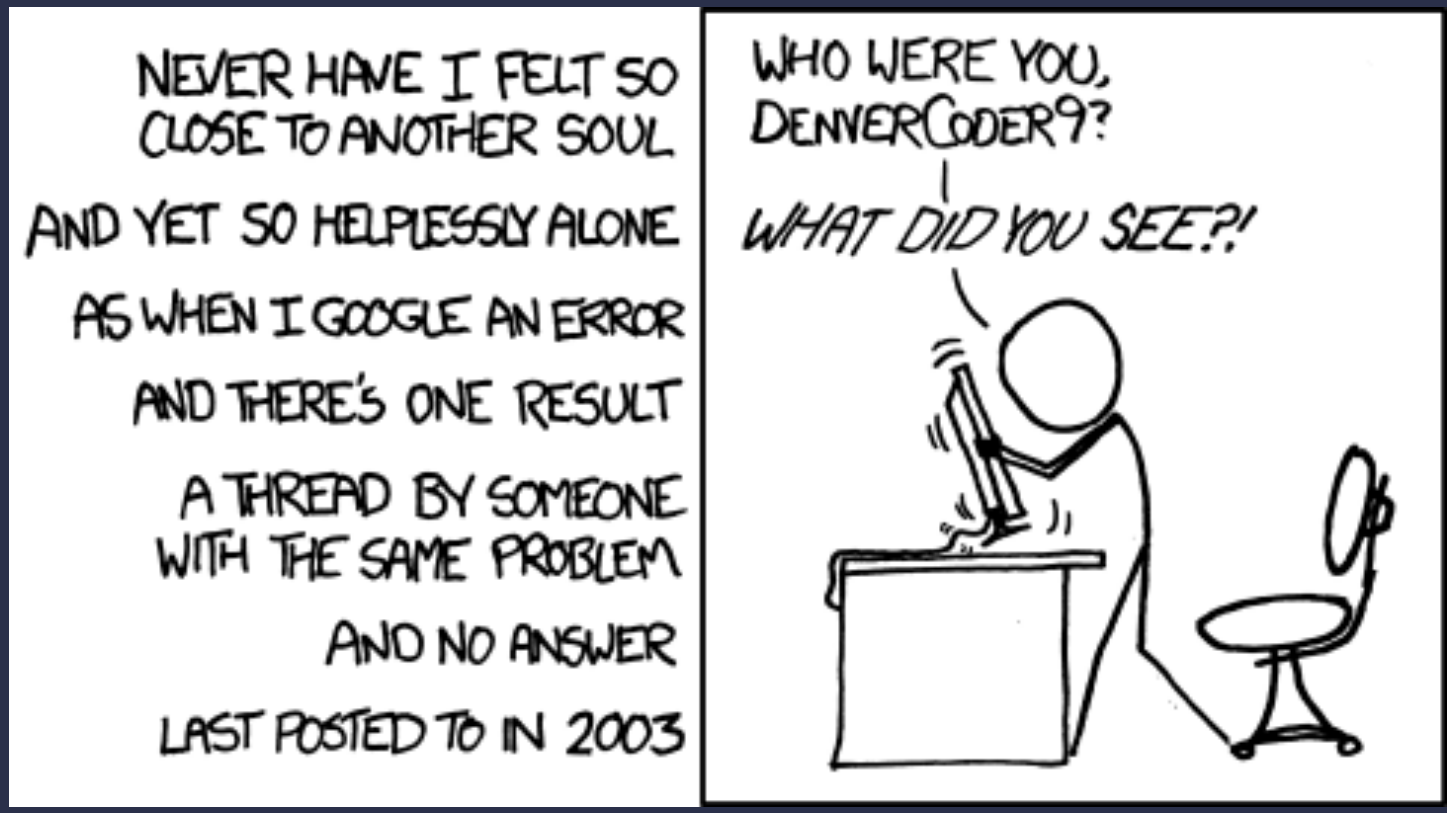
- Comprehending my task & given resources
  - C++ Tutorials
  - Searching APIs for useful functions
  - Initial Algorithm -> Object-Oriented Program
- Starting completely from scratch
- Pivot to MagickWand
  - interface between C & IM image processing libraries

WHAT I'VE LEARNED



A Summer of Learning

- C++ & Object-Oriented Design
- Linux & Bash
- Code Design/Debugging/Review
- Asking for Help



ARE YOU READY?
[DEMO]

THANK YOU!