

1.1

RAW Image Conversion:

Scaling with darkness 0, saturation 16383, and
multipliers 1.628906 1.000000 1.386719 1.000000

Python Initials:

Width: 4284 pixels, Height: 2844 pixels, Bits Per Pixel: 16
Converted image dtype: float64

Identifying the correct Bayer pattern (20 points).

I proposed that the pattern was: RGGB. After testing the color intensity of the top left 2x2 square, I found this data:

Top-left 2x2 pixel values:

```
[[0.10712324 0.1833608 ]  
 [0.18342184 0.14978942]]
```

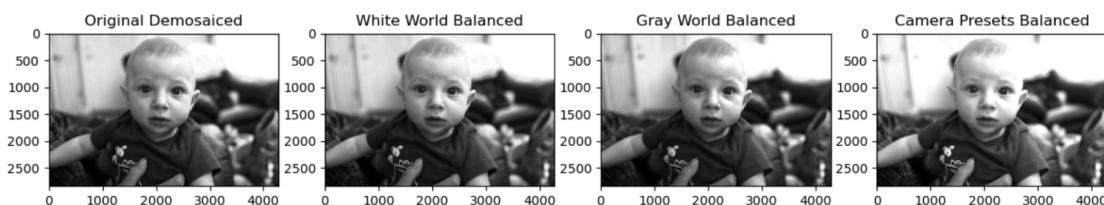
Since green pixels often have higher intensity values in due to the way light interacts with the Bayer filter I decided the pattern would be either:

B G or R G
G R G B

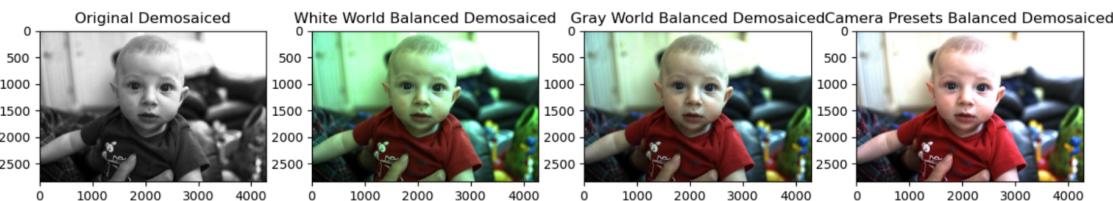
From inspecting the raw image and considering that blue will most likely have higher intensity than red I assumed that the correct Bayer pattern was RGGB.

White Balancing Methods:

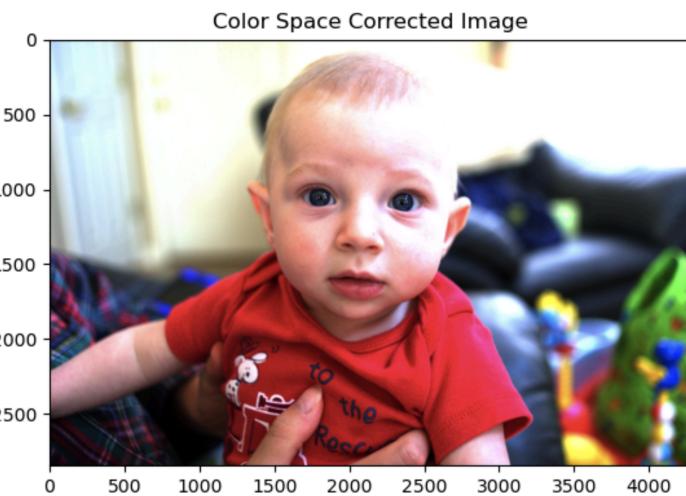
The following picture comes after testing all white balancing methods. All three options are very similar however I prefer the overall quality using the camera presets.



Demosaicing:

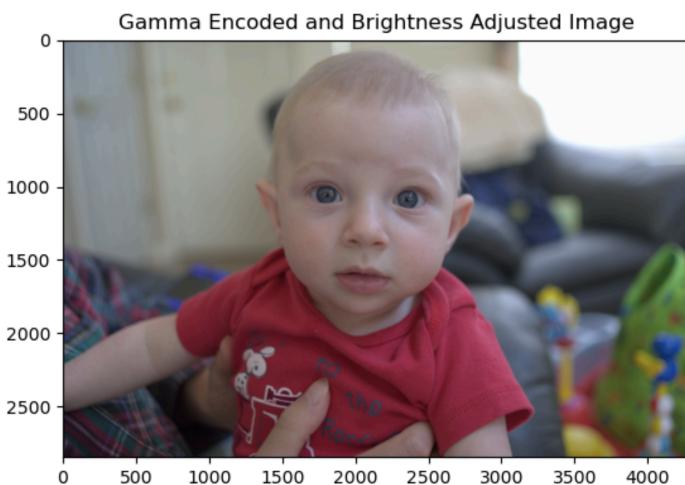


Color Space Corrected



Brightness adjustment and gamma encoding

I tried a few different percentage values(0.75/0.50/0.10) however found 0.25 to be the most natural looking:



Compression:

The following is the final image.png and final_image_95%.jpg

Final_image.png



95%.jpg



I can't tell much of a difference between the two images, if anything I think the 95% jpg might be a little more blurry in the background.

I tried many different quality values and saw the biggest dropoff around 10% quality, looking like this.



Build the pinhole camera:

The following are pictures of my pinhole camera, I only had a small box on hand so I had to use it. Its size is a little bit smaller than a shoe box. Since I don't have any kind of nice camera I had to settle for using my iPhone's camera, with that being said I am happy with the results I achieved. I decided to use the width instead of the length of the box to capture the image, I was limited in the construction of the camera so I decided on a smaller focal length. In terms of screen size I simply tried to cover as much of the back side of the box with white paper to give the best chance of capturing as much of the scene as possible. Since I chose a much smaller box I will see a bit more of a wider form of view however I might lose some detail on objects.

My Pinhole Camera:



The following are different pictures using my pinhole camera, thanks to my roommate for helping out and modeling.

Using .1mm:

Came out very dark and a little blurry. Somewhat expected the darker image because less light comes through the smaller pinhole but hoped for a clearer image.



Orbee gun!



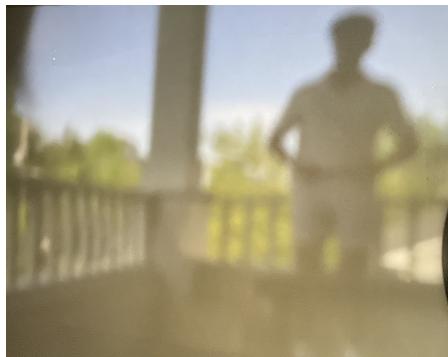
Thumbs Up



Chick Fil-A Cup

Using 1mm:

Good balance between brightness and sharpness. Provided the best practical results.



My roommate Sahil



Nice picture of my Balcony



Orbee Gun!

Using 5mm:

Allowed in some more light but created a slightly blurrier image.



Holding a lego car
(hard to see)



regular pose



Another Lego Car One