1.1 Implement a basic image processing pipeline

Raw Image Conversion

Scaling with darkness 150
Saturation 4095
multipliers 2.393118 1.000000 1.223981 1.0000

Python Initials

Size (4016,6016), dtype=unit 16

Linearization

No output

Identification of the Correct Bayer Pattern

0	1
2	3

In order to quickly modify the code for the bayer pattern I used an array of [r,g,g,b] indexes corresponding to the table above so the code only needed to be updated in one place for a new pattern.

I imagined that the two green channels would on average be closer together than the blue and red channels. Just looking at the array I guessed that the correct pattern was either 2 or 3. After that point I checked the image to see which image was best.

White Balancing

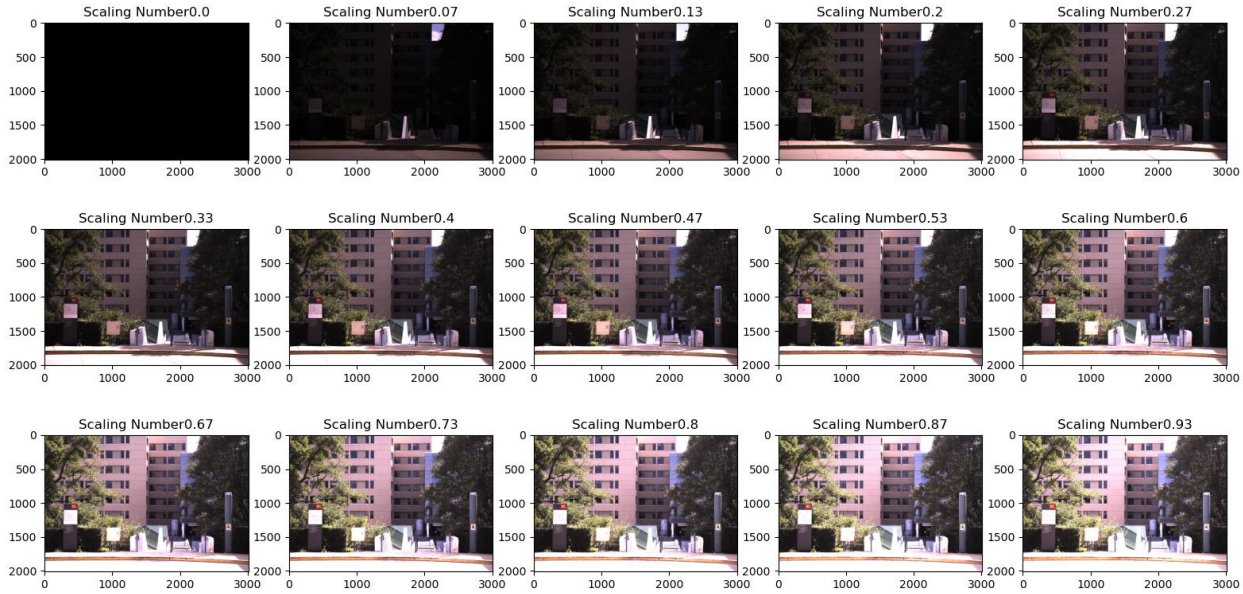
I decided to use the grey balancing algorithm moving forward

See file: White Balancing .png

Color Space Correction

MXYZ→cam=6988,-1384,-714, -5631, 13410, 2447,-1485,2204,7318

Brightness adjustment and gamma encoding



I zoomed in on the map to get an idea of the appropriate brightness. Final number chosen was .38.

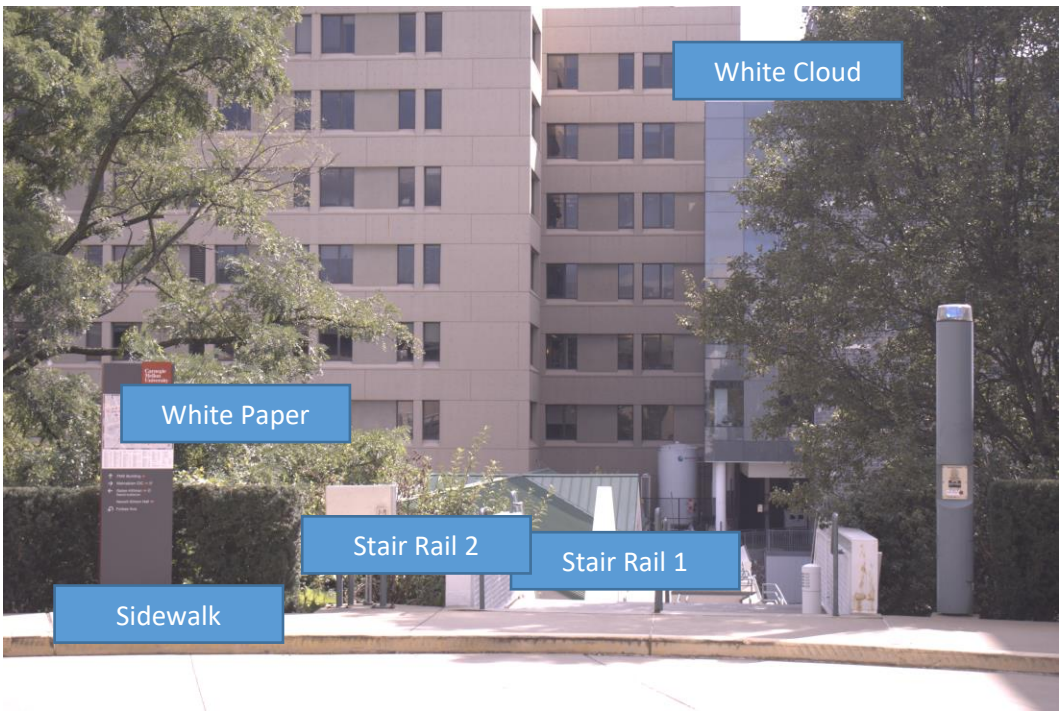
See file Brightenss Adjustment.png

Compression

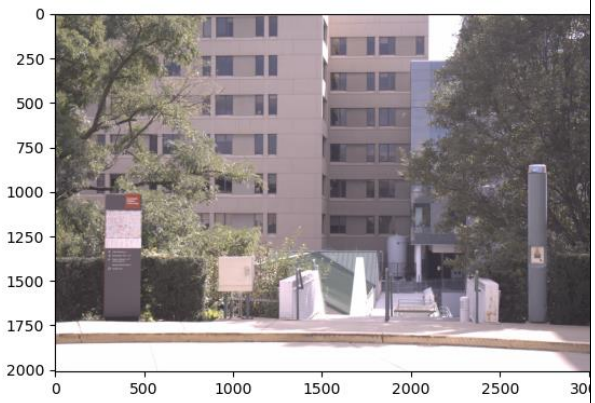
I could not tell the difference between the uncompressed and the 95%

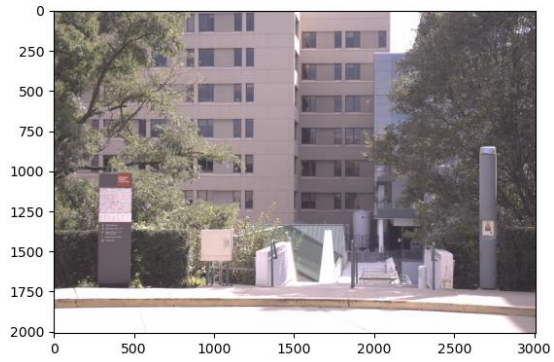
I compressed the pictures 50 to 95% in 5% increments. With all compression it matters what the final size is. So if the images are sized such as above it would be impossible to tell. Even at 80% zooming in almost all the way does not show noticeable difference. However, at 75% zooming in all the way in we can see the image. 5 compression files were chosen for size.

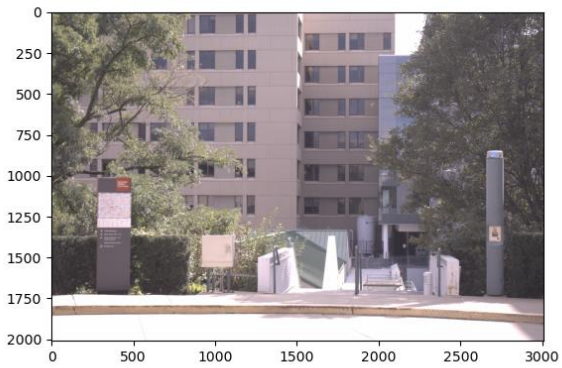
Q 1.2 White balancing



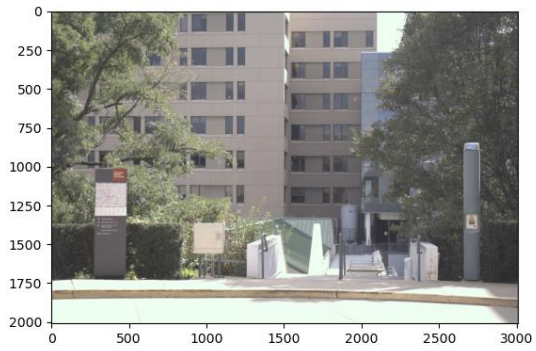
I chose 5 white balancing locations knowing some were better than others.

Stair Rail 1 Balancing	Stair Rail 2 Balancing
	
White Cloud Balancing	Sidewalk Balancing





White Paper Balancing



2 Pin hole camera

2.1 Build the Pinhole camera manufacturing

I used supies I had around the house. The focal length was 30 cm. That made the ideal pinhole .8 mm using supplies I had around the house I used a needle that was .55 mm long. And two knitting needles of sizes 1.6 mm and 2.25 mm. I used the whole screen as I was not sure how much I would need. Because of the box size I knew it was possible only part of the screen would be illuminated.

2.2

I used 3 pinhole types. One was a sheet of paper with a 1 mm hole. The thinner paper gave me larger images on the screen. I also took this earlier in the day so the added light may have been a factor. The cardboard had holes of .6 mm 1.25 mm and 2.25 mm. The paper appeared to be too thin, so sometimes the color was not as clear as I think a little light was bleeding in. The cardboard gave crisper images but often it took up less of the screen. The 1.25 mm hole gave a more precise image than the 2.25 mm hole but both were decent quality. The .6 mm Pinhole was too small and did not show many images. The .6 mm could not make a detectable image so I only included it on the first image. Also the paper I used ripped after shooting the skyline so I could not use it for the sunset unfortunately. The 1 mm hole images were pretty precise but it was hard to know the precision with it being washed out.

Sunset

.6 mm Pinhole

1.25 mm pinhole

2.25 mm pinhole

Leaf Plant

Paper 1 mm hole

2.25 mm cardboard Plant

1.25 pinhole cardboard

Pittsburgh Skyline

2.25 mm pinhole

1.25 mm pinhole skyline

Paper hole