CS682 : Homework #3
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1. Gray and color edges for image ST2MainHall4052.jpg
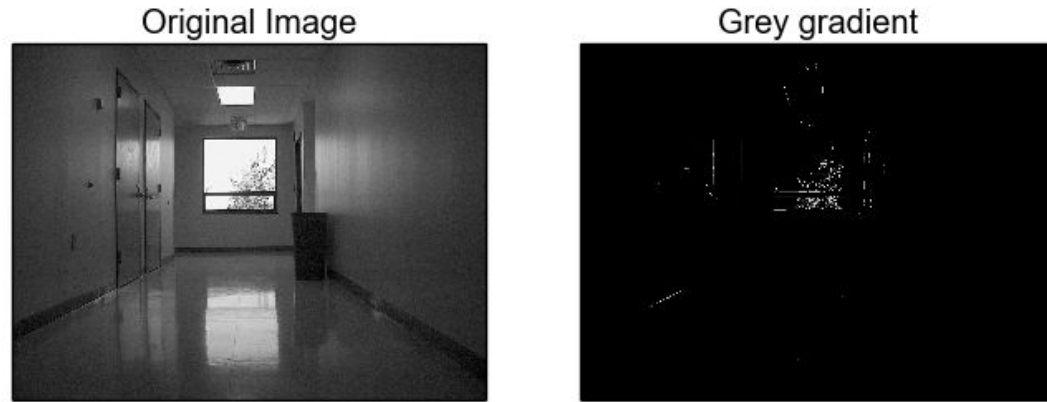
   I used Canny Edge Detector on the image (in grayscale and color mode).
   For grayscale, I used parameters, threshold1=400, threshold2=400.
   For the RGB image, I split the 3 channels and used threshold1=200, threshold2=200.
   I use the same parameters for all 99 images.

Original Image   Grey gradient
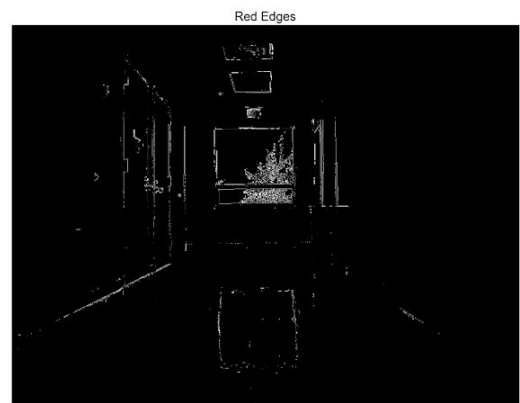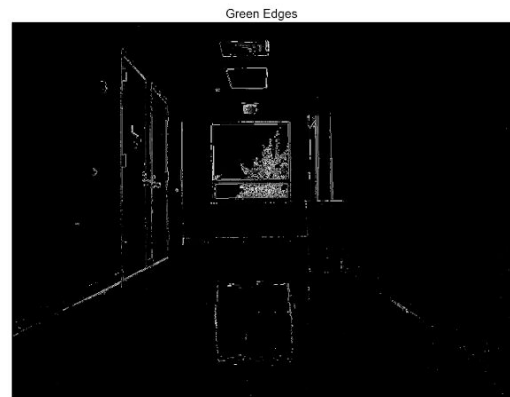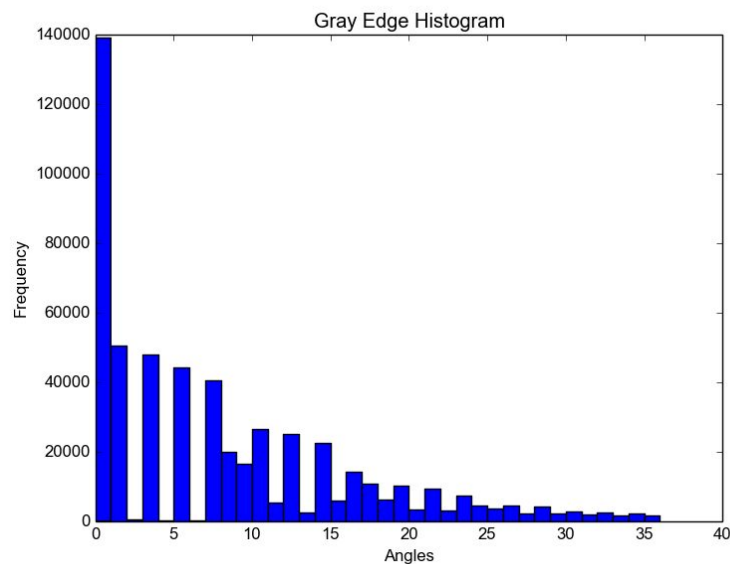
2. Gray Edge Histograms

I calculated the gradient for each image using the `gradient` method in Numpy. Then, using the x and y components of the gradient, I calculated the magnitude and angle as follows -

Magnitude = $\sqrt{g_x^2 + g_y^2}$

Angle = $\arctan2(g_y, g_x)$

Where g_y and g_x are the y and x gradients.

Then I converted each gradient to a value that falls into one of 36-bins and plotted the histogram for all images. One sample is shown below for the image ST2MainHall4052.jpg.


3. Color edge histograms

I split the images into R, G and B channels. Then I used the Canny edge detector to select edges. The thresholds used are threshold1=200, threshold2=200. Then I calculated the magnitude, m = |rx| + |gx| + |bx| + |ry| + |gy| + |by| and u = (rx + gx + bx, ry + gy + by).

This is the histogram of the orientation angles for the image ST2MainHall4052.jpg -
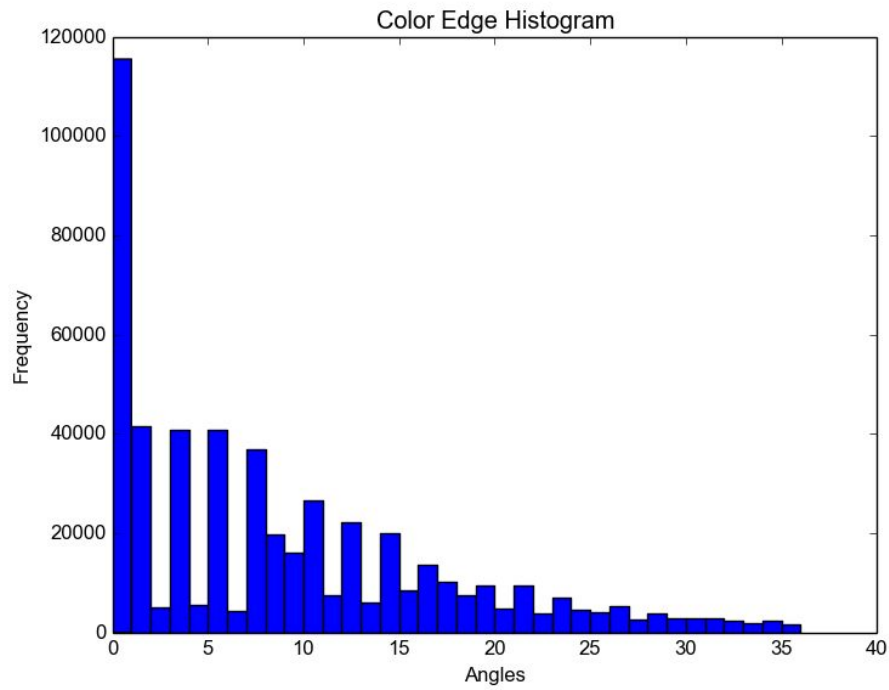
This is the histogram of the edge magnitudes for the image ST2MainHall4052.jpg -
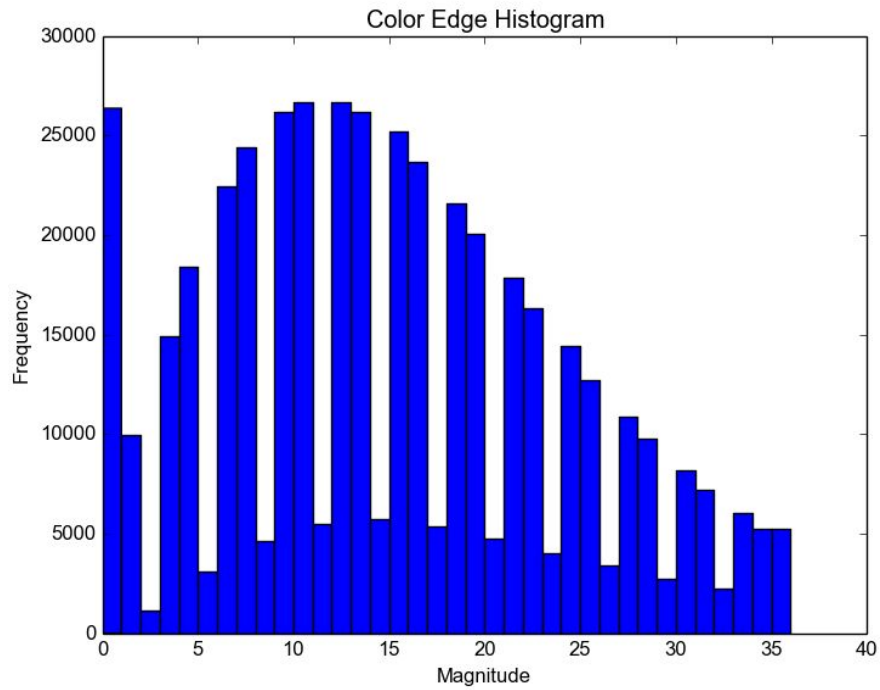
4. Histogram comparison functions
I reused the functions I wrote for Homework #2.

5. Comparison of all 99 images

Chi-square measure - Gray Edges

Intersection - Gray Edges

Chi-square measure - Color Edges

Intersection - Color Edges