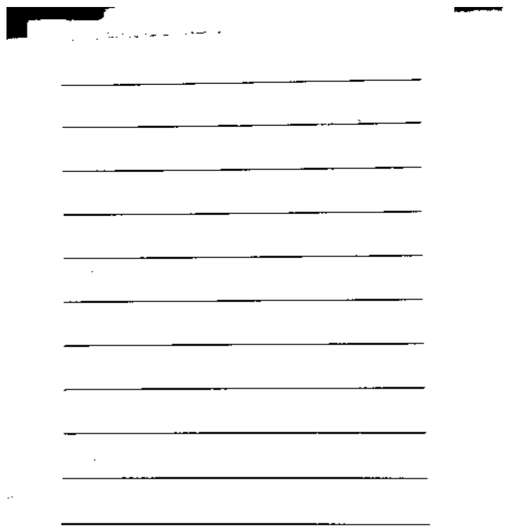
2. e. Graythresh( ) uses an underlying clustering method. What is the name of this method? What was it initially designed for?

Graythresh method uses Otsu method for clustering while calculating threshold value. Otsu method was designed for separating Foreground from Background by deciding an intensity value for which both classes of pixels (background and foreground) give minimum value of combined variance. This algorithms can be extended for multiclass clustering for performing region extraction in image.

2. f. Display the resulting quantized image. Put the resulting image in your write-up, and discuss the results. How well did this work, and why.



Fig(1)

Graythresh return a value for which sum of variances for the intensities of each, foreground and background, category is minimum.

Min(varTotal=varForground+varBackground)

In the given image both intensities (background and text) went into the category of background because this bisect division of all intensity level was giving minimum total variance.

3 Describe your imaging chain, and show your resulting image in your write-up. In particular, explain what each step of your image chain does to the dynamic range of the image and why.

For improving the contrast of the Image I used adaptive Histogram Equalization because Adaptive Histogram equalization improve contrast separately for each segment in the image hence unimportant part of the image (outer boundary of table cloth in this image) do not contribute while improving the contrast for text and paper.

Step 1. Selected Green Channel

Step 2. Converted the image in double matrix so that I can perform Mathematical operations for dynamic ranging

Step3. Using adapthisteq Method enhanced the contrast of the image.

Step4. Took cubic root (1/3 power) for shuffling the intensity values dynamically for improving the contrast. As cubic root does not affect high and less values of intensity, but increase the intensity values which fell in middle rang.

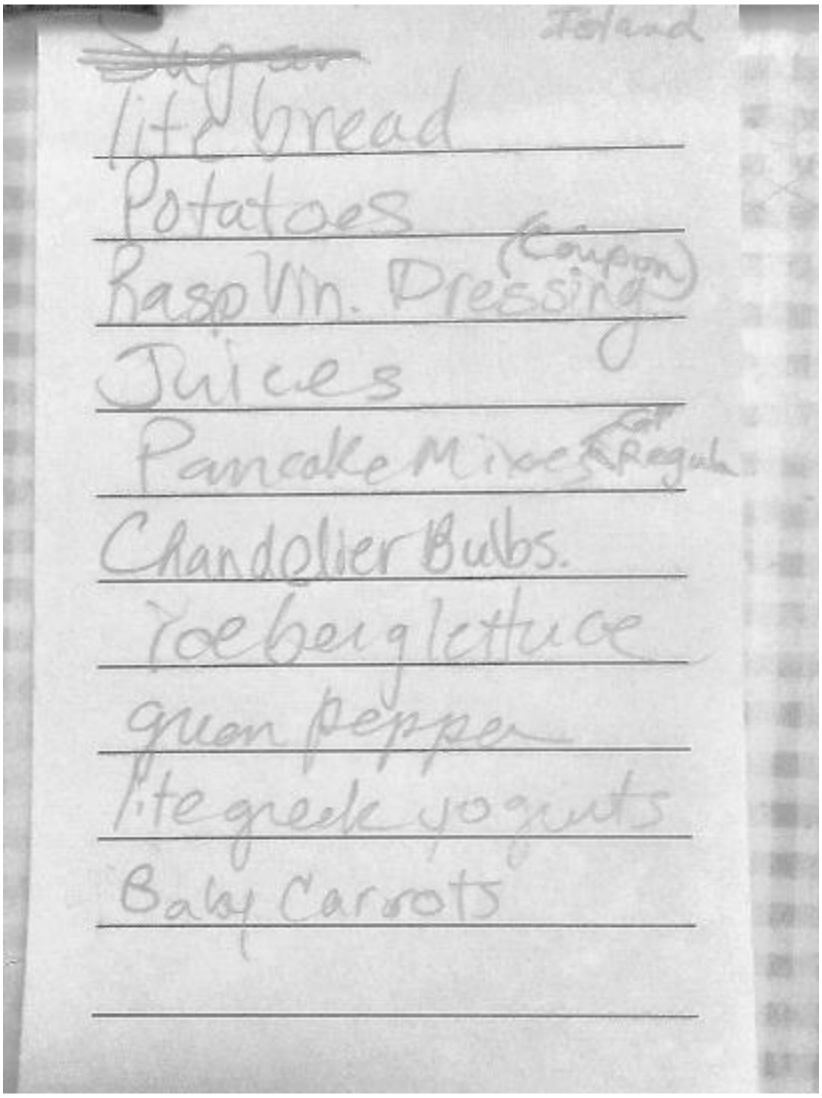

Lite bread
Potatoes
Rasp Vin. Dressing (Coupon)
Juices
Pancake Mixes & Regular
Chandolier Bulbs.
Iceberg lettuce
green pepper
lite greek yogurts
Baby Carrots

Fig. (2)

4. Describe what contrast your imaging chain is trying to enhance. Describe your approach to this. Show the results before and after your enhancement.

Aim was to improve contrast for the Thermometer reading and scale, the right side reading on scale is blur the left side hence again Histogram Equalization will not give uniform contrast image hence I used Adaptive histogram technique.

Step 1. Converted Image to Grayscale

Step 2. Using adapthisteq Method enhanced the contrast of the image.

Step3. Using weighted average method smoothen the image for getting uniformity in background and for reducing noise.

Step4. Took cubic root (1/3 power) for shuffling the intensity values dynamically for improving the contrast. As cubic root does not affect high and less values of intensity, but increase the intensity values which fell in middle rang.

Setp5. After above steps images’ Histogram allow us to convert into binary image using threshold provided by graythresh method.

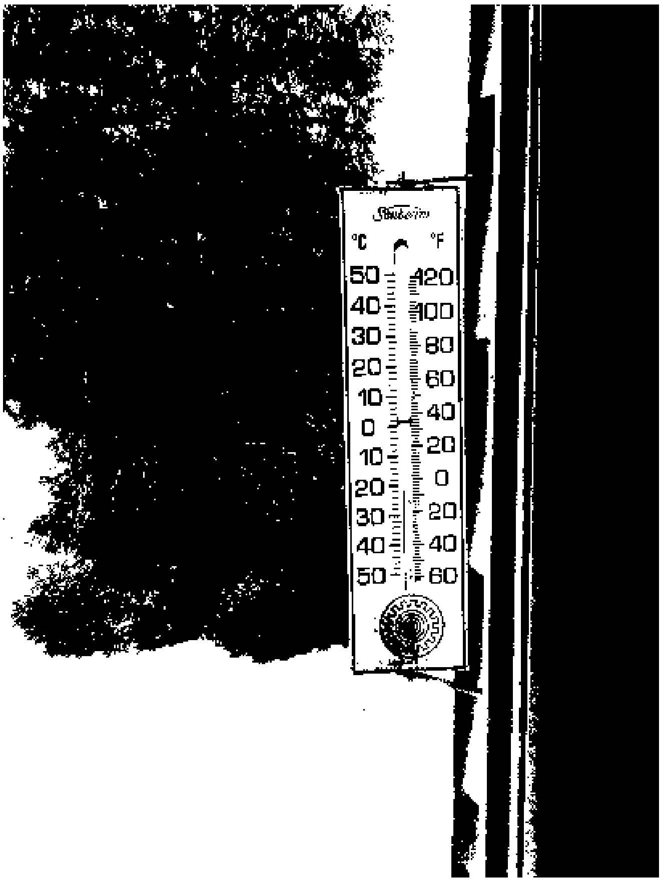


Fig. (3)

5.a. Do you notice any sampling artifacts (aliasing) in the image?

Slight Aliasing can be observed in image.

5c. Describe the details of your imaging chain, what it does and why. Show the resulting image.

Step1. Selected Blue channel of the image.
Step2. Converted image into double to perform mathematical operations.
Step3. Applied Sobel filter with below matrix as these filter matrix will give high values when filter window will slide from dark area to bright area in both X and Y direction.
sobelY= [-1 -2 -1; 0 0 0; 1 2 1];
sobelX= [-1 0 1;-2 0 2;-1 0 1];
Step4. In order to calculate resultant mean root square value was calculated using the results of X and Y direction edge detected values.

Fig. (4)

6.) Show the image before and after in your write-up. Explain your imaging chain, and why you use each step of your imaging chain.

Step1. Selected Red channel of the image.
Step2. Converted image into double matrix for performing mathematical operations.
Step3. Applied Sobel filter with below matrices as these filter matrices will give high values when filter window will slide from bright area to dark area in both X and Y direction.
sobelY= [1 2 1; 0 0 0; -1 -2 -1];
sobelX= [1 0 -1;2 0 -2;1 0 -1];
Step4. In order to calculate resultant edges, mean root square value was calculated using the results of X and Y direction edges.
Step5. **Repeated above steps for Green and Red channel** as all edges can't be detected using any single channel.
Step6.Then I took the average value of edges calculated using calculated edge results of all channels.
Step7. Then calculated the reverse of the image to show the edges efficiently for observations.
Step8. For enhancing the Contrast I took the cubic root of the image.
Step9. Applied smoothing filter (weighted averaged) for reducing the noise.

Fig Before

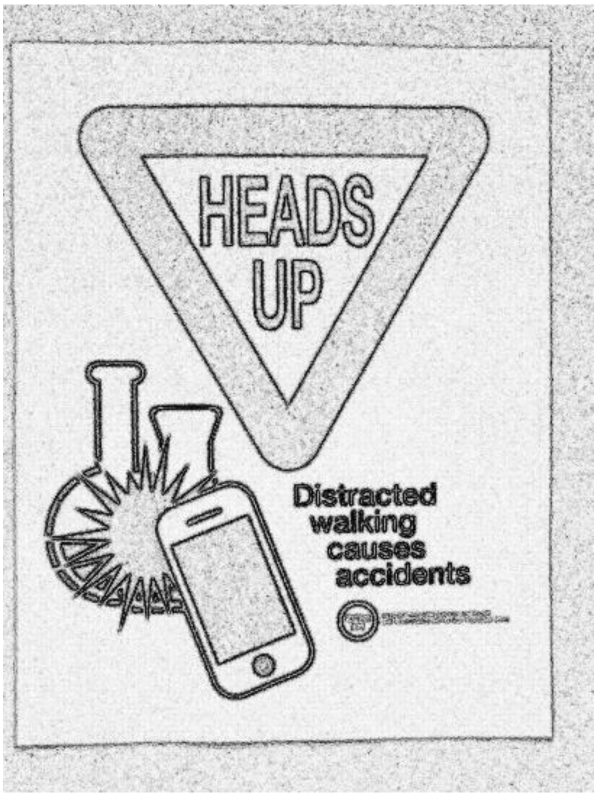


Fig After

7.) Create an imaging chain to show the edges of the white line on the road. Again, show the image before and after, and explain you're imaging chain and what each step of your imaging chain does.

Step1. Selected Red channel of the image.
Step2. Converted image into double matrix for performing mathematical operations.
Step3. Applied Sobel filter with below matrices as these filter matrices will give high values when filter window will slide from bright area to dark area in both X and Y direction.
sobelY= [1 2 1; 0 0 0; -1 -2 -1];
sobelX= [1 0 -1;2 0 -2;1 0 -1];
Step4. In order to calculate resultant edges, mean root square value was calculated using the results of X and Y direction edges.
Step5. **Repeated above steps for Green and Red channel** as all edges can't be detected using any single channel.
Step6.Then I took the average value of edges calculated using calculated edge results of all channels.
Step7. Then calculated the reverse of the image to show the edges efficiently for observations.
Step8. For enhancing the Contrast I took the cubic root of the image.
Step8. Applied smoothing filter (weighted averaged) for reducing the noise.

Fig Original Image.

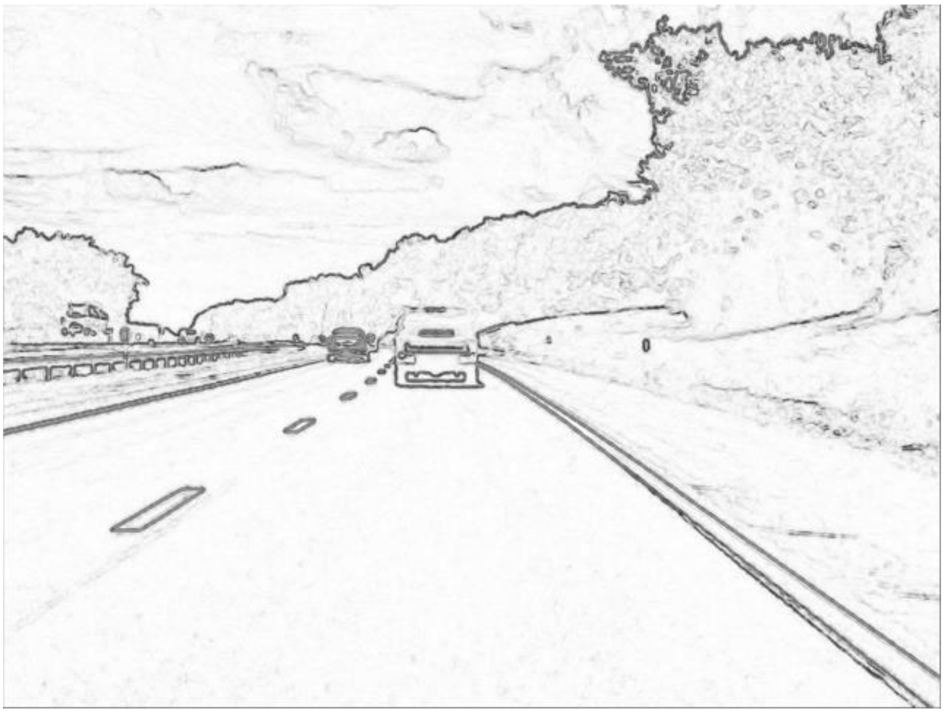


Fig After

8) Again, show an image before and after in your write-up, and describe the processing done in your imaging chain, and what each step of the imaging chain is for.

Step1. Selected Red channel of the image.
Step2. Converted image into double matrix for performing mathematical operations.
Step3. Applied Sobel filter with below matrices as these filter matrices will give high values when filter window will slide from bright area to dark area in both X and Y direction.
sobelY= [1 2 1; 0 0 0; -1 -2 -1];
sobelX= [1 0 -1;2 0 -2;1 0 -1];
Step4. In order to calculate resultant edges, mean root square value was calculated using the results of X and Y direction edges.
Step5. Repeated above steps for Green and Red channel as all edges can't be detected using any single channel.
Step6.Then I took the average value of edges calculated using calculated edge results of all channels.
Step7. Then calculated the reverse of the image to show the edges efficiently for observations.
Step8. For enhancing the Contrast I took the cubic root of the image.
Step9. Applied smoothing filter (weighted averaged) for reducing the noise.

Fig Before

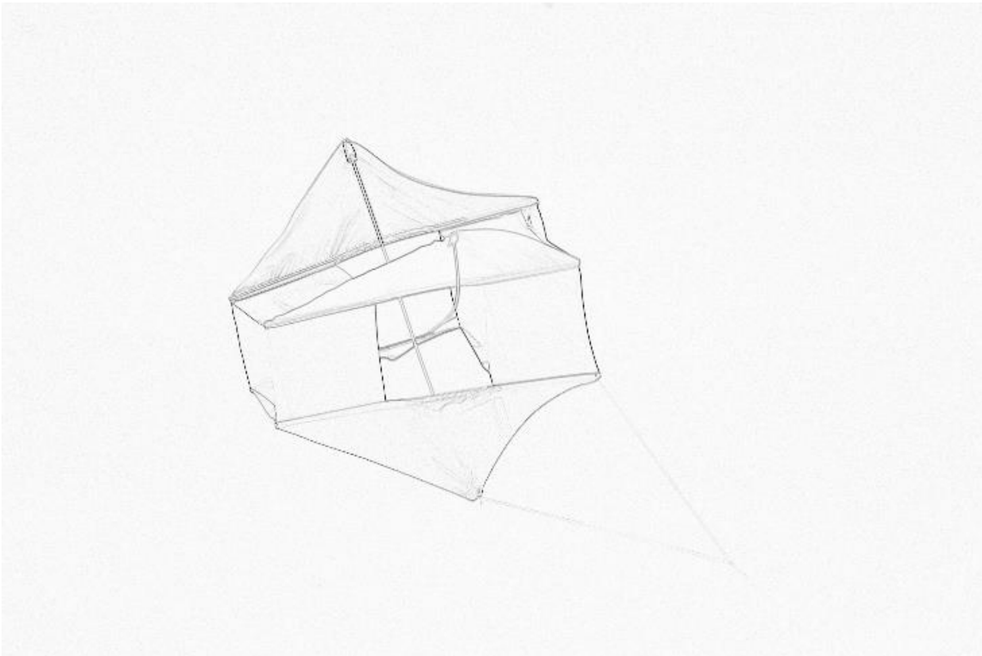


Fig After