ECE6360

Computer Vision and Image Reconstruction

Project1

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1. **Read and Display Image**

(a)   (b)

Figure1 (a): original image (b): image after binarization

2. **Enhancement**

The effect of equalization is to smooth the distribution of the histogram. We can tell from the histogram, the histogram of the original image shows that most of the pixel values located between 100~180 approximately, but only a few pixels have low intensity or high intensity. After equalization, we can observe that the number of pixels which contain low or high intensity have increased, which spread out the histogram.
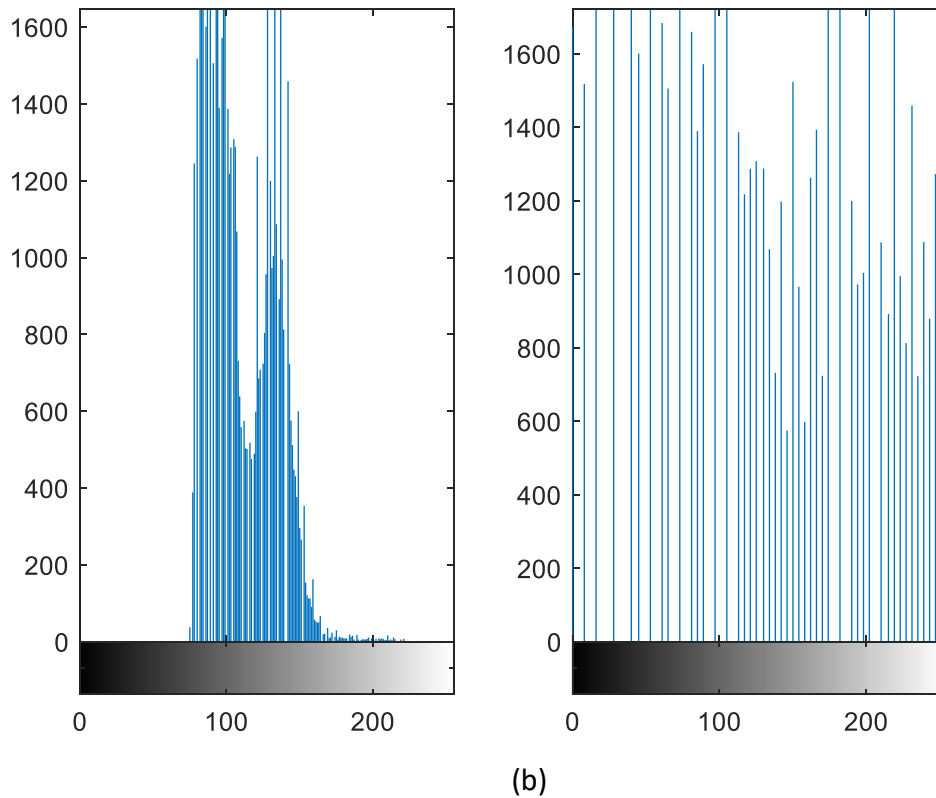

(a)

(b)

Figure 2(a): Image comparison (b): histogram of original image and image after equalization

3. **Denoising**

Salt and pepper is adding the noise with intensity of 255 and 0 using a specific probability. Median. In this part, we can see that the median filter works better on salt and pepper. This is because, median filter will choose the median value of the intensity under the mask (3*3) and replace the pixel at the center of the mask, which will help reduce the noise with intensity 255 and 0.
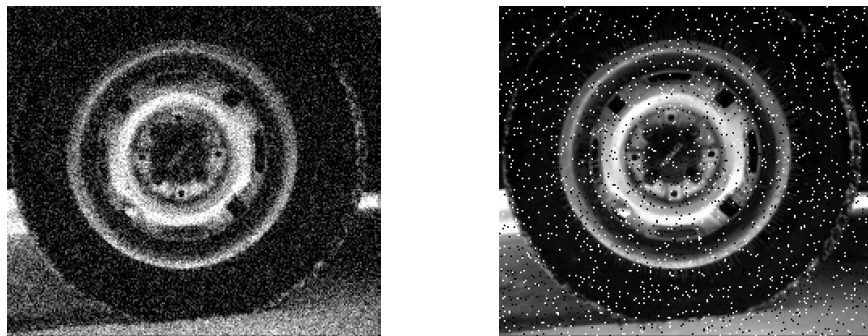

Figure 3: left side is the image with gaussian noise.
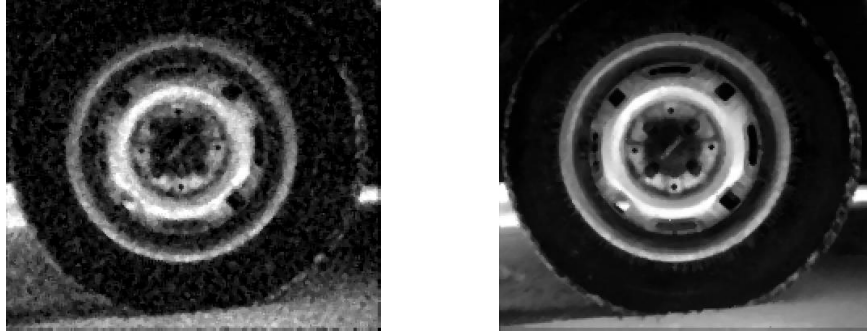Right side is the image with salt and pepper

Figure 4: left side is the image with gaussian noise after denoising

Right side is the image with salt and pepper after denoising

4. **Edge Detection**

Prewitt edge detector is using the two kernels, one is for horizontal and one is for vertical.

Horizontal kernel:

-1	0	+1
-1	0	+1
-1	0	+1

Vertical kernel:

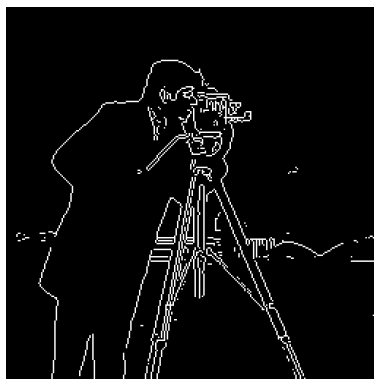| -1	-1	-1
0	0	0
+1	+1	+1

Prewitt edge detector is using these kernels to convolve with the image.

Canny edges detector consists 4 steps [1]:

  i. Filter image with derivative of Gaussian

  ii. Find magnitude and orientation of gradient

  iii. Non-maximum suppression:

      Thin multi-pixel wide "ridges" down to single pixel width

  iv. Linking and thresholding:

      ● Define two thresholds: Low and high

      ● Use the high threshold to start edge curves
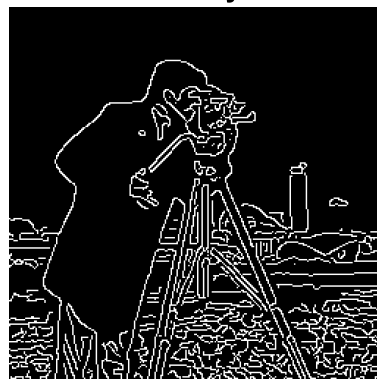
      ● Use the low threshold to continue them

Perwitt　　　　　　　　　**Canny**

Figure 5: Result of edge detection

Refereces:

[1]: https://www.youtube.com/watch?v=17cOHpSaqi0

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