DIP Lab 4

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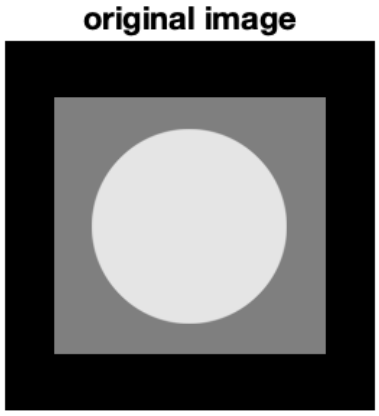
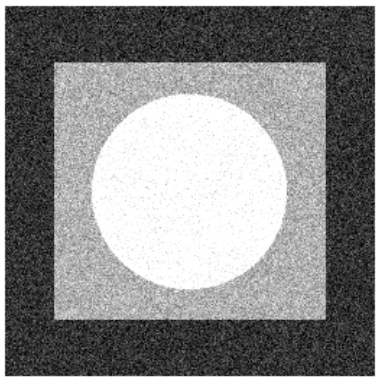
1. Proj05-01 – Noise Generators (20%)

- **Explanation:**

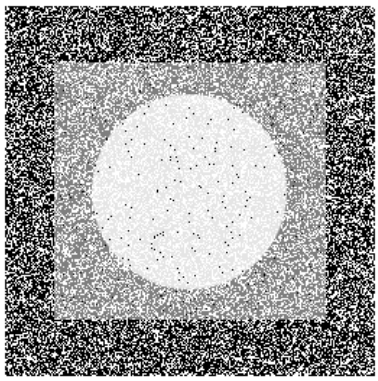
  (a) Implement a Gaussian noise to an image. You must be able to specify the noise mean and variance.
  (b) Implement salt-and-pepper noise to an image. You must be able to specify the probabilities of both salt and pepper.

- **Result:**





(above: Gaussian noise, mean=0.2, variance=0.01)



(above: Salt&Pepper noise, ps=0.3, pp=0.1)

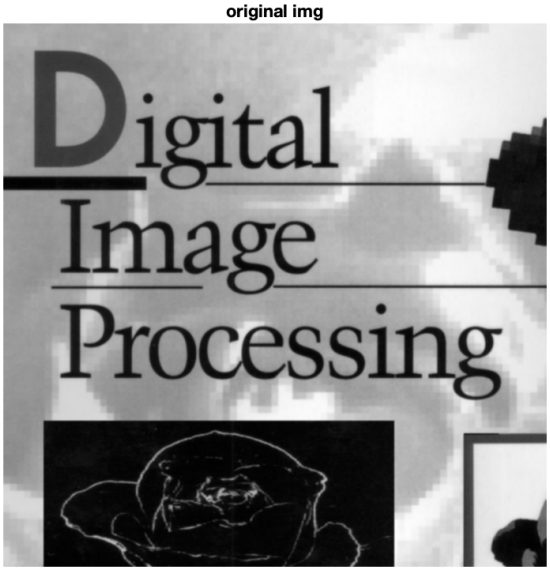
2. Proj05-03 – Periodic Noise Reduction Using a Notch Filter (40%)

- **Explanation:**

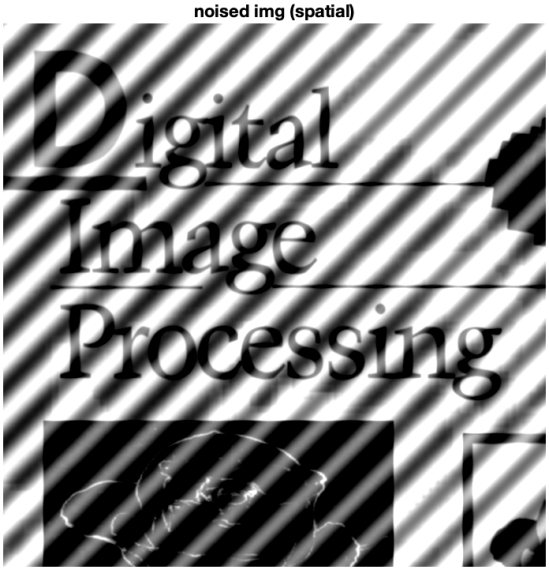
  (a) Implement sinusoidal noise.
  (b) Add sinusoidal noise to image.
  © Display the spectrum of the image.
  (d) Notch-filter the image.

- **Result:**

original img

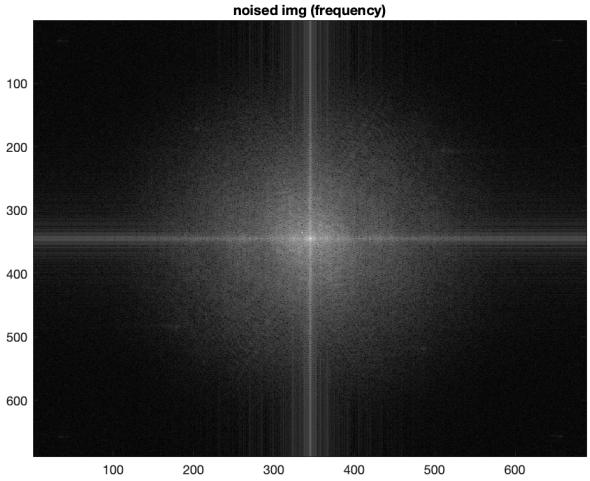


noised img (spatial)

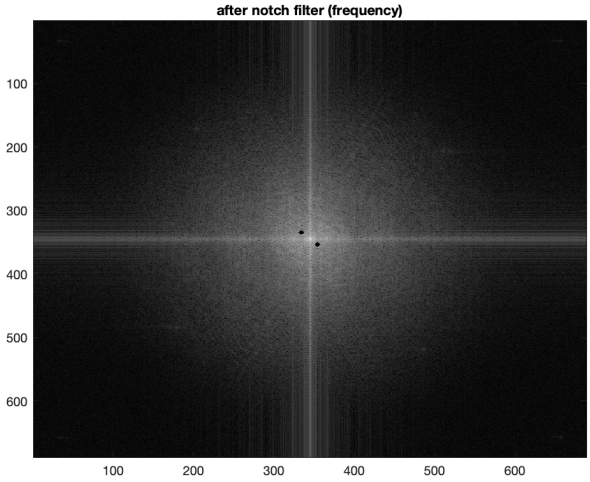


notch filter

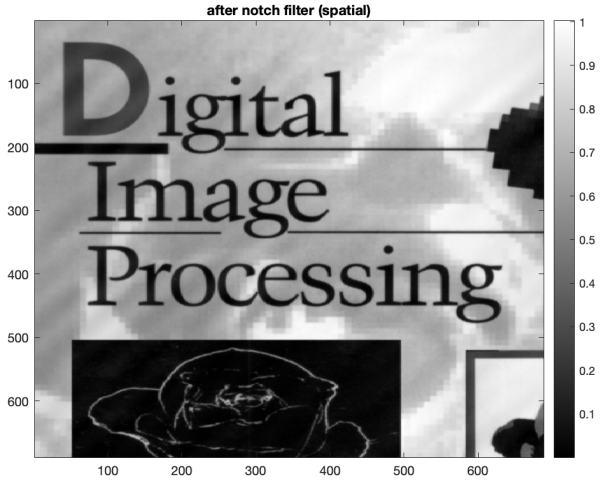
noised img (frequency)



after notch filter (frequency)



after notch filter (spatial)

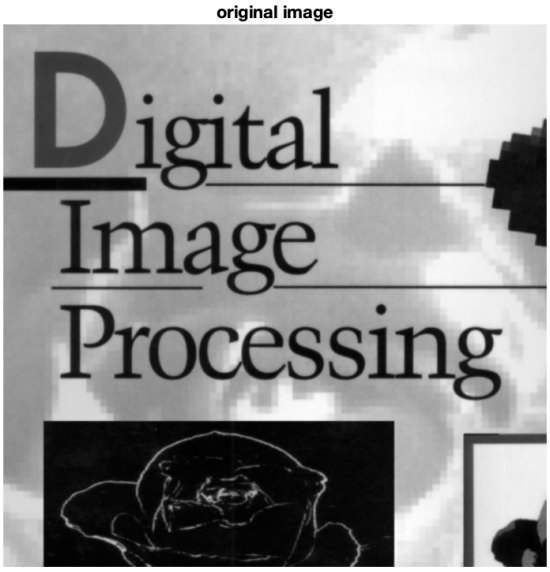


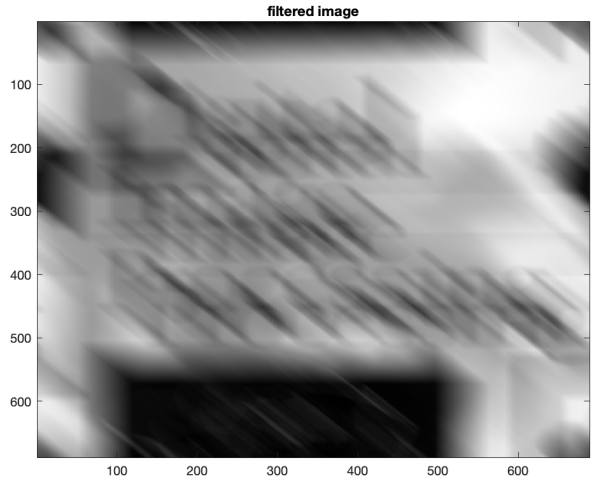
3. Proj05-04 – Parametric Wiener Filter (40%)

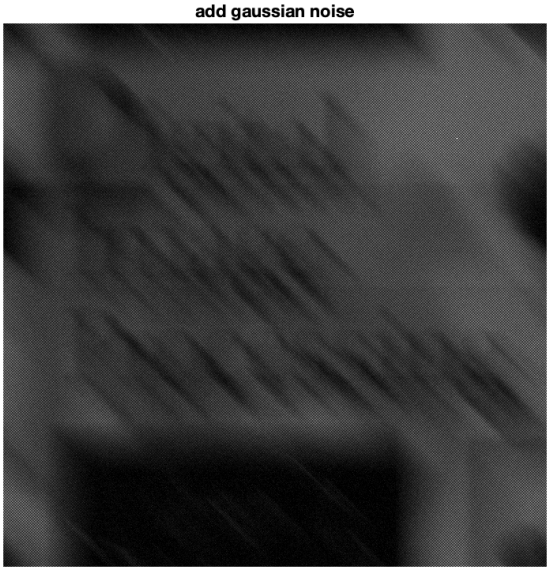
- **Explanation:**

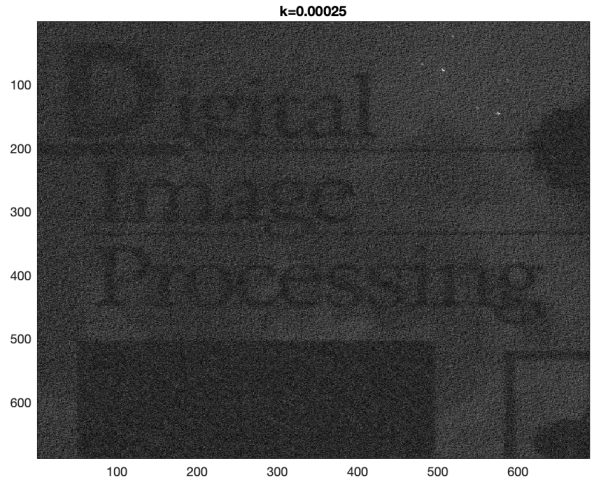
  (a) Implement a linear motion blurring filter.
  (b) Blur image using a=0.1, b=0.1, T=1.
  © Add Gaussian noise of 0 mean and variance of 10 pixels to the blurred image.
  (d) Restore the image using the Wiener filter.

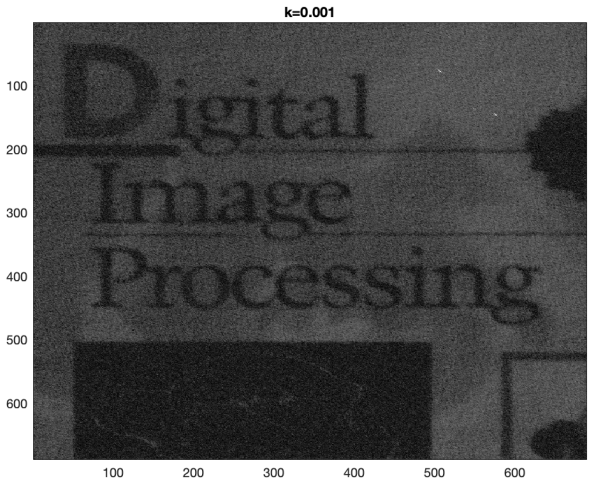
- **Result:**

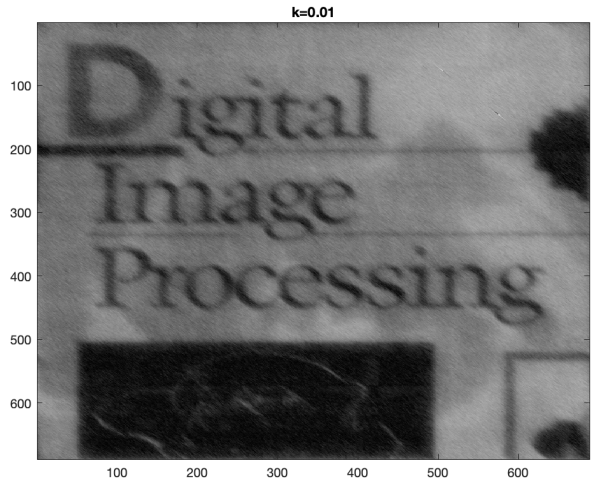


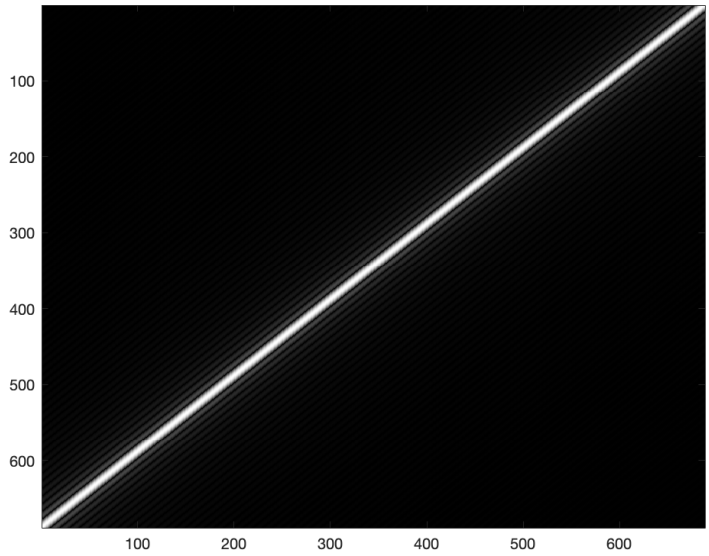












(above: spectrum of linear motion blur filter)

- **Comparison:**

  In Weiner filter debluring, k=0.01 has the best deblur result among k=[0.00025, 0.001, 0.01]. Since:

  noise_var / var(img(:)) = 0.0098

  k=0.01 is the closest to 0.0098, hence k=0.01 has the best result.