

DIGITAL IMAGE PROCESSING 1 UE20EC317

UNIT 4: ASSIGNMENT QUESTIONS

QUESTION 1

For the image 'lena.jpg', perform the following:

- A. Write a function for contraharmonic filter considering the formula

$$\hat{f}(x,y) = \frac{\sum_{(s,t) \in S_{x,y}} g(s,t)^{Q+1}}{\sum_{(s,t) \in S_{x,y}} g(s,t)^Q}$$

- B. Add salt noise to the image and observe the effect of +ve and -ve values of Q (order of the filter) for filter size 3x3
- C. Add pepper noise to the image and observe the effect of +ve and -ve values of Q for filter size 3x3
- D. What conclusion can be drawn from the observations?

2. For the image 'cameraman.jpg',

- a) Convert the image to grayscale.
- b) Add Gaussian noise to the result obtained, for the following cases:
- i) mean = 0 and variance = 0.2
 - ii) mean = 0.5 and variance = 0
 - iii) mean = 0.5 and variance = 0.2

How do the images in each case differ?

- c) Remove the noise from the images obtained in parts 3 i) and iii) using appropriate filters of size 7x7 and 11x11. Is there any tradeoff that is observed? Explain.

3. For a 512x512 'cameraman.jpg' image
 - a) Convert it to grayscale and add sinusoidal noise
 - b) Remove the noise from the image using gaussian band reject filter with width as 12 and $D_0 = 102$
 - c) Remove the noise from the image using band pass filter with width as 52 and $D_0 = 7$ (you can try other values for W, D_0 too)

4. For the image lena.png:

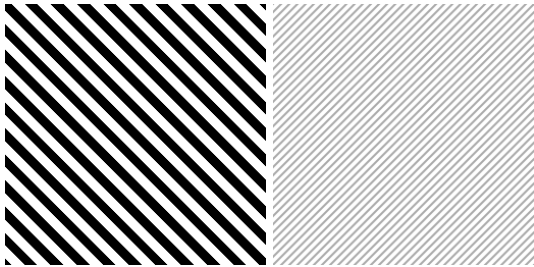
PART A

- i) Convert to grayscale and add salt and pepper noise
- ii) Apply the median filter for neighborhood sizes of 3x3 and 10x10 and compare

the results

PART B

- iii) First add these two images together, and then apply median filter (neighborhood size 10x10)



- iv) First apply the median filter (neighborhood size 10x10) individually on each of the images, and then add the images together
- v) Compare the results of iii and iv and draw conclusions