Multimedia Image Processing

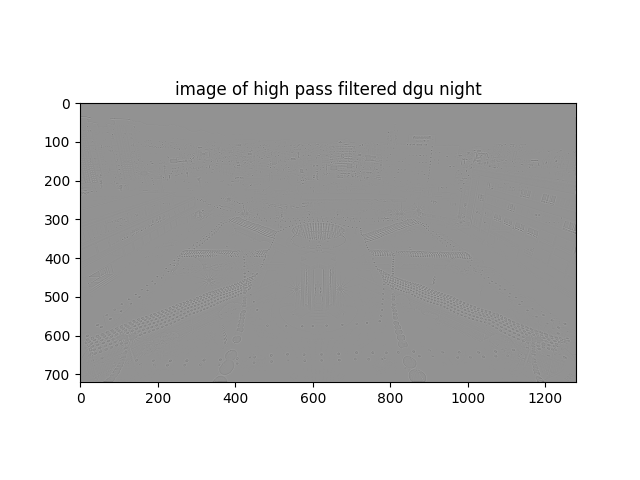
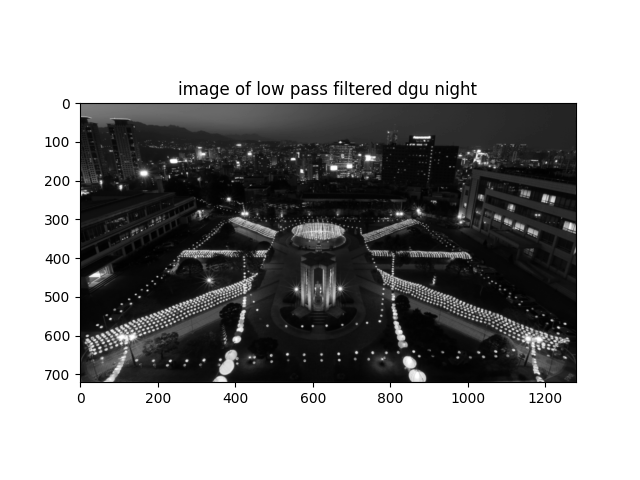
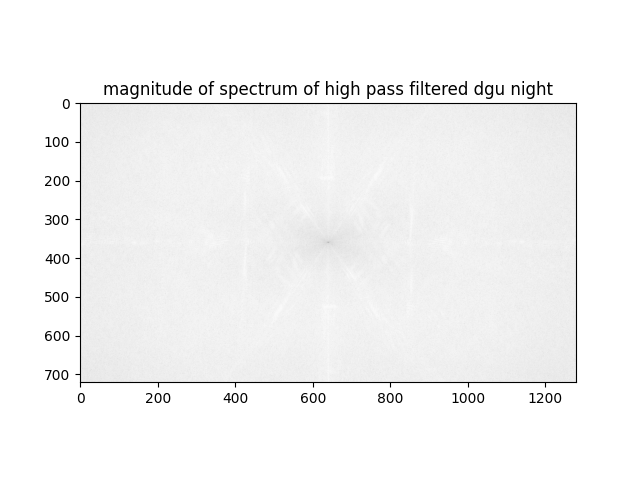
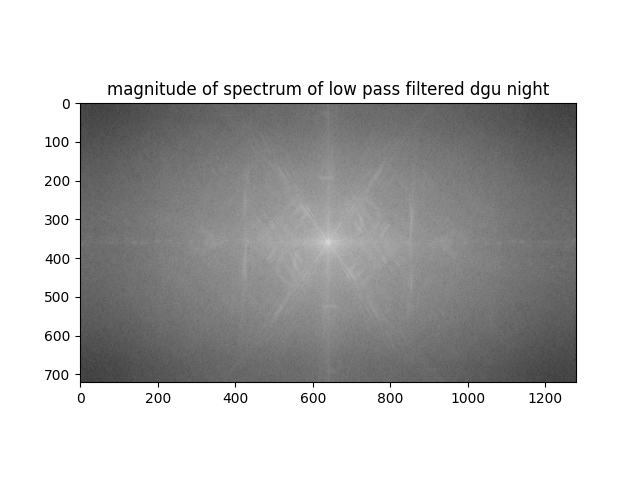
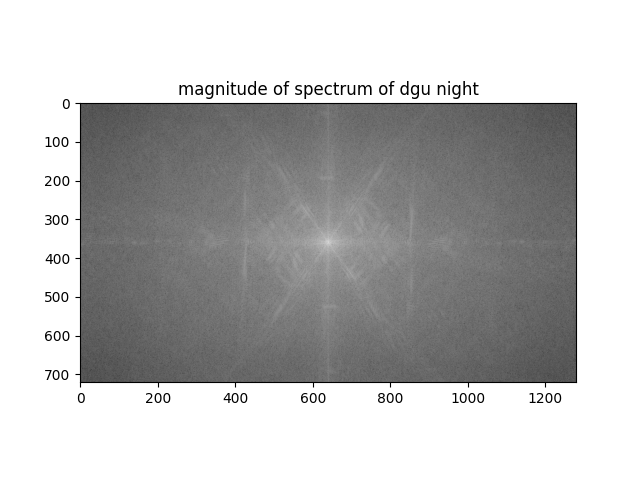
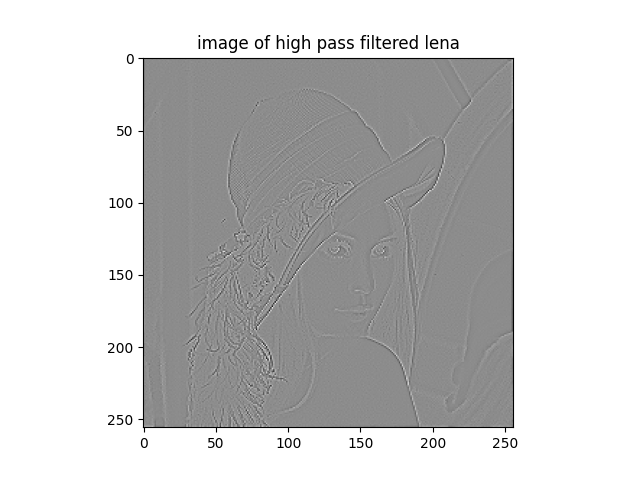
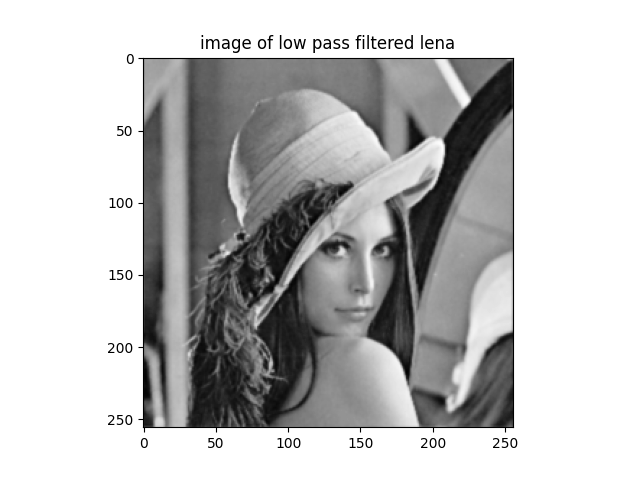
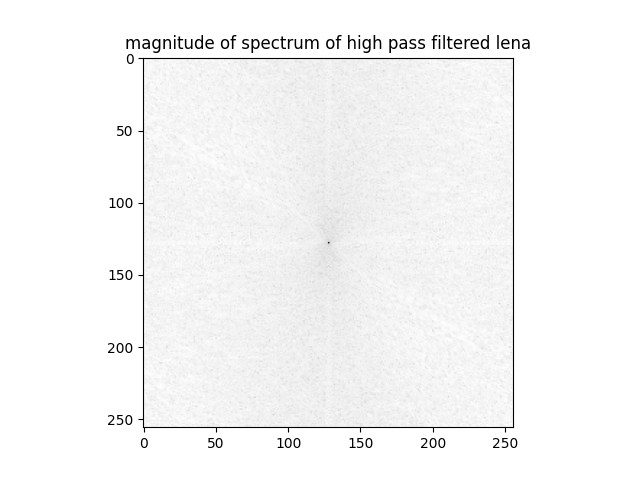
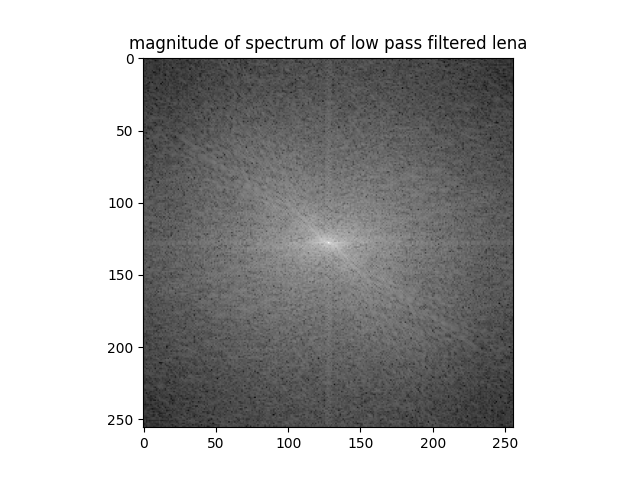
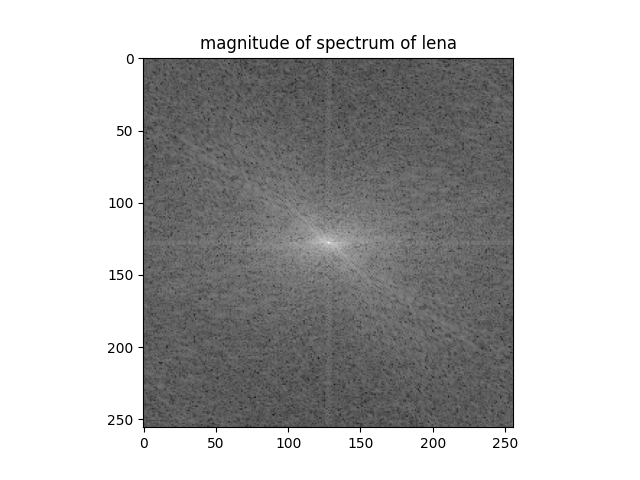
Assignment3

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Source Image1: lena\_gray.png



Source Image2: dgu\_night.png



Source Code:

import cv2

import numpy as np

import matplotlib.pyplot as plt

from numpy import fft

in\_image\_lena = cv2.imread('lena\_gray.png', 0)

f\_lena = fft.fft2(in\_image\_lena)

fshift\_lena = fft.fftshift(f\_lena)

magnitude\_input\_lena = 20\*np.log(np.abs(fshift\_lena)+1e-10)

plt.subplot(111), plt.imshow(magnitude\_input\_lena, cmap='gray')

plt.title('magnitude of spectrum of lena')

plt.show()

h\_lp = 1/25\*np.array([[1,3,1], [3,9,3], [1,3,1]])

h\_hp = np.array([[0,1,0], [1,-4,1], [0,1,0]])

height, width = in\_image\_lena.shape

h\_lp = np.pad(h\_lp, ((height//2-1, height//2-2),(width//2-1, width//2-2)), 'constant')

h\_hp = np.pad(h\_hp, ((height//2-1, height//2-2),(width//2-1, width//2-2)), 'constant')

f\_h\_lp = fft.fft2(h\_lp)

f\_h\_hp = fft.fft2(h\_hp)

f\_lena\_lp = fft.fftshift(np.multiply(f\_lena, f\_h\_lp))

f\_lena\_hp = fft.fftshift(np.multiply(f\_lena, f\_h\_hp))

magnitude\_lp\_output\_lena = 20\*np.log(np.abs(f\_lena\_lp)+1e-10)

magnitude\_hp\_output\_lena = 20\*np.log(np.abs(f\_lena\_hp)+1e-10)

plt.subplot(111), plt.imshow(magnitude\_lp\_output\_lena, cmap='gray')

plt.title('magnitude of spectrum of low pass filtered lena')

plt.show()

plt.subplot(111), plt.imshow(magnitude\_hp\_output\_lena, cmap='gray')

plt.title('magnitude of spectrum of high pass filtered lena')

plt.show()

lena\_lp = np.real(fft.fftshift(fft.ifft2(fft.fftshift(f\_lena\_lp))))

lena\_hp = np.real(fft.fftshift(fft.ifft2(fft.fftshift(f\_lena\_hp))))

plt.subplot(111), plt.imshow(lena\_lp, cmap='gray')

plt.title('image of low pass filtered lena')

plt.show()

plt.subplot(111), plt.imshow(lena\_hp, cmap='gray')

plt.title('image of high pass filtered lena')

plt.show()

####################################################

in\_image\_night = cv2.imread('dgu\_night.png', 0)

f\_night = fft.fft2(in\_image\_night)

fshift\_night = fft.fftshift(f\_night)

magnitude\_input\_night = 20\*np.log(np.abs(fshift\_night)+1e-10)

plt.subplot(111), plt.imshow(magnitude\_input\_night, cmap='gray')

plt.title('magnitude of spectrum of dgu night')

plt.show()

h\_lp = 1/25\*np.array([[1,3,1], [3,9,3], [1,3,1]])

h\_hp = np.array([[0,1,0], [1,-4,1], [0,1,0]])

height, width = in\_image\_night.shape

h\_lp = np.pad(h\_lp, ((height//2-1, height//2-2),(width//2-1, width//2-2)), 'constant')

h\_hp = np.pad(h\_hp, ((height//2-1, height//2-2),(width//2-1, width//2-2)), 'constant')

f\_h\_lp = fft.fft2(h\_lp)

f\_h\_hp = fft.fft2(h\_hp)

f\_night\_lp = fft.fftshift(np.multiply(f\_night, f\_h\_lp))

f\_night\_hp = fft.fftshift(np.multiply(f\_night, f\_h\_hp))

magnitude\_lp\_output\_night = 20\*np.log(np.abs(f\_night\_lp)+1e-10)

magnitude\_hp\_output\_night = 20\*np.log(np.abs(f\_night\_hp)+1e-10)

plt.subplot(111), plt.imshow(magnitude\_lp\_output\_night, cmap='gray')

plt.title('magnitude of spectrum of low pass filtered dgu night')

plt.show()

plt.subplot(111), plt.imshow(magnitude\_hp\_output\_night, cmap='gray')

plt.title('magnitude of spectrum of high pass filtered dgu night')

plt.show()

night\_lp = np.real(fft.fftshift(fft.ifft2(fft.fftshift(f\_night\_lp))))

night\_hp = np.real(fft.fftshift(fft.ifft2(fft.fftshift(f\_night\_hp))))

plt.subplot(111), plt.imshow(night\_lp, cmap='gray')

plt.title('image of low pass filtered dgu night')

plt.show()

plt.subplot(111), plt.imshow(night\_hp, cmap='gray')

plt.title('image of high pass filtered dgu night')

plt.show()