

Duan Nguyen

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CSCI 507 – Computer Vision

Assignment 3

1. Code snapshot

```
import matplotlib.pyplot as plt
import numpy as np
from skimage import io, img_as_float32, util, color, transform, filters
from scipy.fft import fft2, fftshift
```

```
# Load image
image = io.imread("assignment1_photo.jpg")
# convert gray scale
image_gray = img_as_float32(color.rgb2gray(image))
# down sample
image_small = transform.resize(image_gray, (100, 100))

plt.imshow(image_small, cmap=plt.cm.gray)
plt.title("Resized Image 1 - Grayscale")
plt.show()
```

```
# fourier magnitude
image_fourier = fftshift(fft2(image_small))
img_mag = np.abs(image_fourier)
img pha = np.angle(image_fourier)

plt.imshow(np.log(1+img_mag), cmap='gray')
plt.title("Image 1 - Fourier Magnitude")
plt.show()
```

```
# Load image
image_2 = io.imread("assignment3_photo.jpeg")
# conver gray scale
image_gray_2 = img_as_float32(color.rgb2gray(image_2))
# down sample
image_small_2 = transform.resize(image_gray_2, (100, 100))

plt.imshow(image_small_2, cmap=plt.cm.gray)
plt.title("Resized Image 2 - Grayscale")
plt.show()
```

```
# Low pass filter
low_image = filters.gaussian(image_small, sigma=1)

plt.imshow(low_image, cmap=plt.cm.gray)
plt.title("Lowpass filtered")
plt.show()
```

```
# Low pass FF
image_fourier_low = fftshift(fft2(low_image))
img_mag_low = np.abs(image_fourier_low)
img pha_low = np.angle(image_fourier_low)

plt.imshow(np.log(1+img_mag_low), cmap='gray')
plt.title("Lowpass - Fourier Magnitude")
plt.show()
```

```
# high pass filter
low_image_2 = filters.gaussian(image_small_2, sigma=1)
high_image = image_small_2 - low_image_2

plt.imshow(high_image+0.5, cmap=plt.cm.gray)
plt.title("Highpass filtered")
plt.show()
```

```
# high pass fourier
image_fourier_high = fftshift(fft2(high_image))
img_mag_high = np.abs(image_fourier_high)
img_pha_high = np.angle(image_fourier_high)

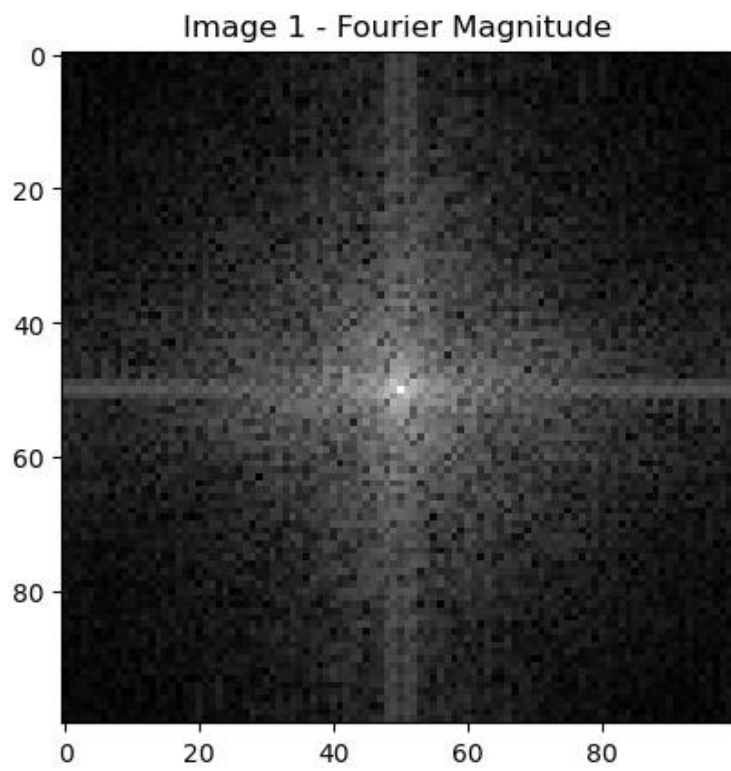
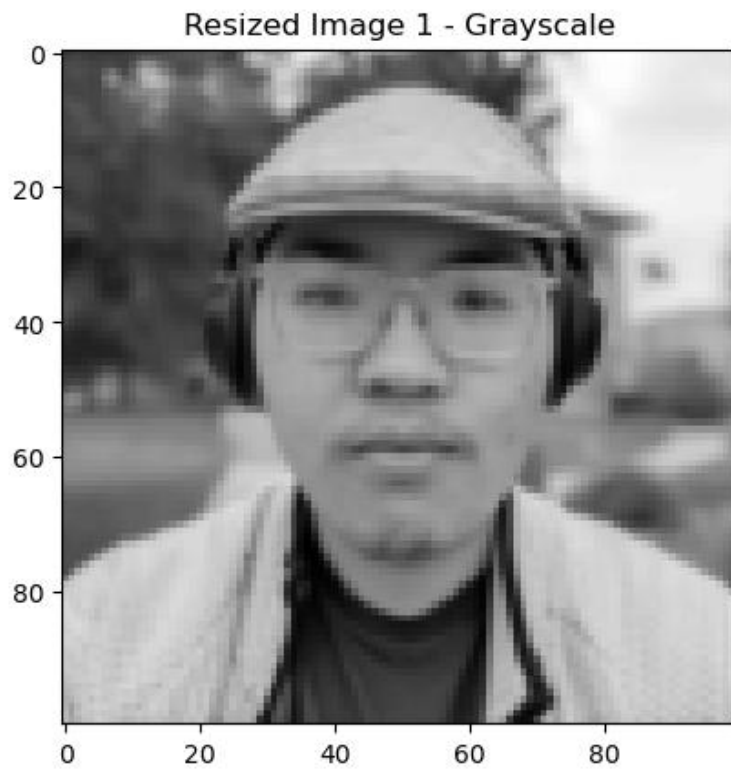
plt.imshow(np.log(1+img_mag_high), cmap='gray')
plt.title("Highpass - Fourier Magnitude")
plt.show()
```

```
# combine
plt.imshow(high_image+low_image, cmap='gray')
plt.title("High Pass + Low Pass")
plt.show()
```

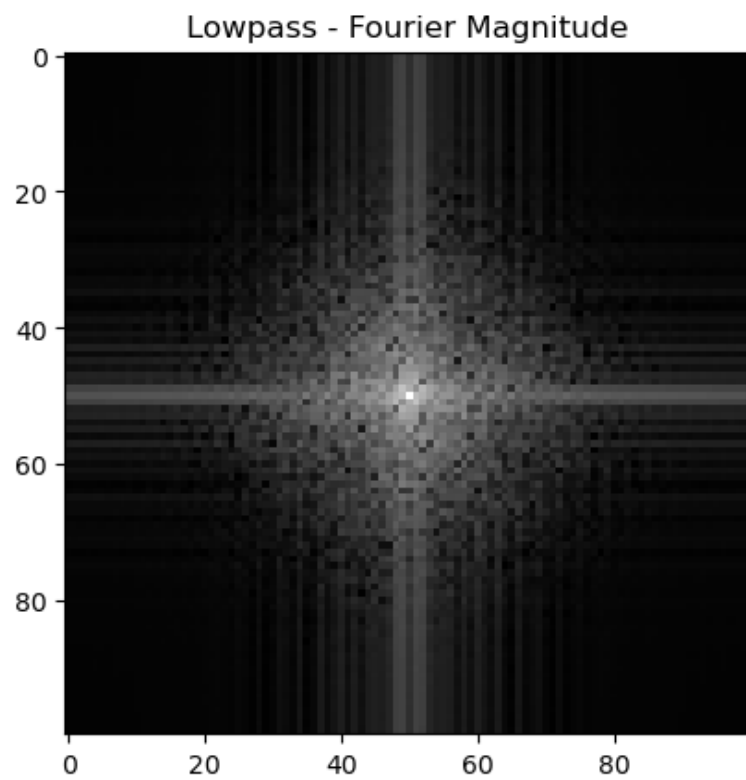
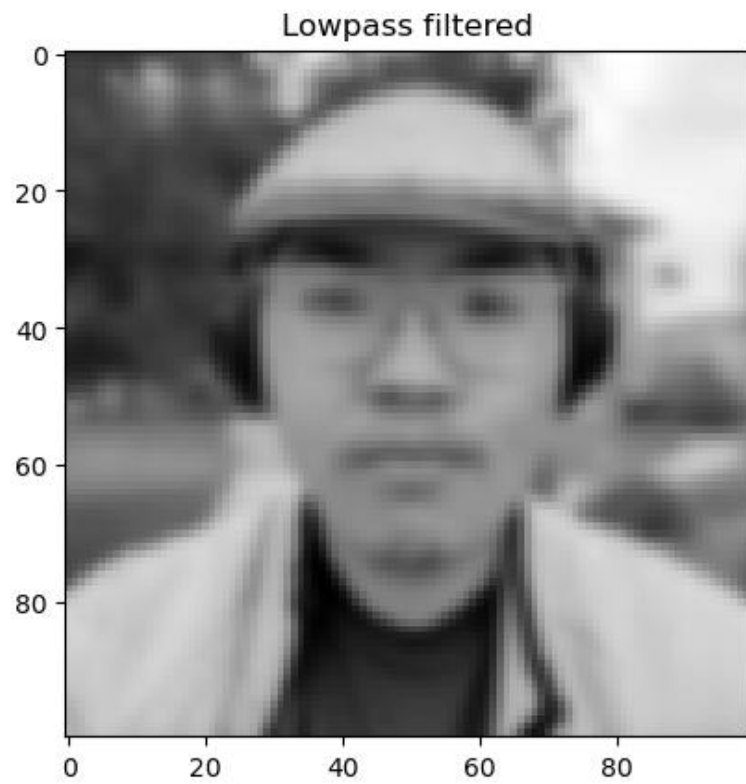
```
image_fourier_combine = fftshift(fft2(high_image+low_image))
img_mag_combine = np.abs(image_fourier_combine)
img_pha_combine = np.angle(image_fourier_combine)

plt.imshow(np.log(1+img_mag_combine), cmap='gray')
plt.title("Image Combine - Fourier Magnitude")
plt.show()
```

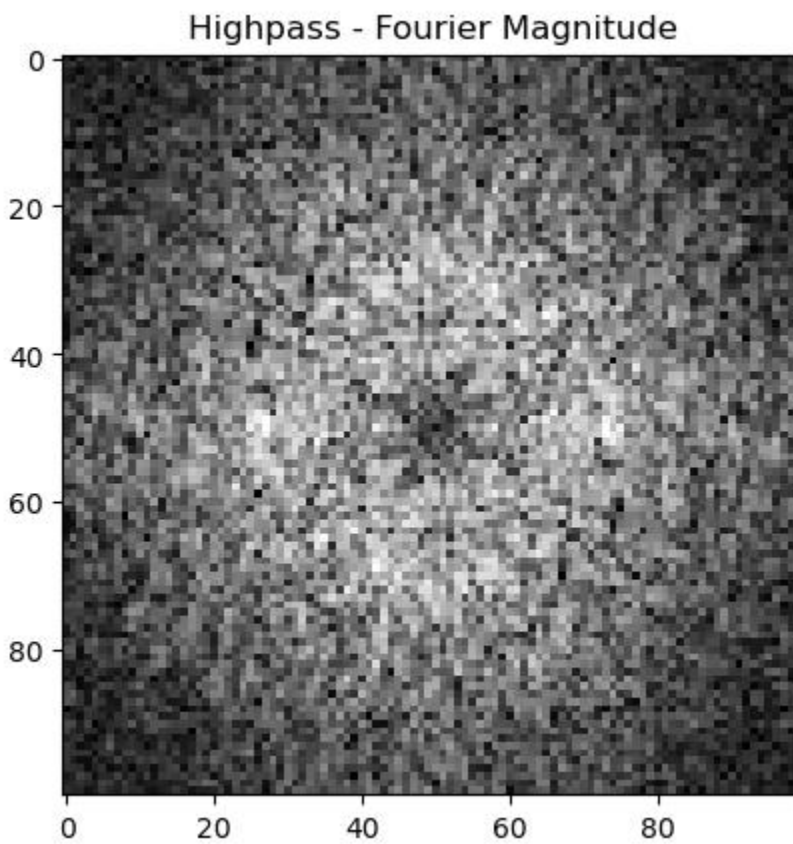
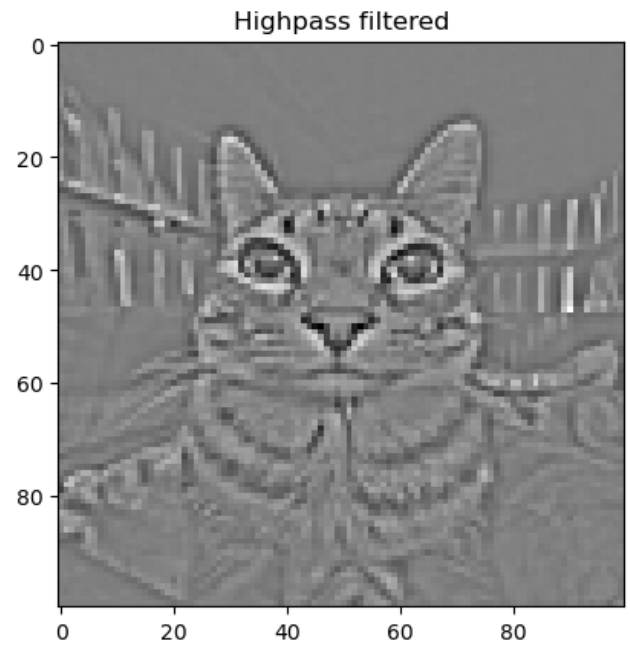
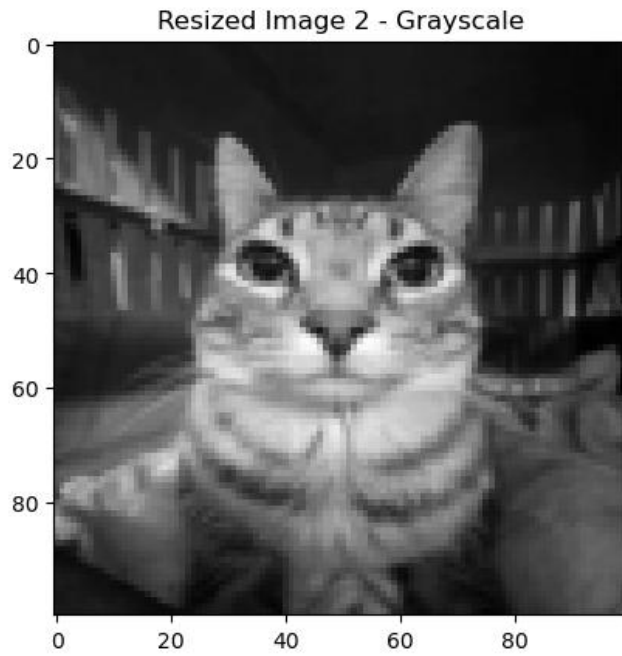
2. Headshot and Fourier magnitude



3. Lowpass headshot and Fourier magnitude



4. 2nd image, highpass filtered, and Fourier magnitude



5. Combined image and Fourier magnitude

