190622R-excercise-02

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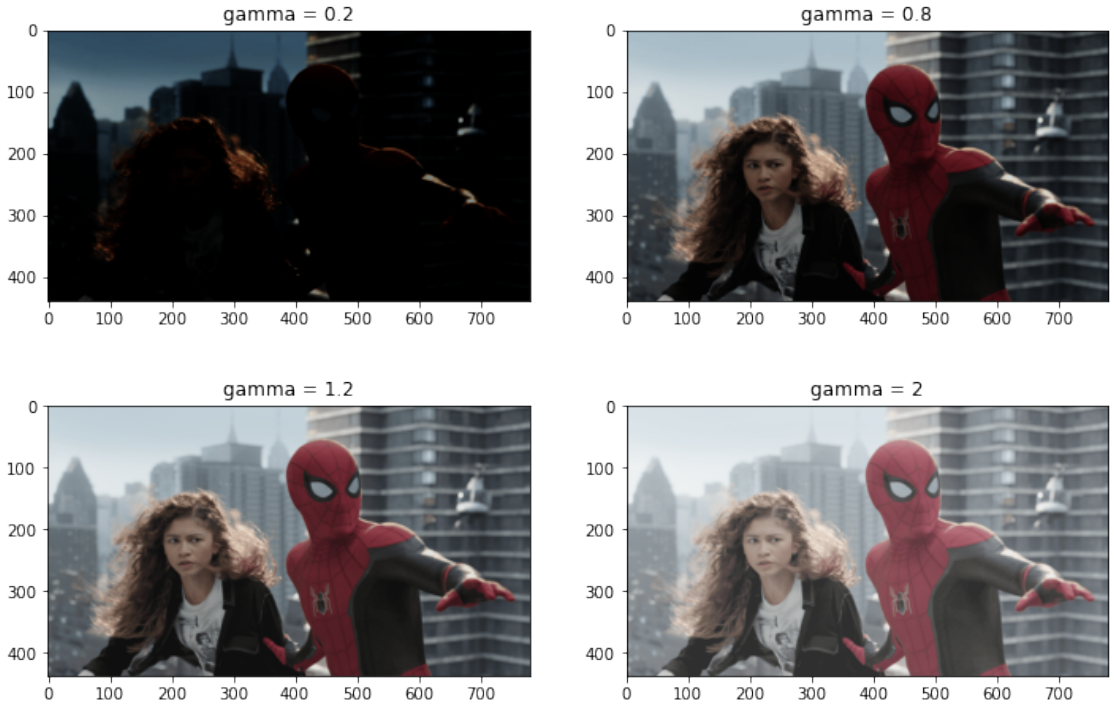
Question 01

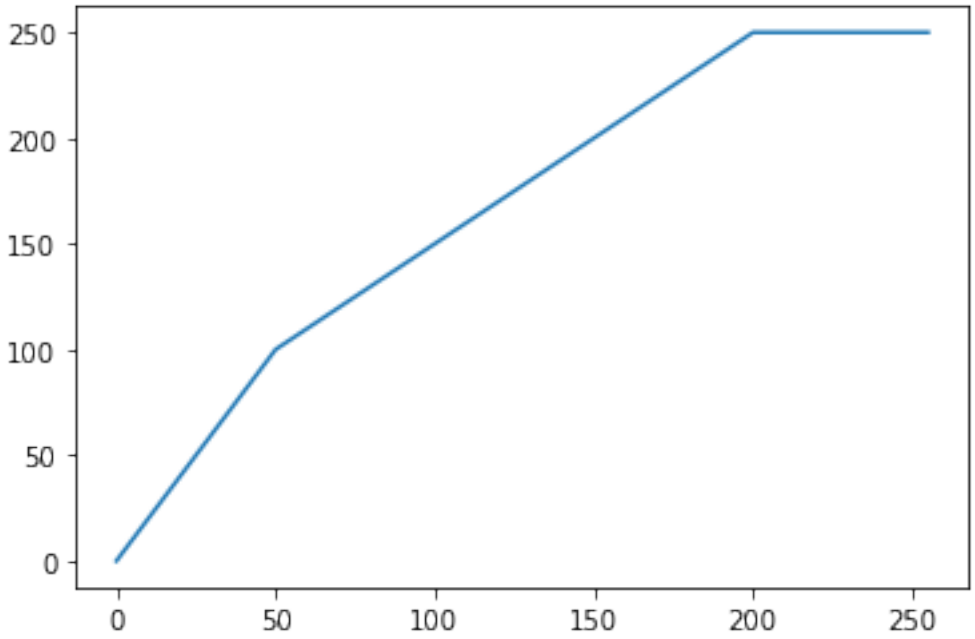
[ ]:
```
import cv2 as cv
import numpy as np
import matplotlib.pyplot as plt

im = cv.imread(r'spider.png')
assert im is not None


def gamma(image, gamma):
    transform = np.array([((i / 255) ** (1 / gamma)) * 255 for i in␣
 ↪range(0,256)],dtype=np.uint8)
    return cv.LUT(image, transform)


fig, axs = plt.subplots(2, 2, figsize=(12, 8))
axs[0, 0].imshow(cv.cvtColor(gamma(im, 0.2), cv.COLOR_BGR2RGB))
axs[0,0].set_title("gamma = 0.2")
axs[0, 1].imshow(cv.cvtColor(gamma(im, 0.8), cv.COLOR_BGR2RGB))
axs[0,1].set_title("gamma = 0.8")
axs[1, 0].imshow(cv.cvtColor(gamma(im, 1.2), cv.COLOR_BGR2RGB))
axs[1,0].set_title("gamma = 1.2")
axs[1, 1].imshow(cv.cvtColor(gamma(im, 2), cv.COLOR_BGR2RGB))
axs[1,1].set_title("gamma = 2")
plt.show()
```

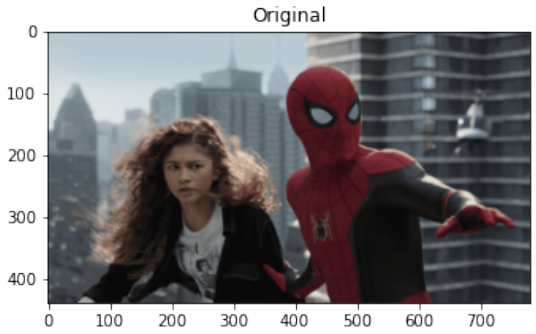


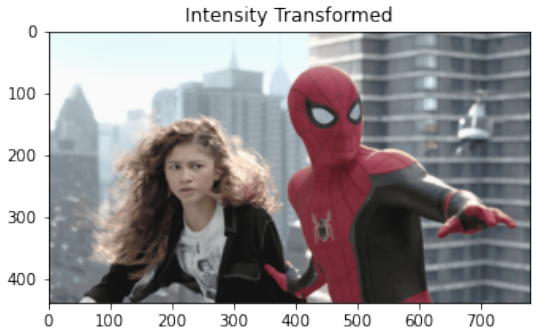
Question 02

[ ]:
```
array_1 = np.array([2 * i for i in range(0,51)])
array_2 = np.array([ i + 50 for i in range(51,201)])
array_3 = np.array([250 for i in range(201,256)])
transform = np.concatenate((array_1, array_2, array_3),axis=0).astype(np.uint8)

fig, ax = plt.subplots()
ax.plot(transform)

im = cv.imread(r'spider.png')
im = cv.cvtColor(im, cv.COLOR_BGR2RGB)
assert im is not None

cvtim = cv.LUT(im, transform)


fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(12, 12))
ax1.imshow(im)
ax1.set_title("Original")
ax2.imshow(cvtim)
ax2.set_title("Intensity Transformed")
```

[ ]:
```
Text(0.5, 1.0, 'Intensity Transformed')
```





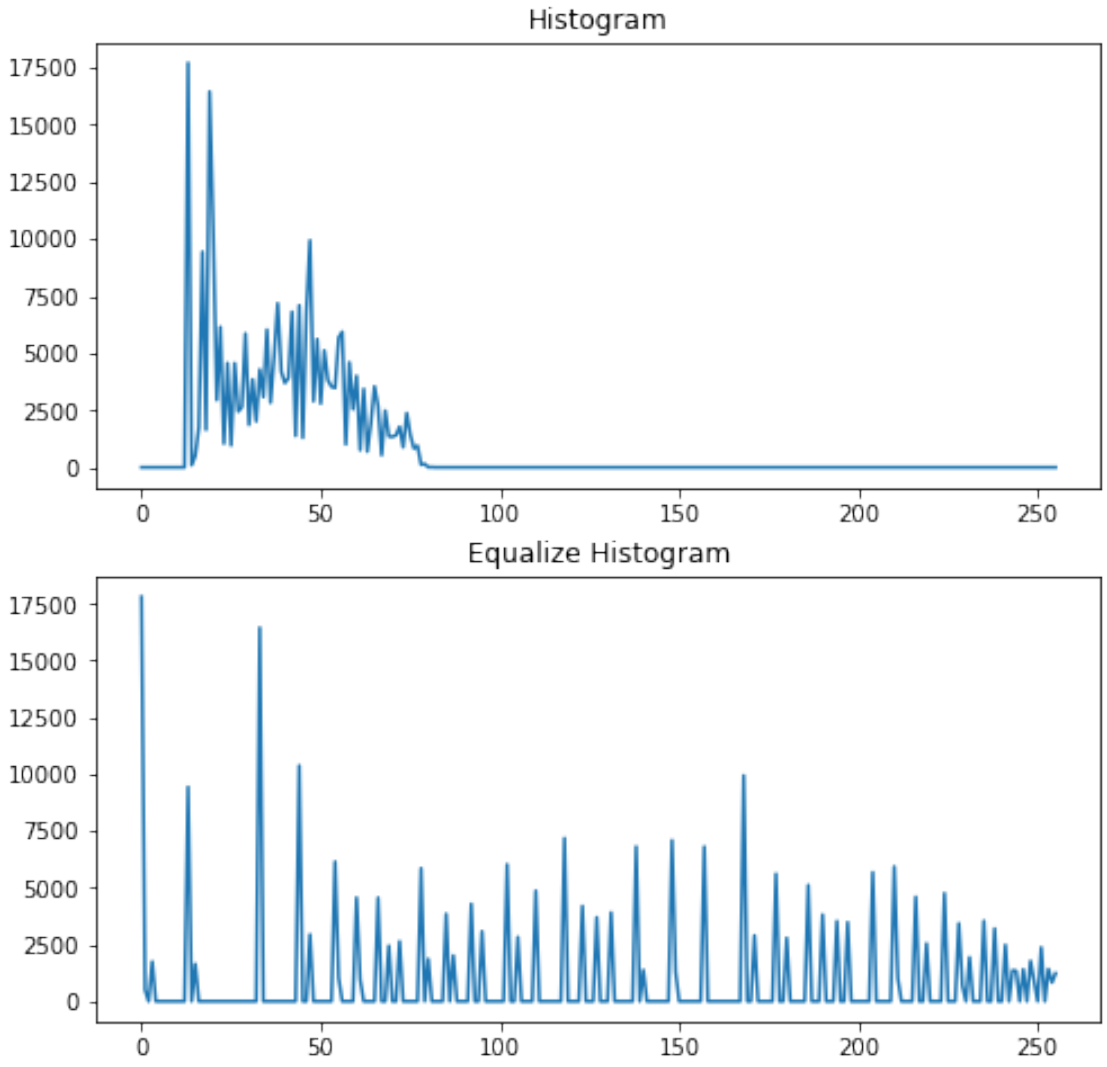


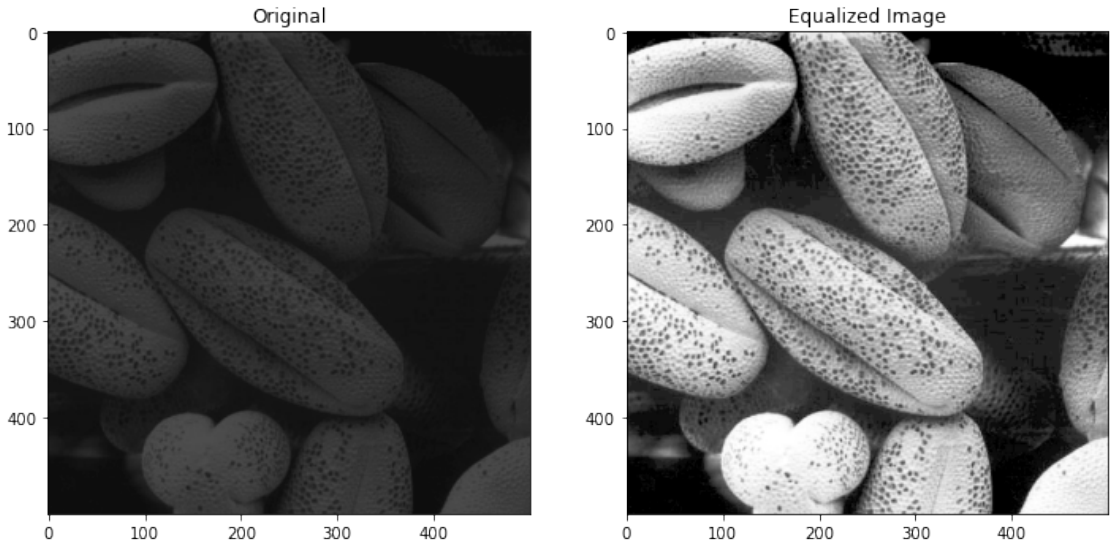
Question 03

[ ]:
```
im = cv.imread(r"shells.tif", cv.IMREAD_GRAYSCALE)
assert im is not None


hist = cv.calcHist([im], [0], None, [256], [0, 256])
eq = cv.equalizeHist(im)

eq_hist = cv.calcHist([eq], [0], None, [256], [0, 256])
```

```
fig, ax = plt.subplots(2, 1, figsize=(8,8))
ax[0].plot(hist)
ax[0].set_title("Histogram")
ax[1].plot(eq_hist)
ax[1].set_title("Equalize Histogram")

fig, axe = plt.subplots(1,2, figsize=(12,12))
axe[0].imshow(im, cmap='gray', vmin=0, vmax=255)
axe[0].set_title("Original")
axe[1].imshow(eq, cmap='gray', vmin=0, vmax=255)
axe[1].set_title("Equalized Image")
```

[ ]: Text(0.5, 1.0, 'Equalized Image')





Question 04

```
[ ]: im = cv.imread(r"zion_pass.jpg")
assert im is not None

hsv_im = cv.cvtColor(im, cv.COLOR_BGR2HSV)
sat_im = hsv_im.copy()
value = 80
sat_im[:,:,1] = hsv_im[:,:,1] + value
sat_im = np.clip(sat_im, 0, 255)

im = cv.cvtColor(im, cv.COLOR_BGR2RGB)
sat_im = cv.cvtColor(sat_im, cv.COLOR_HSV2RGB)

fig, axe = plt.subplots(1,2, figsize=(12,12))
axe[0].imshow(im)
axe[0].set_title("Original")
axe[1].imshow(sat_im)
axe[1].set_title("Saturated")

hue_im = hsv_im.copy()
value = 20
hue_im[:,:,0] = hue_im[:,:,0] + value
hue_im = np.clip(hue_im, 0, 255)

hue_im = cv.cvtColor(hue_im, cv.COLOR_HSV2RGB)

fig, axe = plt.subplots(1,2, figsize=(12,12))
axe[0].imshow(im)
```

```
axe[0].set_title("Original")
axe[1].imshow(hue_im)
axe[1].set_title("Increased Hue")
```

[ ]: Text(0.5, 1.0, 'Increased Hue')