EN2550 Exercise 2 Intensity Transformations

Name - Ekanayake E.M.S.S.N.

Index no - 190164M

---

(01)

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

f = cv.imread(r'Images\spider.png')
assert f is not None

g_list = [0.2,0.8,1.2,2]

for gamma in g_list:
    t = np.array([(p/255)**gamma*255 for p in range(0,256)]).astype(np.uint8)
    g = cv.LUT(f, t)

    #cv.namedWindow('Image', cv.WINDOW_AUTOSIZE)
    #cv.imshow('Image',g)
    #cv.waitKey(0)
    #cv.destroyAllWindows()

    img = cv.cvtColor(g, cv.COLOR_BGR2RGB)
    fig, ax = plt.subplots(figsize=(8,8))
    plt.axis('off')
    ax.set_title('gamma = '+str(gamma))
    ax.imshow(img)
    plt.show()
```

gamma = 1.2

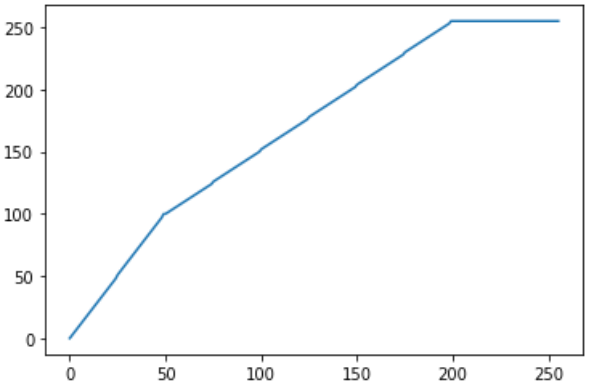
gamma = 2

(02)

In [ ]:

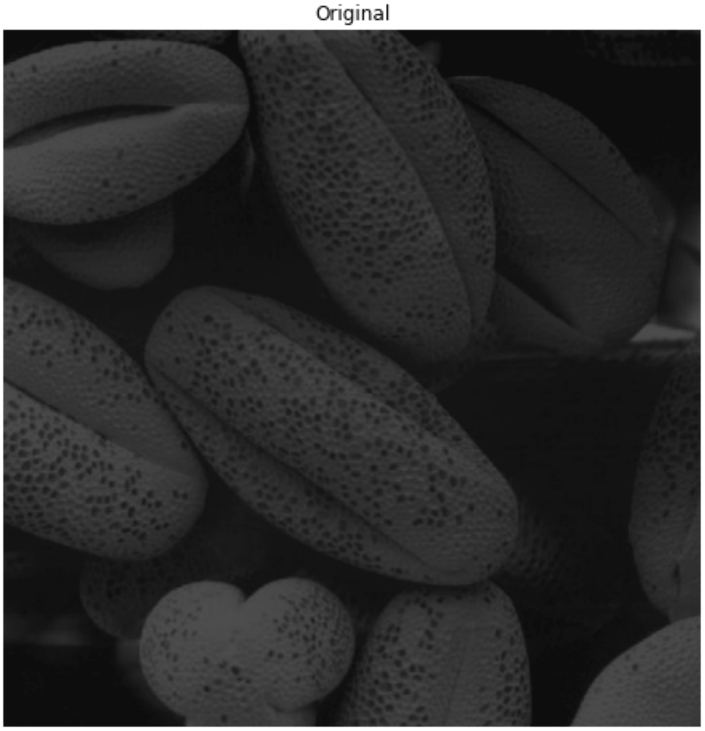
```
t1 = np.linspace(0,100,50)
t2 = np.linspace(100,255,150)
t3 = np.linspace(255,255,56)

t = np.concatenate((t1,t2,t3), axis=0).astype(np.uint8)
print(t.shape)
fig, ax = plt.subplots()
ax.plot(t)
g = cv.LUT(f, t)

img = cv.cvtColor(g, cv.COLOR_BGR2RGB)
fig, ax = plt.subplots(figsize=(8,8))
plt.axis('off')
ax.imshow(img)
plt.show()
```

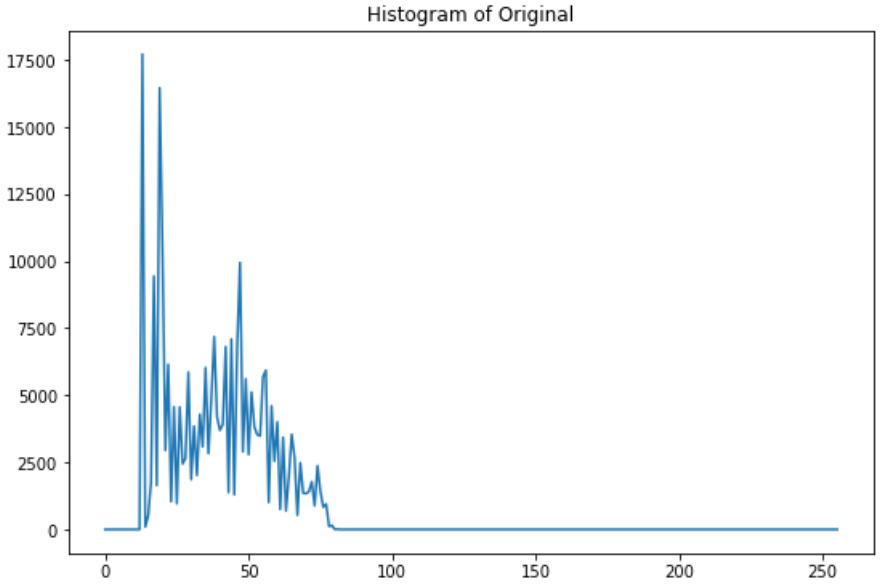
```
(256,)
```



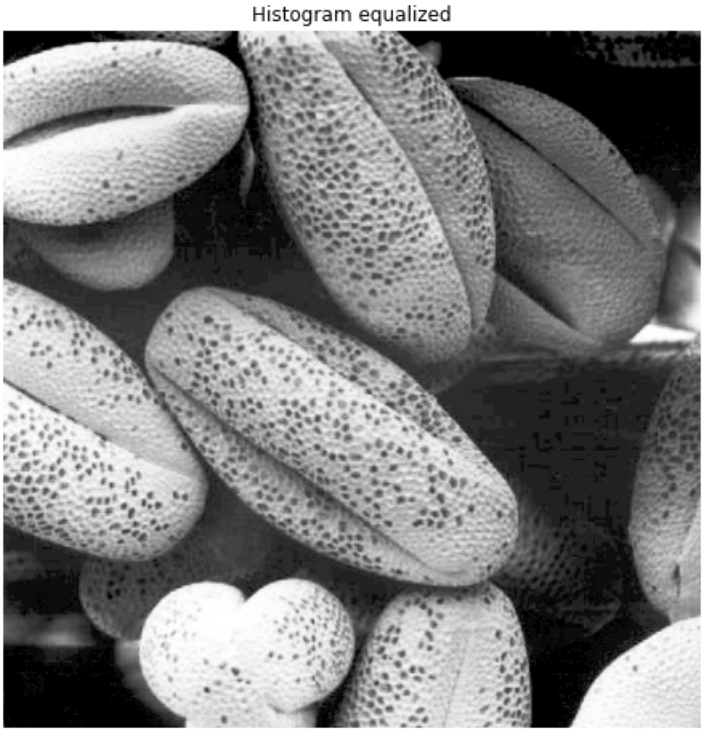
(03)

In [ ]:
```
f = cv.imread(r'Images\shells.tif',cv.IMREAD_GRAYSCALE)
assert f is not None

img = cv.cvtColor(f, cv.COLOR_BGR2RGB)
fig, ax = plt.subplots(figsize=(8,8))
plt.axis('off')
ax.imshow(img)
ax.set_title('Original')
plt.show()

histg = cv.calcHist([f],[0],None,[256],[0,256])

fig, ax = plt.subplots(figsize=(9,6))
ax.set_title('Histogram of Original')
plt.plot(histg)
plt.show()
```

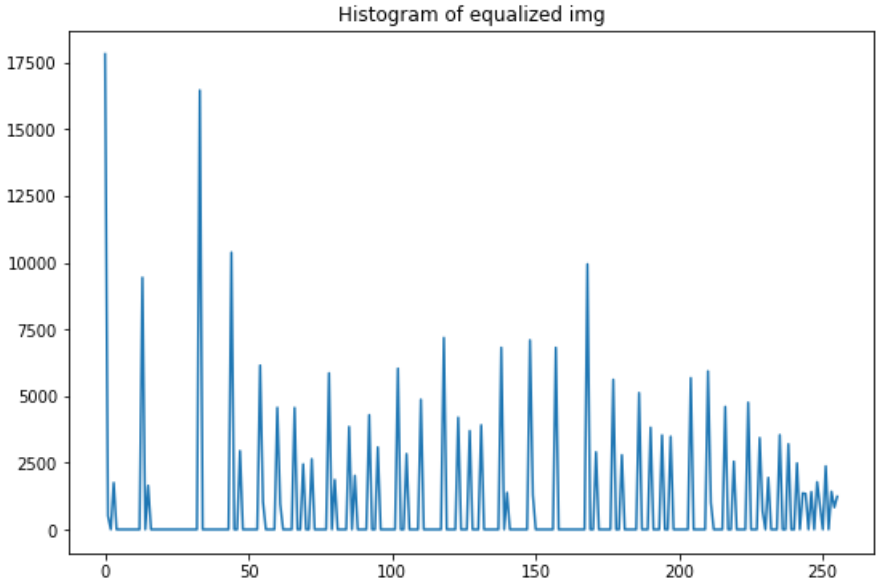




In [ ]:
```
g = cv.equalizeHist(f)
img = cv.cvtColor(g, cv.COLOR_BGR2RGB)
fig, ax = plt.subplots(figsize=(8,8))
plt.axis('off')
ax.imshow(img)
ax.set_title('Histogram equalized')
plt.show()
```



In [ ]:
```
histg_g = cv.calcHist([g],[0],None,[256],[0,256])

fig, ax = plt.subplots(figsize=(9,6))
plt.plot(histg_g)
ax.set_title('Histogram of equalized img')
plt.show()
```



(04)

In [ ]:
```
f = cv.imread(r'Images\zion_pass.jpg',cv.IMREAD_COLOR)
assert f is not None

img = cv.cvtColor(f,cv.COLOR_BGR2RGB)

fig, ax = plt.subplots(figsize=(8,8))
plt.imshow(img)
plt.axis('off')
ax.set_title('Original')
plt.show()
```

In [ ]:
```
img_hsv = cv.cvtColor(f, cv.COLOR_BGR2HSV)
h,s,v = cv.split(img_hsv)
s2 = cv.add(s,60)
img_hsv_1 = cv.merge([h,s2,v])

img_rgb = cv.cvtColor(img_hsv_1, cv.COLOR_HSV2RGB)

fig, ax = plt.subplots(figsize=(8,8))
plt.imshow(img_rgb)
plt.axis('off')
ax.set_title('Staturation increased(+60)')
plt.show()
```

Staturation increased(+60)

In [ ]:
```
h2 = cv.add(h,-40)
img_hsv_2 = cv.merge([h2,s,v])

img_rgb = cv.cvtColor(img_hsv_2, cv.COLOR_HSV2RGB)

fig, ax = plt.subplots(figsize=(8,8))
plt.imshow(img_rgb)
plt.axis('off')
ax.set_title('Hue decreased(-40)')
plt.show()
```

Hue decreased(-40)