

190328V

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01)

```
In [25]: import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt

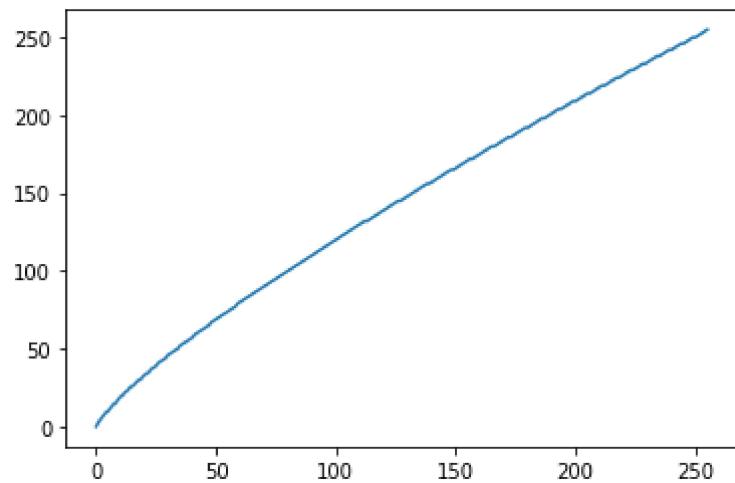
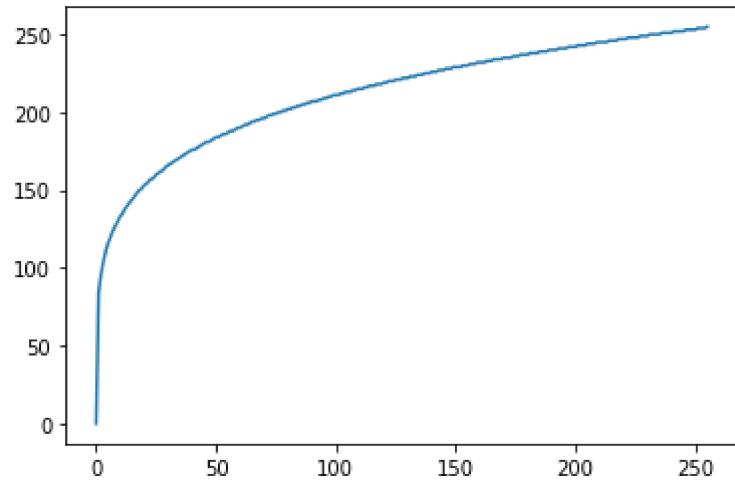
f = cv.imread(r'./Images/spider.png')
assert f is not None

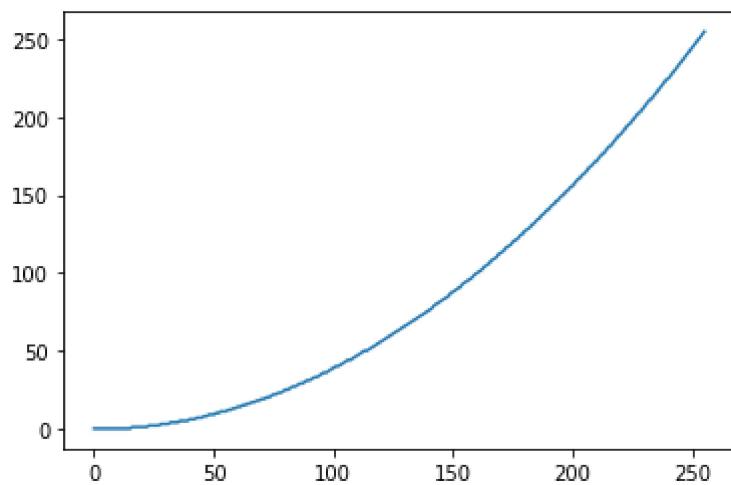
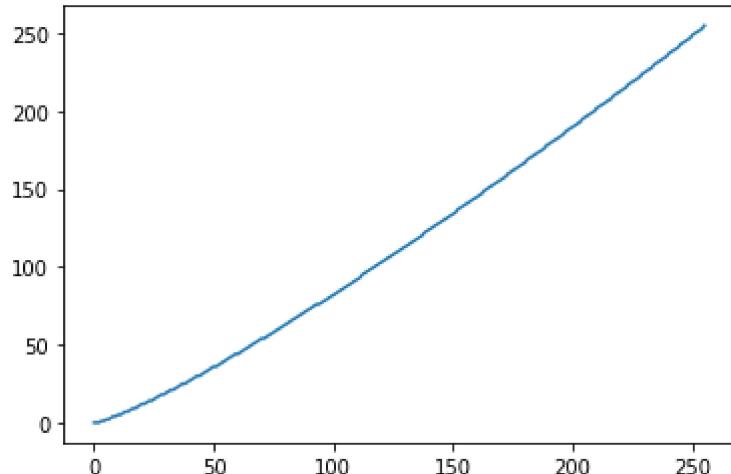
gamma = [0.2,0.8,1.2,2]

cv.namedWindow('Image',cv.WINDOW_AUTOSIZE)
for i in gamma:
    t = np.array([(p/255)**i*255 for p in range(0,256)]).astype(np.uint8)
    g = cv.LUT(f,t)
    fig, ax = plt.subplots()
    ax.plot(t)
    cv.imshow('Image',g)
    cv.waitKey(0)

cv.destroyAllWindows()

plt.show()
```





02)

```
In [26]: 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

t1 = np.linspace(0,50,100)
t2 = np.linspace(50,200,50)
t3 = np.linspace(200,255,106)

t = np.concatenate((t1,t2,t3),axis = 0).astype(np.uint8)
```

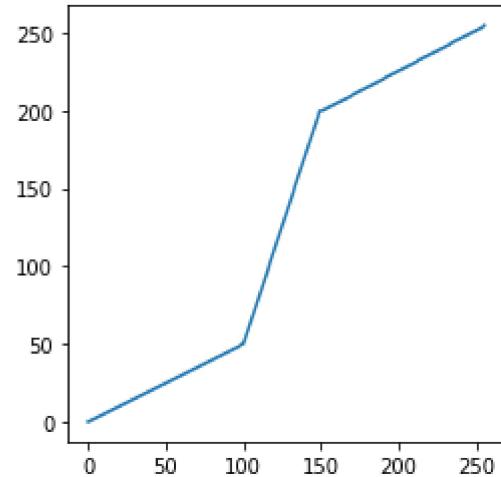
```

fig, ax = plt.subplots()
ax.plot(t)
ax.set_aspect('equal')

assert len(t) == 256
g = cv.LUT(f,t)

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

```



03) a). b). c).

In [10]:

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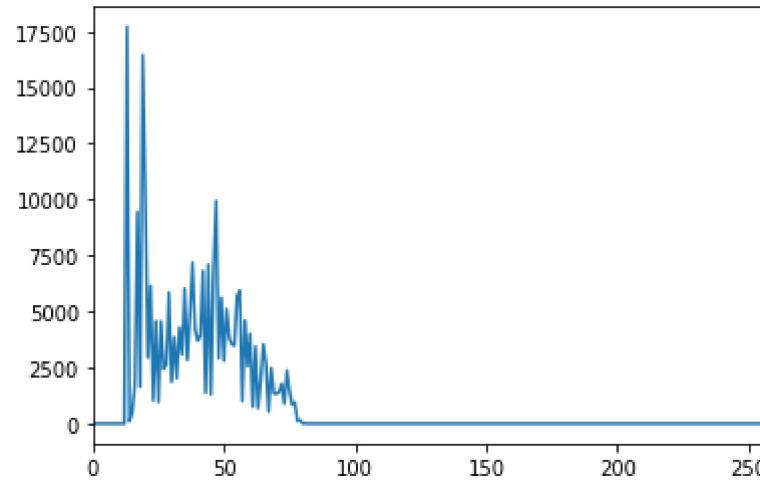
import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt

f = cv.imread(r'./Images/shells.tif',cv.IMREAD_GRAYSCALE)
assert f is not None

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

plt.plot(hist)
plt.xlim([0,256])
plt.show()

```



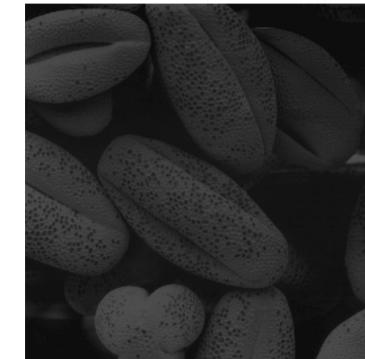
```
In [ ]: import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt

img = cv.imread(r'./Images/shells.tif',cv.IMREAD_GRAYSCALE)
assert img is not None

hist , bins = np.histogram(img.ravel(),256,[0,256])
cdf = hist.cumsum()
cdf_normalized = cdf* hist.max()/cdf.max()
plt.plot(cdf_normalized,color = 'b')
plt.hist(img.flatten(),256,[0,256],color ='r')
plt.xlim([0,256])
plt.legend(('cdf','histogram'),loc = 'upper left')
plt.title('Original Image')
plt.show()

equ = cv.equalizeHist(img)

hist , bins = np.histogram(equ.ravel(),256,[0,256])
cdf = hist.cumsum()
cdf_normalized = cdf* hist.max()/cdf.max()
plt.plot(cdf_normalized,color = 'b')
plt.hist(equ.flatten(),256,[0,256],color ='r')
plt.xlim([0,256])
plt.legend(('cdf','histogram'),loc = 'upper left')
plt.title('Equalized Image')
plt.show()
```



```
cv.namedWindow('Image',cv.WINDOW_AUTOSIZE)
cv.imshow('Image',img)
cv.waitKey(0)
cv.imshow('Image',equ)
cv.waitKey(0)
cv.destroyAllWindows()
```

4) a).

```
In [24]: import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt

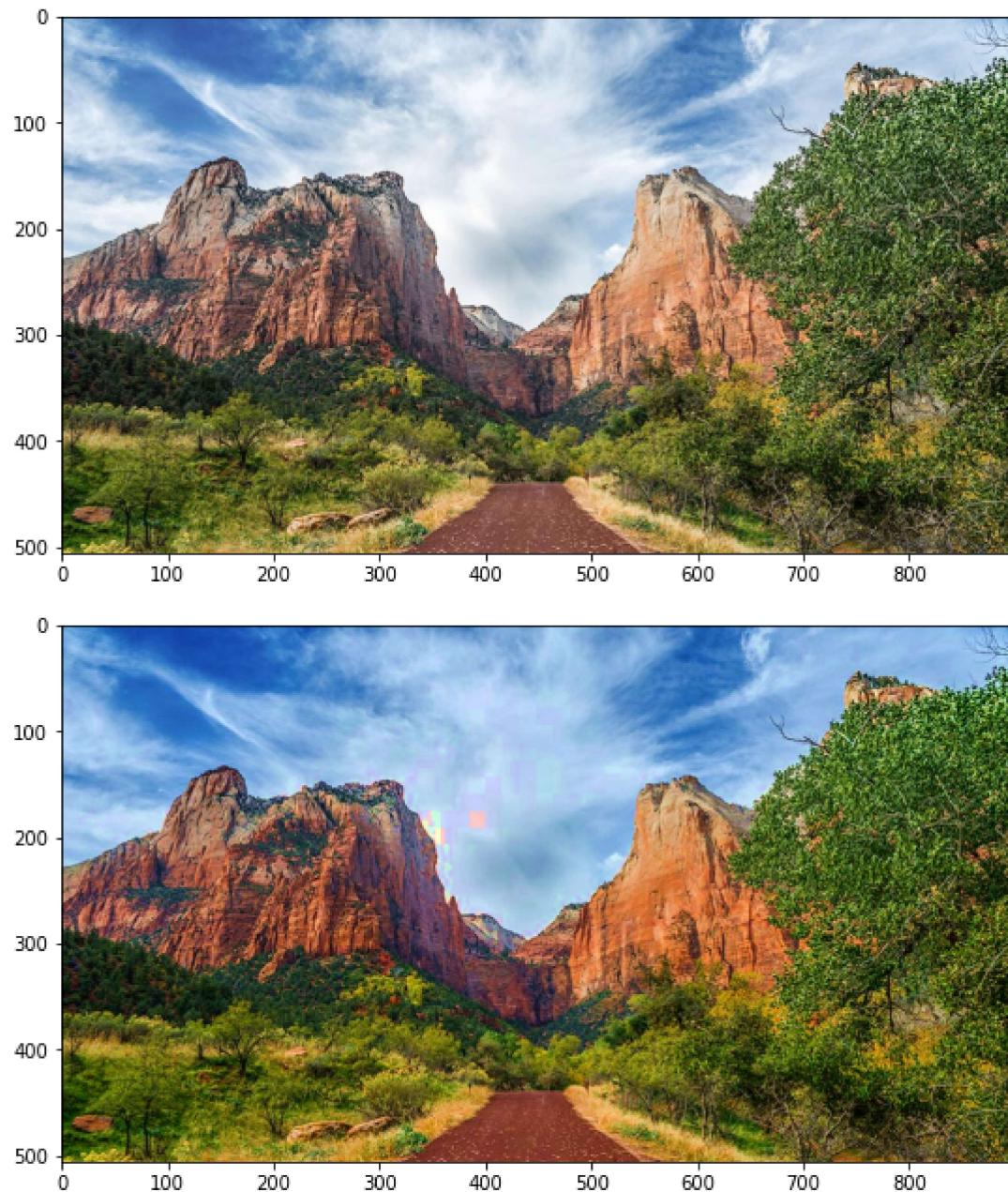
img = cv.imread(r'./Images/zion_pass.jpg',cv.IMREAD_COLOR)
img2 = cv.cvtColor(img,cv.COLOR_BGR2HSV)
v = 50
for R in img2:
    for C in R:
        p = C[1]
        if p+v<=255:
            C[1] = p+v
        else:
            C[1] = 255

img3 = cv.cvtColor(img2,cv.COLOR_HSV2BGR)
cv.namedWindow('Image',cv.WINDOW_AUTOSIZE)
cv.imshow('Image',img)
cv.waitKey(0)
cv.imshow('Image',img3)
cv.waitKey(0)
cv.destroyAllWindows()

plt.figure(figsize = (20,18))
plt.subplot(1,2,1)
imgplot = plt.imshow(cv.cvtColor(img,cv.COLOR_BGR2RGB))

plt.figure(figsize = (20,18))
plt.subplot(1,2,2)
imgplot = plt.imshow(cv.cvtColor(img3,cv.COLOR_BGR2RGB))

plt.show()
```



b).

In [27]:

```
import numpy as np
import cv2 as cv
```

```
import matplotlib.pyplot as plt

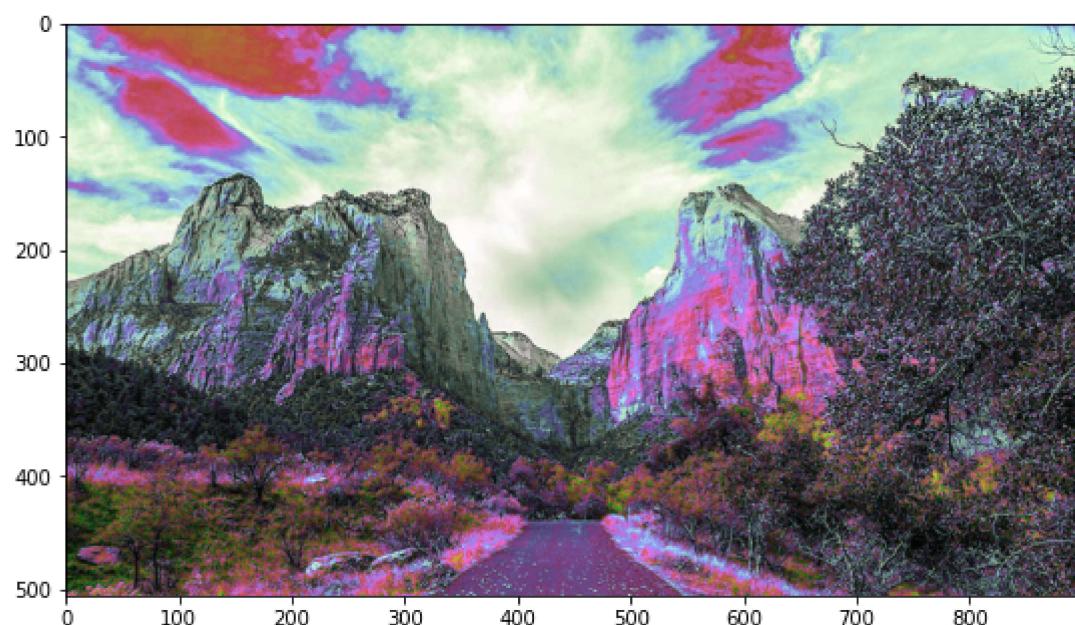
img = cv.imread(r'./Images/zion_pass.jpg',cv.IMREAD_COLOR)
img2 = cv.cvtColor(img,cv.COLOR_BGR2HSV)
v = 20
for R in img2:
    for C in R:
        p = C[1]
        if p+v<=255:
            C[0] = p+v
        else:
            C[0] = 255

img3 = cv.cvtColor(img2,cv.COLOR_HSV2BGR)
cv.namedWindow('Image',cv.WINDOW_AUTOSIZE)
cv.imshow('Image',img)
cv.waitKey(0)
cv.imshow('Image',img3)
cv.waitKey(0)
cv.destroyAllWindows()

plt.figure(figsize = (20,18))
plt.subplot(1,2,1)
imgplot = plt.imshow(cv.cvtColor(img,cv.COLOR_BGR2RGB))

plt.figure(figsize = (20,18))
plt.subplot(1,2,2)
imgplot = plt.imshow(cv.cvtColor(img3,cv.COLOR_BGR2RGB))

plt.show()
```



In []:

In []:

