Image Understanding and Processing (OpenCv-Python)

Lab Exercise – 04

Year 4 **Semester 1, 2024**

Goal

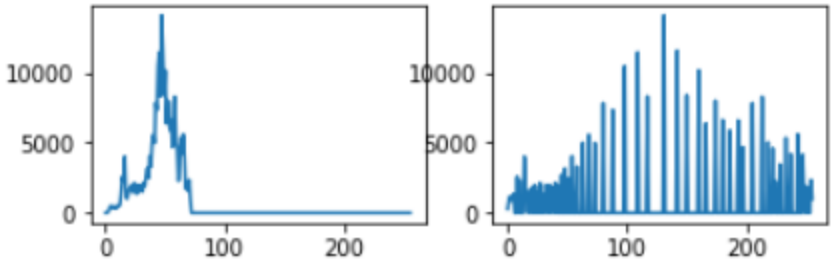
- Learn concepts on Histogram Equalization
- Apply Histogram Equalization to improve the contrast of images
- Apply Histogram Equalization to improve the contrast of color images

Hint: OpenCV has a function to do this, **cv2.equalizeHist()**

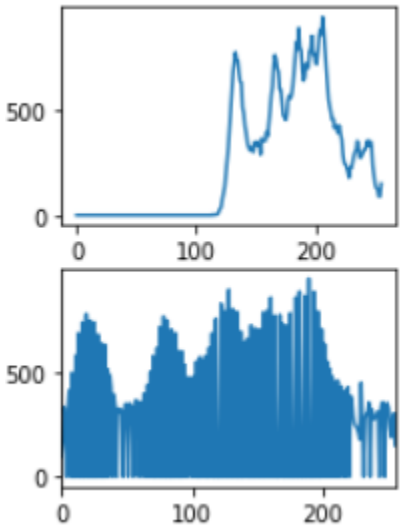
1. Histogram Equalization to improve the contrast of a dark image

```
import cv2
import numpy as np
import matplotlib.pyplot as plt
img = cv2.imread('F:/Python/darkImage.png',0)

hist1 = cv2.calcHist([img],[0],None,[256],[0,256])

#complete the code here
# creating a Histograms Equalization of a image using cv2.equalizeHist()

hist2 = cv2.calcHist([equlizedImg],[0],None,[256],[0,256])

#complete the code here to plot the two histograns, dark image and contrast adjusted

result = np.hstack((img, equlizedImg))
cv2.imshow('Result', result)

cv2.waitKey(0)
```

Compete the code to obtain the outputs

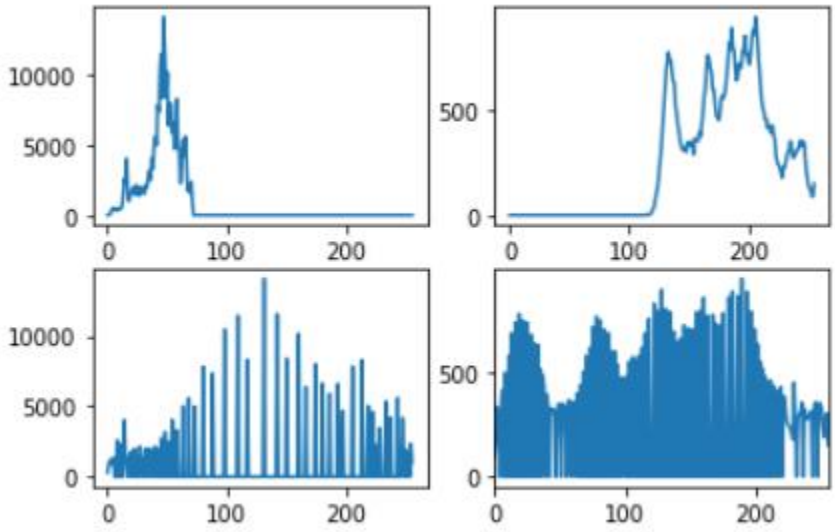


2. **Histogram Equalization to improve the contrast of a bright image**



Modify the above code to improve the contrast of a bright image. You may generate the histograms as listed above.

3. **Histogram Equalization to improve the contrast of a dark and bright image – obtain the outputs below**



4. **Color Histogram Equalization to improve the contrast of color image**

```
import cv2
import numpy as np
import matplotlib.pyplot as plt
image = cv2.imread('F:/Python/color.png',1)

# convert image from RGB to HSV
#complete the code here


# Histogram equalisation on the V-channel
img_hsv[:, :, 2] = cv2.equalizeHist(img_hsv[:, :, 2])

# convert image back from HSV to RGB
#complete the code here

#Plot the two histograns and display the two images
#complete the code here
```

Complete the code below to generate the histograms below