Code:

# %%

#LOAD IMAGE

from matplotlib import gridspec

from PIL import Image

import cv2

from matplotlib import pyplot as plt

from matplotlib.gridspec import GridSpec

import numpy as np

filepath = 'image1.jpg'

imageObj = cv2.imread(filepath)

plt.title("Original Image")

plt.imshow(cv2.cvtColor(imageObj, cv2.COLOR\_BGR2RGB))

plt.savefig('1.jpg')

plt.show()

# %%

#EROSION

#img=cv2.cvtColor(imageObj,cv2.COLOR\_BGR2RGB)

img=cv2.cvtColor(imageObj,cv2.COLOR\_RGB2GRAY)

val\_o,img\_bin=cv2.threshold(img,0,255,cv2.THRESH\_BINARY+cv2.THRESH\_OTSU)

blue\_color = cv2.calcHist([imageObj], [0], None, [256], [0, 256])

red\_color = cv2.calcHist([imageObj], [1], None, [256], [0, 256])

green\_color = cv2.calcHist([imageObj], [2], None, [256], [0, 256])

plt.title('Histogram')

plt.plot(blue\_color)

plt.plot(red\_color)

plt.plot(green\_color)

colors =('r','g','b')

plt.savefig('2.jpg')

plt.show()

kernel=np.ones((5,5),np.float32)

img\_eroded=cv2.erode(img\_bin,kernel,iterations=1)

plt.title('Eroded Color Image')

plt.imshow(img\_eroded)

plt.savefig('3.jpg')

plt.show()

hist\_grayscale = cv2.calcHist([img], [0], None, [256], [0,256])

hist\_otsu = cv2.calcHist([img\_bin], [0], None, [256], [0,256])

hist\_eroded = cv2.calcHist([img\_eroded], [0], None, [256], [0,256])

# %%

#EROSION PLOTTING

row=2

col=3

fig=plt.figure(figsize=(15,15))

gs=GridSpec(row,col)

fig.add\_subplot(gs[0,0])

plt.title('Original Grayscale Image')

plt.imshow(img,cmap='gray')

fig.add\_subplot(gs[0,1])

plt.title('OTSU Binarized Image')

plt.imshow(img\_bin,cmap='gray')

fig.add\_subplot(gs[0,2])

plt.title('Eroded Binarized Image with 5x5 Kernel')

plt.imshow(img\_eroded,cmap='gray')

fig.add\_subplot(gs[1,0])

plt.title('Histogram')

plt.plot(hist\_grayscale)

fig.add\_subplot(gs[1,1])

plt.title('Histogram')

plt.plot(hist\_otsu)

fig.add\_subplot(gs[1,2])

plt.title('Histogram')

plt.plot(hist\_eroded)

plt.savefig('4.jpg')

# %%

#DILATION

kernel=np.ones((5,5),np.float32)

img\_dilated=cv2.dilate(img\_bin,kernel,iterations=1)

plt.title('Dilated Color Image')

plt.imshow(img\_dilated)

plt.savefig('5.jpg')

plt.show()

hist\_dilated = cv2.calcHist([img\_dilated], [0], None, [256], [0,256])

# %%

#DILATION PLOTTING

row=2

col=3

fig=plt.figure(figsize=(15,15))

gs=GridSpec(row,col)

fig.add\_subplot(gs[0,0])

plt.title('Original Grayscale Image')

plt.imshow(img,cmap='gray')

fig.add\_subplot(gs[0,1])

plt.title('OTSU Binarized Image')

plt.imshow(img\_bin,cmap='gray')

fig.add\_subplot(gs[0,2])

plt.title('Dilated Binarized Image with 5x5 Kernel')

plt.imshow(img\_dilated,cmap='gray')

fig.add\_subplot(gs[1,0])

plt.title('Histogram')

plt.plot(hist\_grayscale)

fig.add\_subplot(gs[1,1])

plt.title('Histogram')

plt.plot(hist\_otsu)

fig.add\_subplot(gs[1,2])

plt.title('Histogram')

plt.plot(hist\_eroded)

plt.savefig('6.jpg')

# %%

#GRADIENT

kernel=np.ones((5,5),np.float32)

img\_gradient = cv2.morphologyEx(img\_bin, cv2.MORPH\_GRADIENT, kernel)

plt.title('Gradient Color Image')

plt.imshow(img\_gradient)

plt.savefig('7.jpg')

plt.show()

hist\_gradient = cv2.calcHist([img\_gradient], [0], None, [256], [0,256])

# %%

#GRADIENT PLOTTING

row=2

col=3

fig=plt.figure(figsize=(15,15))

gs=GridSpec(row,col)

fig.add\_subplot(gs[0,0])

plt.title('Original Grayscale Image')

plt.imshow(img,cmap='gray')

fig.add\_subplot(gs[0,1])

plt.title('OTSU Binarized Image')

plt.imshow(img\_bin,cmap='gray')

fig.add\_subplot(gs[0,2])

plt.title('Gradient Binarized Image with 5x5 Kernel')

plt.imshow(img\_gradient,cmap='gray')

fig.add\_subplot(gs[1,0])

plt.title('Histogram')

plt.plot(hist\_grayscale)

fig.add\_subplot(gs[1,1])

plt.title('Histogram')

plt.plot(hist\_otsu)

fig.add\_subplot(gs[1,2])

plt.title('Histogram')

plt.plot(hist\_gradient)

plt.savefig('8.jpg')

Output:















