MACHINE VISION LAB 7 AND LAB 8

COLAB NOTEBOOK LINK:

[https://colab.research.google.com/drive/1KLBZ139Cd7m0XIt4JCfKxF__rQf9TCfj?usp=sharing]

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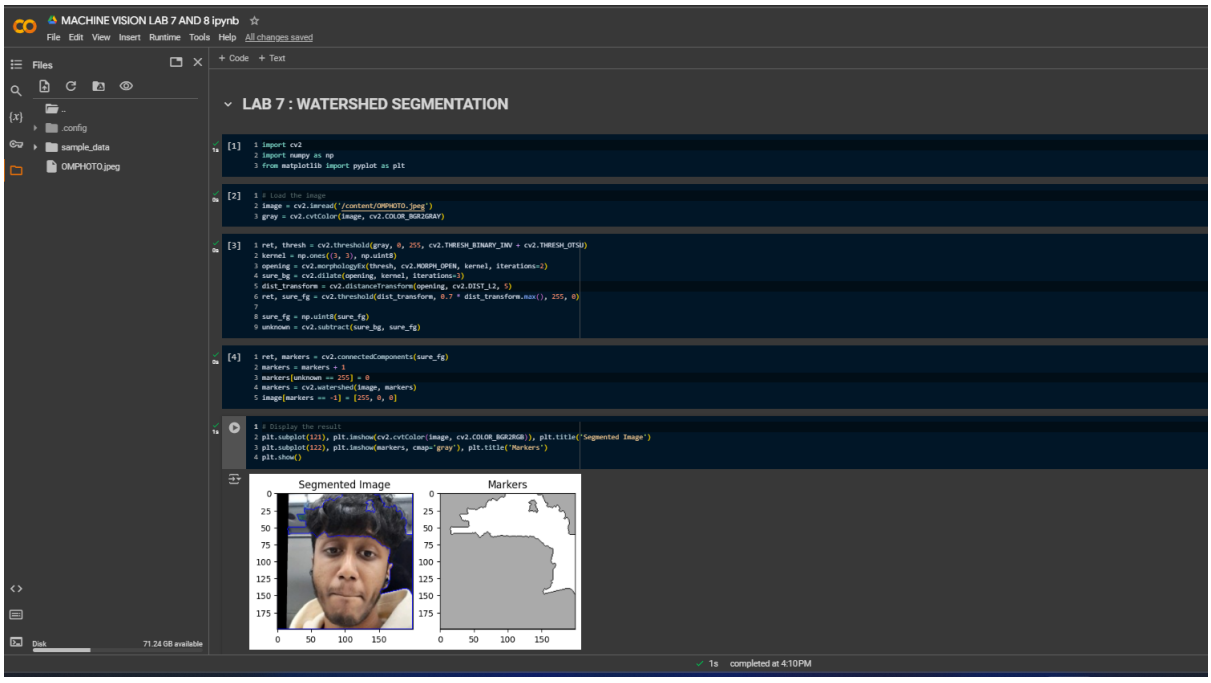
LAB 7: WATERSHED SEGMENTATION

CODE:

```
import cv2

import numpy as np

from matplotlib import pyplot as plt


# Load the image

image = cv2.imread('/content/OMPHOTO.jpeg')

gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)


ret, thresh = cv2.threshold(gray, 0, 255, cv2.THRESH_BINARY_INV +
cv2.THRESH_OTSU)

kernel = np.ones((3, 3), np.uint8)

opening = cv2.morphologyEx(thresh, cv2.MORPH_OPEN, kernel, iterations=2)

sure_bg = cv2.dilate(opening, kernel, iterations=3)

dist_transform = cv2.distanceTransform(opening, cv2.DIST_L2, 5)

ret, sure_fg = cv2.threshold(dist_transform, 0.7 * dist_transform.max(), 255,
0)


sure_fg = np.uint8(sure_fg)

unknown = cv2.subtract(sure_bg, sure_fg)


ret, markers = cv2.connectedComponents(sure_fg)

markers = markers + 1

markers[unknown == 255] = 0

markers = cv2.watershed(image, markers)

image[markers == -1] = [255, 0, 0]


# Display the result

plt.subplot(121), plt.imshow(cv2.cvtColor(image, cv2.COLOR_BGR2RGB)),
plt.title('Segmented Image')

plt.subplot(122), plt.imshow(markers, cmap='gray'), plt.title('Markers')

plt.show()
```

OUTPUT:


MACHINE VISION LAB 7 AND 8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Files
.config
sample_data
OMPHOTO.jpeg
Disk 71.24 GB available
+ Code + Text
LAB 7 : WATERSHED SEGMENTATION
[1] 1 import cv2
2 import numpy as np
3 from matplotlib import pyplot as plt
[2] 1 # Load the image
2 image = cv2.imread('/content/OMPHOTO.jpeg')
3 gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
[3] 1 ret, thresh = cv2.threshold(gray, 0, 255, cv2.THRESH_BINARY_INV + cv2.THRESH_OTSU)
2 kernel = np.ones((3, 3), np.uint8)
3 opening = cv2.morphologyEx(thresh, cv2.MORPH_OPEN, kernel, iterations=2)
4 sure_bg = cv2.dilate(opening, kernel, iterations=3)
5 dist_transform = cv2.distanceTransform(opening, cv2.DIST_L2, 5)
6 ret, sure_fg = cv2.threshold(dist_transform, 0.7 * dist_transform.max(), 255, 0)
7
8 sure_fg = np.uint8(sure_fg)
9 unknown = cv2.subtract(sure_bg, sure_fg)
[4] 1 ret, markers = cv2.connectedComponents(sure_fg)
2 markers = markers + 1
3 markers[unknown == 255] = 0
4 markers = cv2.watershed(image, markers)
5 image[markers == -1] = [255, 0, 0]
1 # Display the result
2 plt.subplot(121), plt.imshow(cv2.cvtColor(image, cv2.COLOR_BGR2RGB)), plt.title('Segmented Image')
3 plt.subplot(122), plt.imshow(markers, cmap='gray'), plt.title('Markers')
4 plt.show()
Segmented Image
Markers
1s completed at 4:10PM

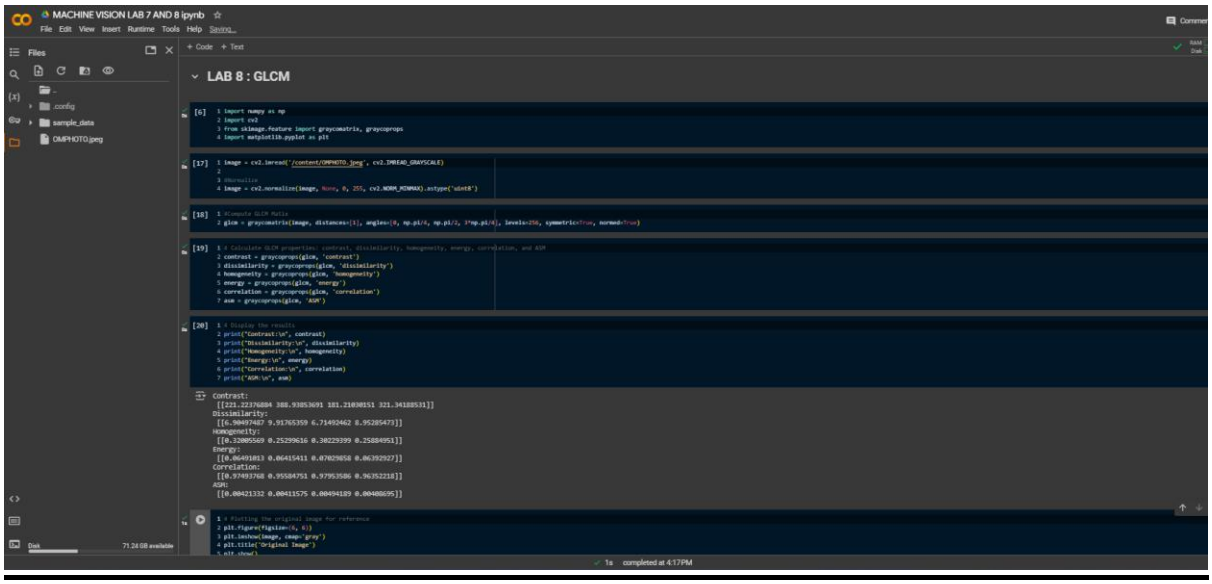
LAB 8: GLCM (Gray Level Co-occurrence Matrix)

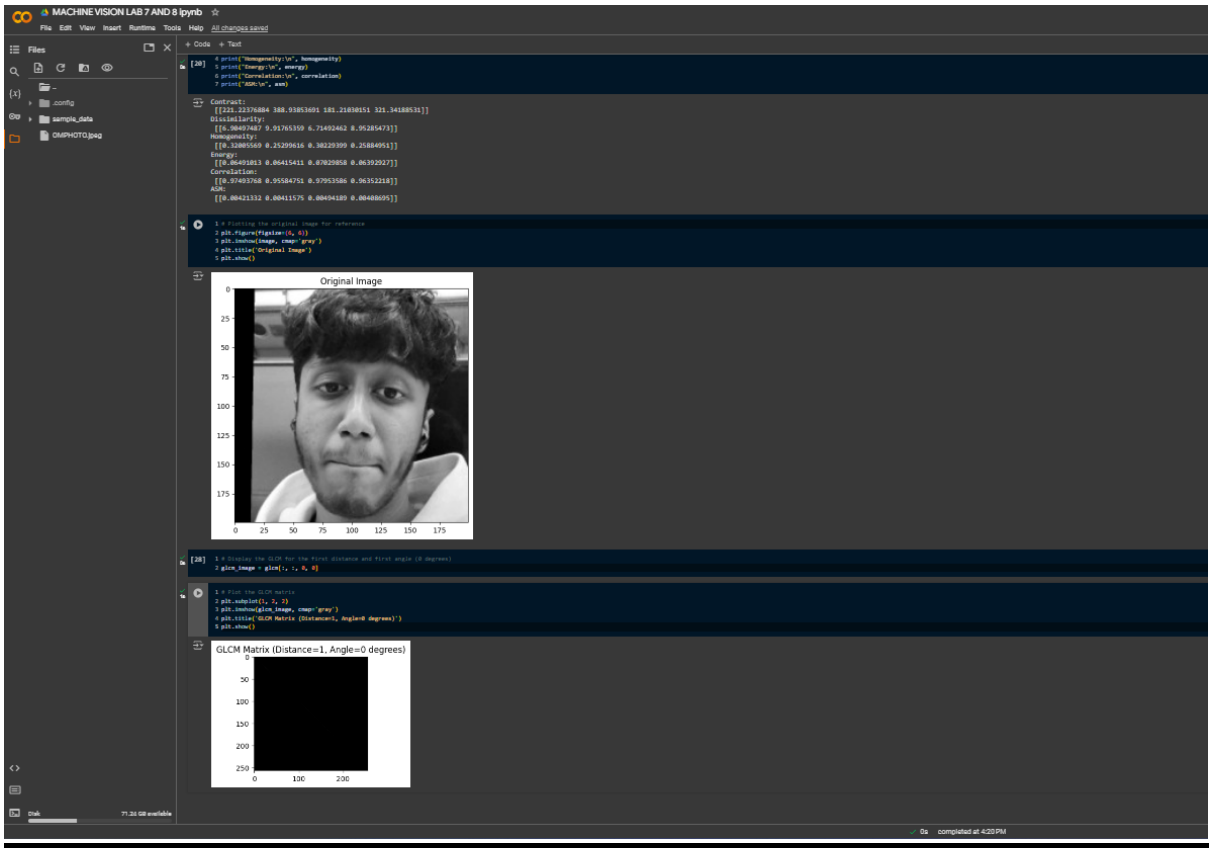
CODE:

```
import numpy as np

import cv2

from skimage.feature import graycomatrix, graycoprops

import matplotlib.pyplot as plt


image = cv2.imread('/content/OMPHOTO.jpeg', cv2.IMREAD_GRAYSCALE)


#Normalize

image = cv2.normalize(image, None, 0, 255, cv2.NORM_MINMAX).astype('uint8')


#Compute GLCM Matix

glcm = graycomatrix(image, distances=[1], angles=[0, np.pi/4, np.pi/2,
3*np.pi/4], levels=256, symmetric=True, normed=True)


# Calculate GLCM properties: contrast, dissimilarity, homogeneity, energy,
correlation, and ASM

contrast = graycoprops(glcm, 'contrast')

dissimilarity = graycoprops(glcm, 'dissimilarity')

homogeneity = graycoprops(glcm, 'homogeneity')

energy = graycoprops(glcm, 'energy')

correlation = graycoprops(glcm, 'correlation')

asm = graycoprops(glcm, 'ASM')


# Display the results

print("Contrast:\n", contrast)

print("Dissimilarity:\n", dissimilarity)

print("Homogeneity:\n", homogeneity)

print("Energy:\n", energy)

print("Correlation:\n", correlation)

print("ASM:\n", asm)
```

```
# Plotting the original image for reference
plt.figure(figsize=(6, 6))
plt.imshow(image, cmap='gray')
plt.title('Original Image')
plt.show()

# Display the GLCM for the first distance and first angle (0 degrees)
glcm_image = glcm[:, :, 0, 0]

# Plot the GLCM matrix
plt.subplot(1, 2, 2)
plt.imshow(glcm_image, cmap='gray')
plt.title('GLCM Matrix (Distance=1, Angle=0 degrees)')
plt.show()
```

OUTPUT:


MACHINE VISION LAB 7 AND 8.ipynb
LAB 8 : GLCM
Contrast:
[[221.22376884 388.93053691 181.21030151 321.34188531]]
Dissimilarity:
[[6.90497487 9.91765359 6.71492462 8.95285473]]
Homogeneity:
[[0.32005569 0.25299616 0.38229399 0.25884951]]
Energy:
[[0.06491813 0.06415411 0.07029858 0.06392927]]
Correlation:
[[0.97493768 0.95584751 0.97953586 0.96352218]]
ASM:
[[0.00421332 0.00411575 0.00494189 0.00408695]]


MACHINE VISION LAB 7 AND 8.ipynb
Original Image
GLCM Matrix (Distance=1, Angle=0 degrees)