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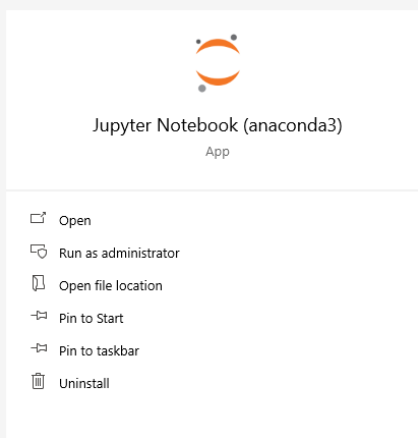
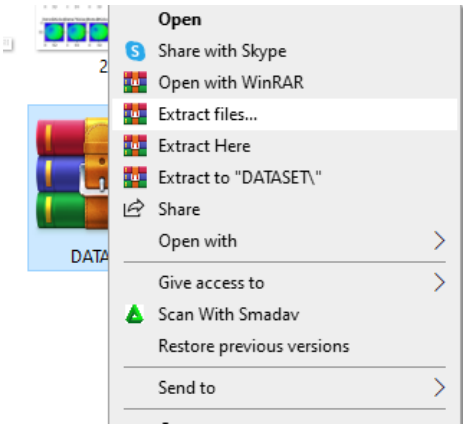
Kelas : B

TUTORIAL MENJALANKAN PROGRAM PROJECT
UAS PENGOLAHAN CITRA DIGITAL

1. Pertama, buka aplikasi Jupyter



2. Extract file dataset yang dipakai



3. Mengimport library-library yang dibutuhkan

```
[ ]  import numpy as np
     import cv2 as cv
     import matplotlib.pyplot as plt
     from sklearn.neighbors import KNeighborsClassifier
     from sklearn.model_selection import train_test_split
```

4. Membuat fungsi HSV

```
#membuat fungsi hsv
def hsv(y, z):
    return cv.cvtColor(cv.imread('KELAS'+str(z)+'/'+str(y)+'.jpg'), cv.COLOR_BGR2HSV)
```

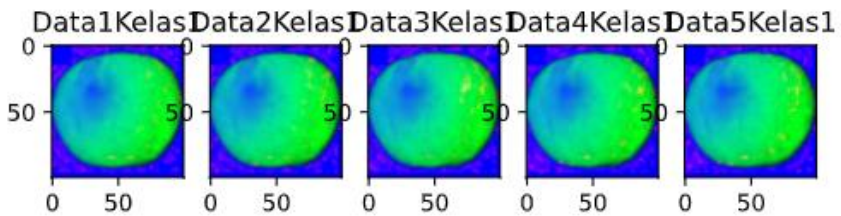
5. Membaca data tiap kelas dan dimasukkan ke list kelas

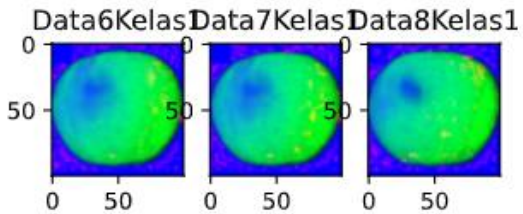
```
#membaca data tiap kelas dan dimasukkan ke list kelas
kelas1=list()
kelas2=list()
kelas3=list()
kelas4=list()
kelas5=list()

for i in range(1,33):
    kelas1.insert(i, hsv(i,1))
    kelas2.insert(i, hsv(i,2))
    kelas3.insert(i, hsv(i,3))
    kelas4.insert(i, hsv(i,4))
    kelas5.insert(i, hsv(i,5))
```

6. Setelah data tiap kelas dibaca dan dimasukkan ke list kemudian menampilkan HSV kelas

```
#Menampilkan HSV Kelas 1
for i in range(8):
     plt.subplot(2, 5, i+1)
     plt.title('Data' + str(i+1) + 'Kelas1')
     plt.imshow(kelas1[i])
plt.show()
```

Hasil HSV kelas 1





7. Membuat histogram

```
#Membuat histogram
hist1=list()
hist2=list()
hist3=list()
hist4=list()
hist5=list()


for i in range(32):
    hist_1, bins = np.histogram(kelas1[i].ravel(), 256, [0,256])
    hist1.append(hist_1)

    hist_2, bins = np.histogram(kelas2[i].ravel(), 256, [0,256])
    hist2.append(hist_2)

    hist_3, bins = np.histogram(kelas3[i].ravel(), 256, [0,256])
    hist3.append(hist_3)

    hist_4, bins = np.histogram(kelas4[i].ravel(), 256, [0,256])
    hist4.append(hist_4)

    hist_5, bins = np.histogram(kelas5[i].ravel(), 256, [0,256])
    hist5.append(hist_5)
```

8. Setelah histogram dibuat, kemudian mengubah vector ke matriks dan lakukan transpose matriks

```
[ ] #Mengubah vektor ke matriks dan lakukan transpose matriks
    trans1=list()
    trans2=list()
    trans3=list()
    trans4=list()
    trans5=list()

    for i in range (32):
        trans_1=np.transpose(hist1[i][0:18,np.newaxis])
        trans1.append(trans_1)

        trans_2=np.transpose(hist2[i][0:18,np.newaxis])
        trans2.append(trans_2)

        trans_3=np.transpose(hist3[i][0:18,np.newaxis])
        trans3.append(trans_3)

        trans_4=np.transpose(hist4[i][0:18,np.newaxis])
        trans4.append(trans_4)

        trans_5=np.transpose(hist5[i][0:18,np.newaxis])
        trans5.append(trans_5)
```

9. Menggabungkan data citra menjadi satu matriks data

```
[ ]  #gabungkan data citra menjadi satu matriks data
     Data = np.concatenate((trans1[0],trans1[1],trans1[2],trans1[3],trans1[4],trans1[5],trans1[6],trans1[7],trans1[8],trans1[9],
                            trans1[10],trans1[11],trans1[12],trans1[13],trans1[14],trans1[15],trans1[16],trans1[17],trans1[18],
                            trans1[19],trans1[20],trans1[21],trans1[22],trans1[23],trans1[24],trans1[25],trans1[26],trans1[27],
                            trans1[28],trans1[29],trans1[30],trans1[31],trans2[0],trans2[1],trans2[2],trans2[3],trans2[4],trans2[5],
                            trans2[6],trans2[7],trans2[8],trans2[9],trans2[10],trans2[11],trans2[12],trans2[13],trans2[14],trans2[15],
                            trans2[16],trans2[17],trans2[18],trans2[19],trans2[20],trans2[21],trans2[22],trans2[23],trans2[24],trans2[25],
                            trans2[26],trans2[27],trans2[28],trans2[29],trans2[30],trans2[31],trans3[0],trans3[1],trans3[2],trans3[3],
                            trans3[4],trans3[5],trans3[6],trans3[7],trans3[8],trans3[9],trans3[10],trans3[11],trans3[12],trans3[13],
                            trans3[14],trans3[15],trans3[16],trans3[17],trans3[18],trans3[19],trans3[20],trans3[21],trans3[22],trans3[23],
                            trans3[24],trans3[25],trans3[26],trans3[27],trans3[28],trans3[29],trans3[30],trans3[31],trans4[0],trans4[1],
                            trans4[2],trans4[3],trans4[4],trans4[5],trans4[6],trans4[7],trans4[8],trans4[9],trans4[10],trans4[11],trans4[12],
                            trans4[13],trans4[14],trans4[15],trans4[16],trans4[17],trans4[18],trans4[19],trans4[20],trans4[21],trans4[22],
                            trans4[23],trans4[24],trans4[25],trans4[26],trans4[27],trans4[28],trans4[29],trans4[30],trans4[31],trans5[0],
                            trans5[1],trans5[2],trans5[3],trans5[4],trans5[5],trans5[6],trans5[7],trans5[8],trans5[9],trans5[10],trans5[11],
                            trans5[12],trans5[13],trans5[14],trans5[15],trans5[16],trans5[17],trans5[18],trans5[19],trans5[20],trans5[21],
                            trans5[22],trans5[23],trans5[24],trans5[25],trans5[26],trans5[27],trans5[28],trans5[29],
                            trans5[30],trans5[31]), axis=0).astype(np.float32)
```

10. Membuat responses kelas

```
#membuat responses kelas
responses = np.array([1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
                      2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,
                      3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,
                      4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,
                      5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5]).astype(np.float32)
```

Setelah responses kelas terbuat, lakukan split data dengan membagi data menjadi data Train dan data Test.

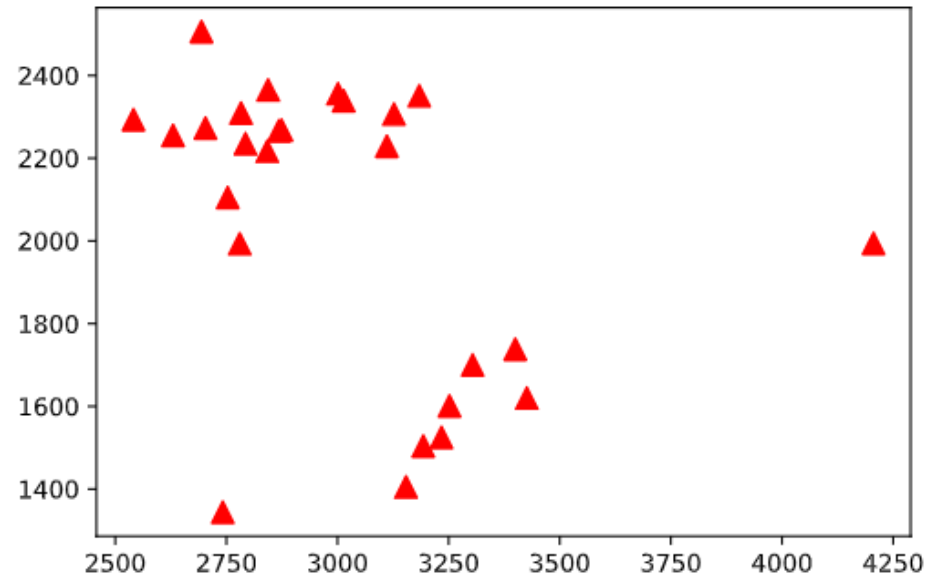
```
[ ]  # Split Data (Train dan Test)
     x_train, x_test, y_train, y_test,= train_test_split(
         Data, responses, test_size=0.2, random_state=5)
```

11. Membuat digram scatter kelas 1

```
[ ]  # Scatter Kelas 1 (Visualisasi)
     red = x_train[y_train.ravel() == 1]
     plt.scatter(red[:, 0], red[:, 1], 80, 'red', '^')
```

Hasil diagram scatter kelas 1

```
<matplotlib.collections.PathCollection at 0x1e3004c4d60>
```



12. Lakukan inisialisasi KNN, dimana K = 3

```
# Inisialisasi KNN (K = 3)
knn = KNeighborsClassifier(n_neighbors=3)
knn.fit(x_train, y_train)  # Melatih Data (Train)
res = knn.predict(x_test)  # Prediksi Data Test
```

Hasil klasifikasi KNN

```
[ ] # Hasil Klasifikasi
    print("Hasil Klasifikasi Data Testing (KNN) = ", res)  # Hasil Klasifikasi Untuk Data Testing
    print("Kelas yang seharusnya benar (KNN)    = ", y_test)
```

```
Hasil Klasifikasi Data Testing (KNN) =  [1. 3. 3. 5. 5. 2. 1. 5. 1. 1. 4. 2. 2. 2. 4. 2. 5. 3. 3. 2. 2. 3. 2. 2.
 2. 5. 1. 3. 1. 5. 5. 2.]
Kelas yang seharusnya benar (KNN)    =  [1. 3. 3. 5. 5. 2. 1. 5. 1. 1. 4. 2. 2. 4. 4. 2. 5. 3. 3. 2. 2. 3. 2. 2.
 2. 5. 1. 3. 1. 5. 5. 4.]
```

Setelah itu menampilkan akurasi dari hasil klasifikasi. Akurasi yang didapat dari hasil klasifikasi KNN adalah 93.75%

```
[ ] #Menampilkan akurasi dari hasil Klasifikasi
    from sklearn.metrics import accuracy_score
    print('Akurasi data KNN : ', float(accuracy_score(y_test,res))*100, "%")
```

```
Akurasi data KNN :  93.75 %
```

13. Menampilkan confussion matrix

```
[ ]  #Confusion Matrix
     from sklearn.metrics import confusion_matrix
     import seaborn as sns

     cm = confusion_matrix(res,y_test)
     sns.heatmap(cm,annot=True)
     plt.show()
```

Hasil confussion matrix