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import os
import numpy as np
import pandas as pd
import cv2
import matplotlib.pyplot as plt
%matplotlib inline

dataset_dir = 'drive/Plant Classification Using C-CNN/dataset' #Change Directory here for dat

SPECIES = ['Black-grass', 'Charlock', 'Cleavers', 'Common Chickweed', 'Common wheat', 'Fat Hen',
           'Loose Silky-bent', 'Maize', 'Scentless Mayweed', 'Shepherds Purse',
           'Small-flowered Cranesbill', 'Sugar beet']

for species in SPECIES:
    print('{} {} images'.format(species, len(os.listdir(os.path.join(dataset_dir, species)))))

↳ Black-grass 310 images
   Charlock 452 images
   Cleavers 335 images
   Common Chickweed 713 images
   Common wheat 253 images
   Fat Hen 538 images
   Loose Silky-bent 766 images
   Maize 257 images
   Scentless Mayweed 607 images
   Shepherds Purse 274 images
   Small-flowered Cranesbill 586 images
   Sugar beet 463 images

train = []

for spec_num, species in enumerate(SPECIES):
    for file in os.listdir(os.path.join(dataset_dir, species)):
        train.append(['drive/Plant Classification Using C-CNN/dataset/{}/{}'.format(species, f

train = pd.DataFrame(train, columns=['file', 'spec_num', 'species'])

print('Training Data: ',train.shape)

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↳ Training Data: (5554, 3)

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print(train.head())
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↳

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|   | file  | spec_num | species     |
|---|---|----------|-------------|
| 0 | drive/Plant Classification Using C-CNN/dataset... | 0        | Black-grass |
| 1 | drive/Plant Classification Using C-CNN/dataset... | 0        | Black-grass |
| 2 | drive/Plant Classification Using C-CNN/dataset... | 0        | Black-grass |
| 3 | drive/Plant Classification Using C-CNN/dataset... | 0        | Black-grass |
| 4 | drive/Plant Classification Using C-CNN/dataset... | 0        | Black-grass |

```

def Masking(image):
    hsv_image = cv2.cvtColor(image, cv2.COLOR_BGR2HSV)

    sensitivity = 35
    lower= np.array([60 - sensitivity, 100, 50])
    upper= np.array([60 + sensitivity, 255, 255])

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mask = cv2.inRange(hsv_image, lower, upper)
Morph = cv2.getStructuringElement(cv2.MORPH_ELLIPSE, (11,11))
mask = cv2.morphologyEx(mask, cv2.MORPH_CLOSE, Morph)

return mask

def Segmenting(img):
    mask = Masking(img)
    segmented = cv2.bitwise_and(img, img, mask = mask)
    return segmented

def Sharpening(img):
    img_blur = cv2.GaussianBlur(img, (0, 0), 3)
    sharp = cv2.addWeighted(img, 1.5, img_blur, -0.5, 0)
    return sharp

%%time

x_train = []

for i in range(len(train)):
    img = cv2.imread(train['file'][i])
    img = cv2.resize(img,dsize=(256,256))
    img_seg = Segmenting(img)
    img_sharp = Sharpening(img_seg)
    img_rgb = cv2.cvtColor( img_sharp, cv2.COLOR_RGB2GRAY )
    img_grey = np.reshape(img_rgb,(256,256,1))
    x_train.append(np.concatenate((np.array(img),np.array(img_grey)),axis=2))
    if ((i % 500) == 0):
        print(i,' images has been processed.')

x_train = np.array(x_train)

↳ 0 images has been processed.
500 images has been processed.
1000 images has been processed.
1500 images has been processed.
2000 images has been processed.
2500 images has been processed.
3000 images has been processed.
3500 images has been processed.
4000 images has been processed.
4500 images has been processed.
5000 images has been processed.
5500 images has been processed.
CPU times: user 1min, sys: 4.18 s, total: 1min 4s
Wall time: 44min 50s

from scipy.io import savemat
data = {}
data["train"] = x_train
savemat("drive/Plant Classification Using C-CNN/train/Image_Processed_data.mat", data) #Change

from keras.utils.np_utils import to_categorical
labels = train['spec_num']
labels = to_categorical(labels, num_classes = len(SPECIES))

↳ Using TensorFlow backend.

%%time
from scipy.io import savemat
data = {}
data["train"] = x_train

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data["train_labels"] = labels  
savemat("drive/Plant Classification Using C-CNN/train/Image_Processed_1data.mat", data)#Change
```

☞ CPU times: user 1min 11s, sys: 664 ms, total: 1min 12s  
Wall time: 4min 24s