

```
#import random
#import cv2
#from keras.preprocessing import image
#import scipy.misc as sm
#from keras.utils import to_categorical
from keras.models import Model
from keras.layers import Dense, GlobalAveragePooling2D
from keras.optimizers import SGD#, Adam

from keras.applications.resnet50 import ResNet50
from keras.preprocessing.image import ImageDataGenerator
#import numpy as np
#import os
#from matplotlib import pyplot
#from sklearn.preprocessing import LabelEncoder
# from keras.preprocessing.image import flow_from_directory
#from keras.preprocessing.image import img_to_array
#from sklearn.preprocessing import LabelBinarizer
#from sklearn.model_selection import train_test_split
#import matplotlib.pyplot as plt
#from imutils import paths
#import scipy.misc as sm
#from keras.models import model_from_json

data = ['C:/Users/ankur/.spyder-py3/autosave/data']
labels = []
IMAGE_DIMS = (224,224,3)

print("1")
```

```

"""count=0
ls1=os.listdir('color1')
dic1={}
for idx,i in enumerate(ls1):
    dic1[i]=idx
    ls2=os.listdir('color1/'+i)
    for j in ls2:
        #im1=np.asarray(sm.imread('color/'+i+'/'+j))
        #temp=np.zeros((len(im1),len(im1[0]),len(im1[0][0])) )
        count=count+1
print(count)
print(dic1)
X=np.zeros((count,224,224,3))
Y=np.zeros((count,1))
vap=0
for idx,i in enumerate(ls1):
    dic1[i]=idx
    ls2=os.listdir('color1/'+i)
    for j in ls2:
        img = image.load_img('color1/'+i+'/'+j, target_size=(224, 224))
        #im1=np.asarray(sm.imread('color1/'+i+'/'+j))
        img = image.img_to_array(img)
        print(img[0])
        print(img.shape)
        #X[vap,:,:,:]=im1
        #Y[vap,0]=idx
        vap=vap+1

```

```

"""

# imagePaths = sorted(list(paths.list_images("color")))

# i=0

# print("2")

# for imagePath in imagePaths:

    # load the image, pre-process it, and store it in the data list

    # img = image.load_img(imagePath,target_size=(224,224))

    # img = img_to_array(img)

    # data.append(img)

    # """im0=np.asarray(image)

    # data[i,:,:,:]=im0"""

    # extract set of class labels from the image path and update the

    # labels list

    # l = label = imagePath.split(os.path.sep)[-2]

    # labels.append(l)

# print("3")

# data = np.array(data, dtype="float") / 255.0

# ltb=labels = np.array(labels)

# print(labels[16])

# lb = LabelBinarizer()

# labels = lb.fit_transform(labels)

"""

train_labels = os.listdir("color")

le = LabelEncoder()

```

```

le.fit([tl for tl in train_labels])

le = LabelEncoder()

le_labels = le.fit_transform(ltb)
"""

# (trainX, testX, trainY, testY) = train_test_split(data,
# labels, test_size=0.3, random_state=42)

# print("4")

# print(trainX.shape)
"""

ind_train = random.sample(list(range(trainX.shape[0])), 20)

trainX = trainX[ind_train]

trainY = trainY[ind_train]

# test data

ind_test = random.sample(list(range(testX.shape[0])), 5)

testX = testX[ind_test]

testY = testY[ind_test]

def resize_data(data):

    data_upscaled = np.zeros((data.shape[0], 320, 320, 3))

    for i, img in enumerate(data):

        large_img = cv2.resize(img, dsize=(320, 320), interpolation=cv2.INTER_CUBIC)

        data_upscaled[i] = large_img

    return data_upscaled

# resize train and test data

x_train_resized = resize_data(trainX)

x_test_resized = resize_data(testX)

"""

# y_train_hot_encoded = to_categorical(trainY)

```

```
# y_test_hot_encoded = to_categorical(testY)

"""for i in range(0,len(trainY)):

    print(y_train_hot_encoded[i])
    print("\n")
"""

aug = ImageDataGenerator(rotation_range=25, width_shift_range=0.1,
                         height_shift_range=0.1, shear_range=0.2, zoom_range=0.2,
                         horizontal_flip=True, fill_mode="nearest")

train_generator=aug.flow_from_directory(
[10:35, 11/8/2022] Irin: directory=r"C:/Users/ankur/.spyder-py3/autosave/data/train",
                         target_size=(224,224),
                         color_mode="rgb",
                         batch_size=64,
                         class_mode="categorical",
                         shuffle=True,
                         seed=None
)

valid_generator=aug.flow_from_directory(
                         directory=r"C:/Users/ankur/.spyder-py3/autosave/data/test",
                         target_size=(224,224),
                         color_mode="rgb",
                         batch_size=64,
                         class_mode="categorical",
```

```
shuffle=True,  
seed=None  
)  
  
def model(base_model):  
  
    print("5")  
  
    # get layers and add average pooling layer  
  
    x = base_model.output  
  
    x = GlobalAveragePooling2D()(x)  
  
    # add fully-connected layer  
  
    x = Dense(512, activation='relu')(x)  
  
    # add output layer  
  
    predictions = Dense(7, activation='softmax')(x)  
  
model = Model(inputs=base_model.input, outputs=predictions)  
  
# fname = "weights.hdf5"  
  
# model.load_weights(fname)  
  
# freeze pre-trained model area's layer  
  
for layer in base_model.layers:  
    layer.trainable = False
```

```

# update the weight that are added

# model.compile(optimizer='rmsprop', loss='categorical_crossentropy')

# model.fit(x_train, y_train, epochs=4)

# choose the layers which are updated by training

layer_num = len(model.layers)

print(layer_num, " number of layers")

for layer in model.layers[:int(layer_num * 0.7)]:

    layer.trainable = False

for layer in model.layers[int(layer_num * 0.7):]:

    layer.trainable = True

# update the weights

model.compile(optimizer=SGD(lr=1e-4, decay=1e-6, momentum=0.9),
loss='categorical_crossentropy', metrics=['accuracy'])

"""history = model.fit_generator(
    aug.flow(x_train, y_train, ),
    validation_data=(testX, testY),
    steps_per_epoch=len(trainX),
    epochs=5, verbose=1)"""

STEP_SIZE_TRAIN=train_generator.n//train_generator.batch_size
STEP_SIZE_VALID=valid_generator.n//valid_generator.batch_size
history=model.fit_generator(generator=train_generator,
                             steps_per_epoch=STEP_SIZE_TRAIN,
                             validation_data=valid_generator,
                             validation_steps=STEP_SIZE_VALID,
                             # use_multiprocessing=True,
                             # workers=3,

```

```

        # verbose=2,
        epochs=100
    )

# print(model.evaluate_generator(generator=valid_generator))

model_json = model.to_json()

with open("C:/Users/ankur/.spyder-py3/autosave/model.json", "w") as json_file:
    json_file.write(model_json)

# serialize weights to HDF5

model.save_weights("model.h5")

print("Saved model to disk")

fname="C:/Users/ankur/.spyder-py3/autosave/weights1.hdf5"

model.save_weights(fname,overwrite=True)

# prediction

#img =
image.load_img(r'C:\Users\WASD\Desktop\hoga\color\Pepper,bell__Bacterial_spot\29.jpg',target_size=
(224,224))

#img = image.img_to_array(img)

#img=np.expand_dims(img,axis=0)

#predictedclass = model.predict(img)

# print(train_generator.class_indices)

# predictedclass

#for i in train_generator.class_indices:

#    if train_generator.class_indices[i] == np.argmax(predictedclass):
#        print(i)
#        break

```

```
# history = model.fit(x_train, y_train, epochs=7,batch_size=10)

# pyplot.plot(history.history['loss'])

# pyplot.plot(history.history['val_loss'])

# pyplot.title('model train vs validation loss')

# pyplot.ylabel('loss')

# pyplot.xlabel('epoch')

# pyplot.legend(['train', 'validation'], loc='upper right')

# pyplot.show()

# print(model.summary())

return history
```

```
res_50_model = ResNet50(weights='imagenet', include_top=False)
```

```
history=model(res_50_model)
```