

Assignment -3

Build CNN Model for Classification Of Flowers

ASSIGNMENT DATE	10 October 2022
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MAXIMUM MARKS	2 Marks

Question-1:

- Download the Dataset

SOLUTION:

1)Download the Dataset

```
✓ 3s !unzip "/content/Flowers-Dataset.zip"
inflating: flowers/daisy/34658035045_7782e95b50_n.jpg
inflating: flowers/daisy/34661399476_9ea7e2fd53_n.jpg
inflating: flowers/daisy/34664107325_701d5c6f08_n.jpg
inflating: flowers/daisy/34665595995_13f76d5b60_n.jpg
inflating: flowers/daisy/34670512115_af22cce24d_n.jpg
inflating: flowers/daisy/34682895116_88ef018e83_n.jpg
inflating: flowers/daisy/3468498624_d082f99e98.jpg
inflating: flowers/daisy/34693373736_9ce6d9e1c3_n.jpg
inflating: flowers/daisy/34695914906_961f92ffcd_n.jpg
inflating: flowers/daisy/34696729796_190b1dfdf1_n.jpg
inflating: flowers/daisy/34696730126_056ffea63c_n.jpg
inflating: flowers/daisy/34696730346_5f0c131e59_n.jpg
inflating: flowers/daisy/34701078235_4a770d14a1_n.jpg
inflating: flowers/daisy/34701198765_54aa641d7a_n.jpg
inflating: flowers/daisy/34718882165_68cdc9def9_n.jpg
inflating: flowers/daisy/34720703615_bdf1335d8b_n.jpg
inflating: flowers/daisy/34727863665_b00ac77266_n.jpg
inflating: flowers/daisy/34729724865_787c98299d_n.jpg
```

Question-2:

- Image Augmentation

SOLUTION:

2)Image Augmentation

```
[ ] from tensorflow.keras.preprocessing.image import ImageDataGenerator
    from sklearn.model_selection import train_test_split

[ ] train_datagen=ImageDataGenerator(rescale = 1./255, zoom_range=0.2, horizontal_flip=True, vertical_flip=True)

[ ] x_train=train_datagen.flow_from_directory(r"/content/flowers", target_size=(64,64), class_mode="categorical", batch_size=32)

Found 4317 images belonging to 5 classes.

[ ] test_datagen=ImageDataGenerator(rescale = 1./255, zoom_range=0.2, horizontal_flip=True, vertical_flip=True)

[ ] x_test=test_datagen.flow_from_directory(r"/content/flowers", target_size=(64,64), class_mode="categorical", batch_size=32)

Found 4317 images belonging to 5 classes.

[ ] x_train.class_indices

{'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}

[ ] x_test.class_indices

{'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}
```

Question-3:

- Create Model & Add Layers

SOLUTION:

3) Create Model & Add Layers

```
[ ] from tensorflow.keras.models import Sequential
    from tensorflow.keras.layers import Dense, Convolution2D, MaxPooling2D, Flatten, Activation

[ ] #initialize
    model=Sequential()
    model.add(Convolution2D(32,(3,3),strides=(1,1),input_shape=(64,64,3)))
    model.add(Activation("relu"))
    model.add(MaxPooling2D(pool_size=(2,2)))

    model.add(Convolution2D(32,(3,3),strides=(1,1),input_shape=(64,64,3)))
    model.add(Activation("relu"))
    model.add(MaxPooling2D(pool_size=(2,2)))

    model.add(Convolution2D(64,(3,3),strides=(1,1),input_shape=(64,64,3)))
    model.add(Activation("relu"))
    model.add(MaxPooling2D(pool_size=(2,2)))

[ ] model.add(Flatten())

[ ] model.add(Dense(388))
    model.add(Activation("relu"))
    model.add(Dense(388))
    model.add(Activation("Softmax"))
```

```
model.summary()

Model: "sequential"

```

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 62, 62, 32)	896
activation (Activation)	(None, 62, 62, 32)	0
max_pooling2d (MaxPooling2D)	(None, 31, 31, 32)	0
conv2d_1 (Conv2D)	(None, 29, 29, 32)	9248
activation_1 (Activation)	(None, 29, 29, 32)	0
max_pooling2d_1 (MaxPooling2D)	(None, 14, 14, 32)	0
conv2d_2 (Conv2D)	(None, 12, 12, 64)	18496

Question-4:

- Compile The Model

SOLUTION:

4)Compile The Model

```
[ ] model.compile(loss="categorical_crossentropy",optimizer="adam",metrics=["accuracy"])

[ ] len(x_train)
```

135

Question-5:

- Fit The Model

SOLUTION:

```
▶ model.fit (x_train,epochs=100,steps_per_epoch=len(x_train),validation_data=x_test,validation_steps=len(x_test))
```

```
Epoch 1/100  
108/108 [=====] - 79s 727ms/step - loss: 0.9333 - accuracy: 0.6482 - val_loss: 0.8710 -  
val_accuracy: 0.6686  
Epoch 2/100  
108/108 [=====] - 78s 724ms/step - loss: 0.8859 - accuracy: 0.6642 - val_loss: 0.9045 -  
val_accuracy: 0.6489  
Epoch 3/100  
108/108 [=====] - 78s 723ms/step - loss: 0.8349 - accuracy: 0.6769 - val_loss: 0.7972 -  
val_accuracy: 0.6918  
Epoch 4/100  
108/108 [=====] - 78s 720ms/step - loss: 0.7841 - accuracy: 0.7038 - val_loss: 0.7972 -  
val_accuracy: 0.6987  
Epoch 5/100  
108/108 [=====] - 78s 720ms/step - loss: 0.7707 - accuracy: 0.7116 - val_loss: 0.7873 -  
val_accuracy: 0.7219  
Epoch 6/100  
108/108 [=====] - 78s 720ms/step - loss: 0.7255 - accuracy: 0.7171 - val_loss: 0.8026 -  
val_accuracy: 0.6952  
Epoch 7/100  
108/108 [=====] - 78s 721ms/step - loss: 0.6889 - accuracy: 0.7435 - val_loss: 0.7638 -  
val_accuracy: 0.7115  
Epoch 8/100  
108/108 [=====] - 78s 720ms/step - loss: 0.6588 - accuracy: 0.7499 - val_loss: 0.7983 -  
val_accuracy: 0.7080  
Epoch 9/100  
108/108 [=====] - 78s 719ms/step - loss: 0.6502 - accuracy: 0.7522 - val_loss: 0.7979 -  
val_accuracy: 0.7173  
Epoch 10/100
```

Question-6:

- Save The Model

SOLUTION:

6) Save The Model

```
model.save("flower.h5")
```

Question-7:

- Test The Model

SOLUTION:

Test The Model

```

import numpy as np
from keras.preprocessing import ImageDataGenerator
from keras.models import Sequential
from keras.layers import Dense, Dropout, Activation, Flatten
from keras.optimizers import Adam

img_train = ImageDataGenerator(
    rotation_range=20,
    width_shift_range=0.1,
    height_shift_range=0.1,
    shear_range=0.1,
    zoom_range=0.1,
    crop_range=[0.05, 0.95],
    fill_mode='nearest',
    horizontal_flip=True,
    vertical_flip=True)

img_test = ImageDataGenerator(
    rotation_range=0,
    width_shift_range=0,
    height_shift_range=0,
    shear_range=0,
    zoom_range=0,
    crop_range=[0.05, 0.95],
    fill_mode='nearest',
    horizontal_flip=False,
    vertical_flip=False)

img_train_flow = img_train.flow_from_directory(
    'train',
    target_size=(256, 256),
    batch_size=32,
    class_mode='categorical')

img_test_flow = img_test.flow_from_directory(
    'test',
    target_size=(256, 256),
    batch_size=32,
    class_mode='categorical')

model = Sequential()
model.add(Dense(128, input_shape=(256, 256, 3)))
model.add(Activation('relu'))
model.add(Dropout(0.5))
model.add(Dense(128))
model.add(Activation('relu'))
model.add(Dropout(0.5))
model.add(Dense(10))
model.add(Activation('softmax'))

model.compile(loss='categorical_crossentropy',
              optimizer=Adam,
              metrics=['accuracy'])

model.fit(img_train_flow, img_test_flow,
          validation_data=(img_test_flow, img_test_flow),
          epochs=100,
          verbose=1)

```