

Assignment-3

VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning

Assignment Date	November 14, 2022
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Maximum Marks	2 Marks

Question-1:

Download the dataset

Solution:

Download the given dataset in the given attached link.

Question-2:

Image Augmentation

Solution:

```
from tensorflow.keras import losses
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
fas-nicity, nopy, google-pasta, gasc, matplotlib, astunparse, tensorflow
```

```
In [36]: #importing keras libraries

#!pip install tensorflow
from tensorflow.keras import losses
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
In [46]: #Splitting the folder into training, testing and validation

!pip install split-folders
import splitfolders
splitfolders.ratio('C:/Users/santhosh/Desktop/assignment/Flowers-Dataset', output="C:/Users/santhosh/Desktop/assignment/output",
<
Requirement already satisfied: split-folders in c:\users\santhosh\anaconda3\lib\site-packages (0.5.1)
Copying files: 4317 files [00:08, 535.10 files/s]
```

```
In [47]: #Generate train data and test data using ImageDataGenerator function

train_datagen = ImageDataGenerator(rescale = 1./255, zoom_range=0.2, horizontal_flip = True)
test_datagen = ImageDataGenerator(rescale = 1./255)
```

```
In [48]: # Fetching xtrain and xtest for image classification

xtrain = train_datagen.flow_from_directory('C:/Users/santhosh/Desktop/assignment/output/train', target_size=(220,220), class_mode=
xtest = test_datagen.flow_from_directory('C:/Users/santhosh/Desktop/assignment/output/test', target_size=(220,220), class_mode= 'c
<
Found 3452 images belonging to 6 classes.
Found 435 images belonging to 6 classes.
```

Question 3:

Create Model

Solution:

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

```
In [49]: #importing Sequential model and required libraries for classification using Convolutional Neural Networks
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
```

Question 4:

- Add Layers (LSTM, Dense-(Hidden Layers), Output)
- Compile the Model
- Fit the Model
- Save The Model
- Test The Model

Solution:

```
model = Sequential()
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(220,220,3)))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))

#This softmax activation is used for the classification of images into 5 classes
model.add(Dense(5,activation='softmax'))
model.compile(optimizer='adam',loss=losses.categorical_crossentropy,metrics=['accuracy'])
#fit the model xtrain and validate using xtest
model.fit(xtrain, steps_per_epoch=len(xtrain), epochs=30,validation_data=xtest,
validation_steps=len(xtest))
#Save the model as flower-predict.h5
model.save('C:/Users/santhosh/Desktop/assignment/flower_predict.h5')
#Image classification part
import numpy as np
from tensorflow.keras.preprocessing import image
# Loading a sample image for testing the classifier
img =
image.load_img('C:/Users/santhosh/Desktop/assignment/output/val/daisy/10994032453_ac
7f8d9e2e.jpg',target_size=(220,220))
img #Output image
x= image.img_to_array(img) # Covert image data into array of rgb values
x
x=np.expand_dims(x,axis=0) #expand the dimension of the array
model.predict(x) # Predict the output of classification
op=['daisy','dandelion','rose','sunflower','tulip']
```

predicted output

```
pred = np.argmax(model.predict(x))  
op[pred]
```

```
In [50]: #Creating an instance of sequential model and add convolution layers into it
```

```
model = Sequential()  
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(220,220,3)))
```

```
In [51]: #Add a max pooling layer with a size of 2*2
```

```
model.add(MaxPooling2D(pool_size=(2,2)))  
model.add(Flatten())  
model.add(Dense(300,activation='relu'))  
model.add(Dense(150,activation='relu'))  
  
#This softmax activation is used for the classification of images into 5 classes  
model.add(Dense(5,activation='softmax'))
```

```
In [52]: #Compile the model
```

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

```
In [53]: #fit the model xtrain and validate using xtest
```

```
model.fit(xtrain, steps_per_epoch=len(xtrain), epochs=30,validation_data=xtest, validation_steps=len(xtest))
```

```
In [55]: #Save the model as flower-predict.h5
```

```
model.save('C:/Users/santhosh/Desktop/assignment/flower_predict.h5')
```

```
In [57]: #Image classification part
```

```
import numpy as np  
from tensorflow.keras.preprocessing import image
```

```
In [70]: # Loading a sample image for testing the classifier
```

```
img = image.load_img('C:/Users/santhosh/Desktop/assignment/output/val/daisy/10994032453_ac7f8d9e2e.jpg',target_size=(220,220))
```

```
In [71]: img #Output image
```

```
Out[71]:
```



```
In [72]: x= image.img_to_array(img) # Covert image date into array of rgb values
```

```
In [73]: x
```

```
Out[73]: array([[ 85.,  55.,  63.],
                [101.,  71.,  79.],
                [110.,  80.,  92.],
                ...,
                [124.,  87.,  95.],
                [110.,  78.,  93.],
                [ 89.,  65.,  79.]],

                [[ 92.,  68.,  68.],
                [ 91.,  71.,  72.],
                [106.,  81.,  84.],
                ...,
                [115.,  78.,  85.],
                [103.,  77.,  80.],
                [ 87.,  67.,  76.]],

                [[ 90.,  63.,  68.],
                [ 86.,  65.,  70.],
                [101.,  76.,  80.],
                ...,
                [108.,  73.,  79.],
                [ 98.,  70.,  84.],
                [ 84.,  63.,  68.]],

                ...,

                [[ 95., 127.,  80.],
                [106., 133.,  90.],
                [124., 159., 129.],
                ...,
                [ 55.,  60.,  30.],
                [ 77.,  63.,  60.],
                [102.,  90., 136.]],

                [[ 96., 128.,  79.],
                [105., 134.,  90.],
                [125., 160., 127.],
                ...,
                [ 58.,  67.,  48.],
                [ 84.,  79., 133.],
                [ 32.,  41.,  24.]],

                [[ 90., 122.,  75.],
                [ 93., 124.,  82.],
                [120., 156., 118.],
                ...,
                [ 33.,  33.,  23.],
                [ 46.,  43.,  26.],
                [100.,  88., 110.]])], dtype=float32)
```

```
In [74]: x=np.expand_dims(x,axis=0) #expand the dimension of the array
```

```
In [75]: model.predict(x) # Predict the output of classification
```

```
Out[75]: array([[2.88144489e-16, 1.00000000e+00, 2.84125234e-26, 7.68427070e-14,
                1.24847975e-17]], dtype=float32)
```

```
In [76]: op=['daisy','dandelion','rose','sunflower','tulip']
```

```
In [77]: # Finding the maximum argument value of prediction and print the corresponding predicted output
pred = np.argmax(model.predict(x))
```

```
]:
```

```
: [27]: 'daisy'
```