EMERGINGMETHODSFOREARLYDETECTION OF FOREST FIRES

Video AnalysisCreatingAnAccountInTwilioService

Date	06November2022
TeamID	PNT2022TMID30362
ProjectName	EmergingMethodsforEarlyDetectionof ForestFires

ImportingTheImageDataGeneratorLibrary

```
importkeras
fromkeras.preprocessing.imageimportImageDataGenerator
```

Definetheparameters/argumentsforImageDataGeneratorclass

```
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,
rotation_range=180,zoom_range=0.2, horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)
```

ApplyingImageDataGeneratorfunctionalitytotrainset

```
x_train=train_datagen.flow_from_directory(r'/content/drive/MyDrive/Dataset/train_set',target_size
=(128,128),batch_size=32, class_mode='binary')
```

```
Found436imagesbelongingto2classes.
```

ApplyingImageDataGeneratorfunctionalitytotestset

```
x_test=test_datagen.flow_from_directory(r'/content/drive/MyDrive/Dataset/test_set',target_size=(1
28,128),batch_size=32, class_mode='binary')
```

```
Found121imagesbelongingto2classes.
```

Importmodelbuildinglibraries

```
#TodefineLinearinitialisationimportSequential
fromkeras.modelsimportSequential
#ToaddlayersimportDense
fromkeras.layersimportDense
#TocreateConvolutionkernelimportConvolution2D
fromkeras.layersimportConvolution2D
#importMaxpoolinglayer
fromkeras.layersimportMaxPooling2D
#importflattenlayer
from keras.layers import Flatten import
warningswarnings.filterwarnings('ignore')
```

Initializingthemodel

```
model=Sequential()
```

AddCNNLayer

```
model.add(Convolution2D(32,(3,3),input_shape=(128,128,3),activation='relu'))
#add maxpooling layer
model.add(MaxPooling2D(pool_size=(2,2)))
#add flatten layer
model.add(Flatten())
```

AddDenseLayer

```
#add hidden
layermodel.add(Dense(150,activation='relu')
) #add output
layermodel.add(Dense(1,activation='sigmoid
'))
```

Configurethelearningprocess

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

Trainthemodel

```
model.fit_generator(x_train,steps_per_epoch=14,epochs=10,validation_da
ta=x_test,validation_steps=4)
Epoch1/10
14/14[==============================]-205s15s/step-loss:2.7344-
accuracy:0.7454-val_loss:0.2016-val_accuracy:0.9256
Epoch 2/10
14/14[==============================]-20s1s/step-loss:accuracy:0.8945-
val_loss:0.2290-val_accuracy:0.9339 Epoch
3/10
14/14[==============================]-20s1s/step-loss:accuracy:0.8922-
val_loss:0.0524-val_accuracy:0.9835 Epoch
4/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9174-
val_loss:0.1570-val_accuracy:0.9421 Epoch
5/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9083-
val_loss:0.0767-val_accuracy:0.9752 Epoch
6/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9335-
val_loss:0.0749-val_accuracy:0.9752 Epoch
7/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9312-
val_loss:0.1264-val_accuracy:0.9421 Epoch
8/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9266-
val_loss:0.0652-val_accuracy:0.9835 Epoch
9/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9358-
val_loss:0.0567-val_accuracy:0.9835 Epoch
10/10
14/14[==============================]-20s1s/step-loss:accuracy:0.9404-
val_loss:0.0448-val_accuracy:0.9917
0.3267-
0.2991-
0.2418-
0.1984-
0.1643-
0.1538-
0.1732-
0.1514-
0.1445-
<keras.callbacks.Historyat0x7f51fdf33610>
```

SaveTheModel

```
model.save("forest1.h5")
```

Predictions

```
#importload_modelfromkeras.model

fromkeras.modelsimportload_model

#import image class from keras
fromtensorflow.keras.preprocessingimportimage#importnumpyimportnumpyas np
#importcv2
import cv2

#loadthesavedmodel
model=load_model("forest1.h5")

img=image.load_img(r'/content/drive/MyDrive/Dataset/test_set/forest/0.48
007200_1530881924_final_forest.jpg') x=image.img_to_array(img)
res=cv2.resize(x,dsize=(128,128),interpolation=cv2.INTER_CUBIC)#expandthe image
shape

x=np.expand_dims(res,axis=0)
pred= model.predict(x)
1/1[==============================]-0s94ms/steppred
array([[0.]],dtype=float32)
```

OpenCVForVideoProcessing

```
pipinstalltwilio
Lookinginindexes:https://pypi.org/simple,https://us-
python.pkg.dev/colab-wheels/public/simple/Collecting
twilio
Downloadingtwilio-7.15.1-py2.py3-none-any.whl(1.4MB)
entalreadysatisfied:pytzin/usr/local/lib/python3.7/dist-packages(fromtwilio) (2022.5)
CollectingPyJWT<3.0.0,>=2.0.0
DownloadingPyJWT-2.6.0-py3-none-any.whl(20kB)
Requirement already satisfied: requests>=2.0.0 in /usr/local/lib/python3.7/dist-
packages(fromtwilio)(2.23.0)Requirementalreadysatisfied:chardet<4,>=3.0.2in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0->twilio) (3.0.4)
Requirementalreadysatisfied:idna<3,>=2.5in/usr/local/lib/python3.7/dist-packages
(from requests>=2.0.0->twilio)
(2.10)
Requirementalreadysatisfied:certifi>=2017.4.17in/usr/local/lib/python3.7/dist- packages
(from requests>=2.0.0->twilio) (2022.9.24)
Requirementalreadysatisfied:urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1in
```

```
/usr/local/lib/python3.7/dist-packages(fromrequests>=2.0.0->twilio)(1.24.3)
Installing collected packages: PyJWT, twilio
SuccessfullyinstalledPyJWT-2.6.0twilio-7.15.1 pip
install playsound
Lookinginindexes:https://pypi.org/simple,https://us-
python.pkg.dev/colab-wheels/public/simple/Collecting
playsound
Downloadingplaysound-1.3.0.tar.gz(7.7kB)Buildingwheelsforcollected
packages: playsound
Building wheel for playsound (setup.py) ... e=playsound-1.3.0-py3- none-any.whl
size=7035
sha256=e7e96c774a98522e182b59b7b292f0f932097658d8bfce86c922c363f862b0e
2
Storedindirectory:
/root/.cache/pip/wheels/ba/f8/bb/ea57c0146b664dca3a0ada4199b0ecb5f9dfc
b7b7e22b65ba2
Successfullybuiltplaysound
Installingcollectedpackages:playsound
Successfully installed playsound-1.3.0
#import opencv library
import cv2
#importnumpy
importnumpyasnp
#import image function from keras
fromkeras.preprocessingimportimage
#import load_model from keras
fromkeras.modelsimportload_model
#import client from twilio API
fromtwilio.restimportClient
#import playsound package
fromplaysoundimportplaysound
WARNING:playsound:playsoundisrelyingonanotherpythonsubprocess.Please use
`pip install pygobject` if you want playsound to run more efficiently.
#loadthesavedmodel
model=load_model("forest1.h5")#definevideovideo=cv2.VideoCapture(0)#define
the features name=['forest','with fire']
```

CreatingAnAccountInTwilioService

```
account_sid='ACfb4e6d0e7b0d25def63044919f1b96e3'
auth_token='f9ae4fc4a617a527da8672e97eefb2d8'
client=Client(account_sid,auth_token)
message=client.messages \
.create(
     body='ForestFireisdetected,stayalert',
     from_='+1 302 248 4366',
     to='+919940012164'
)
print(message.sid)
```

```
SM4aa5a4751b7bcec159dc4c695752293d
```