EMERGING METHODS FOR EARLY DETECTIONOF FORESTFIRES

VIDEOANALYSIS

OPENCVFORVIDEOPROCESSING

Date	04 November2022
Team ID	PNT2022TMID33734
Project Name	EmergingMethodsforEarly Detectionof Forest Fires

ImportingTheImageDataGeneratorLibrary

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

Definetheparameters/argumentsfor ImageDataGeneratorclass

```
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,rota
ti on_range=180,zoom_range=0.2,
horizontal_flip=True)test_datagen=ImageDataGenerator(rescale=1./2
55)
```

ApplyingImageDataGeneratorfunctionalitytotrainset

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

```
Found436imagesbelongingto2classes.
```

ApplyingImageDataGeneratorfunctionalitytotestset

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

```
Found121imagesbelongingto2classes.
```

Importmodelbuildinglibraries

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

Initializingthemodel

```
model=Sequential()
```

AddCNNLayer

```
model.add(Convolution2D(32,(3,3),input_shape=(12
8,128,3),activation='relu'))#addmaxpooling layer

model.add(MaxPooling2D(pool_size=(2,2)))
#addflattenlayer
model.add(Flatten())
```

AddHiddenLayer

```
 #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_
data=x_test,validation_steps=4)
```

```
Epoch1/10
14/14[==============================]-97s7s/step -loss:
1.3060 -
accuracy: 0.7775 - val_loss: 0.5513 - val_accuracy:
0.8512Epoch2/10
14/14[==============================]-26s2s/step -loss:
0.3178 -
accuracy: 0.8807 - val_loss: 0.1299 - val_accuracy:
0.9421Epoch3/10
14/14[==============================]-26s2s/step -loss:
0.2226 -
accuracy: 0.9106 - val_loss: 0.1311 - val_accuracy:
0.9421Epoch4/10
14/14[==============================]-31s2s/step -loss:
0.1836 -
accuracy: 0.9174 - val_loss: 0.1129 - val_accuracy:
0.9339Epoch5/10
14/14[==============================]-30s 2s/step-loss:
0.1675 -
```

```
accuracy: 0.9243 - val_loss: 0.0925 - val_accuracy:
0.9669Epoch6/10
14/14[=====================]-26s2s/step -loss:
0.1884 -
accuracy: 0.9289 - val_loss: 0.1287 - val_accuracy:
0.9339Epoch7/10
14/14[=====================] -28s 2s/step -loss:
0.1724 -
accuracy: 0.9335 - val_loss: 0.0926 - val_accuracy:
0.9752Epoch8/10
14/14[=====================]-26s2s/step -loss:
0.1510 -
accuracy: 0.9404 - val_loss: 0.0757 - val_accuracy:
0.9752Epoch 9/10
14/14[=====================]-26s
2s/step-loss:
accuracy:0.9174-val_loss:0.0537 -val_accuracy:0.9835
Epoch10/10
14/14[=====================]-26s
2s/step-loss:
accuracy:0.9312-val_loss:0.0573 -val_accuracy:0.9835
 <keras.callbacks.Historyat0x7f05d66a9c90>
```

SaveTheModel

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

Predictions

```
  #import
load_modelfrom
keras.model
fromkeras.models
importload_model
#importimageclassfromk
eras
from tensorflow.keras.preprocessing import image
#importnumpy
importnumpyasnp
```

```
#importcv2
importcv2
```

0.173-2

0.154-6

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

img=image.load_img(r'/content/drive/MyDrive/Dataset/test_set/fore
st/
0.48007200_1530881924_final_forest.jpg')x=image.img_to_arra
y(img)
res = cv2.resize(x, dsize=(128,
128),interpolation=cv2.INTER_CU
BIC)#expand the image
shapex=np.expand_di

ms(res,axis=0)p

red=model.predi

ct(x)

1/1[==============================]-0s
126ms/step

pred

array([[0.]],dtype=float32)
```

OpenCVForVideoProcessing

```
pipinstalltwilio
```

```
Looking in indexes: https://pypi.org/simple, https://us-
python.pkg.dev/colab-
wheels/public/simple/Requirementalready
satisfied:twilioin
/usr/local/lib/python3.7/dist-packages(7.15.1)
Requirement already satisfied: pytz in /usr/local/lib/python3.7/dist-
packages(fromtwilio)(2022.5)
Requirementalreadysatisfied:requests>=2.0.0in
/usr/local/lib/python3.7/dist-
packages(fromtwilio)(2.23.0)Requirementalreadysatisfied:
PyJWT<3.0.0,>=2.0.0in
/usr/local/lib/python3.7/dist-
packages(fromtwilio)(2.6.0)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)
Requirementalreadysatisfied:certifi>=2017.4.17in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0-
>twilio)(2022.9.24)
Requirementalreadysatisfied:idna<3,>=2.5in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0-
>twilio)(2.10)
Requirementalreadysatisfied:chardet<4,>=3.0.2in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0-
>twilio)(3.0.4)
```

```
pipinstallplaysound
```

```
Looking in indexes: https://pypi.org/simple, https://us-
python.pkg.dev/colab-
wheels/public/simple/Requirementalready
satisfied:playsound in
/usr/local/lib/python3.7/dist-packages(1.3.0)
```

```
#importopencvlibrary
importcv2
```

```
#importnumpy
importnumpyasnp
#importimagefunctionfromkeras
fromkeras.preprocessingimport
```

```
image#importload_modelfromk
eras
fromkeras.modelsimportload_model
#import client from twilio
APIfrom twilio.rest import
Client#importplaysoundpacka
ge
fromplaysoundimportplaysound
```

```
WARNING:playsound:playsoundisrelyingonanotherpythonsubproces
s.Pleaseuse`pipinstallpygobject`ifyouwantplaysoundtorun more
efficiently.
```

```
#load the saved
modelmodel=load_model("fores
t1.h5") #define
videovideo=cv2.VideoCapture(
0)#define the
featuresname=['forest','withfire'
]
```