EMERGING METHODS FOR EARLY DETECTIONOF FORESTFIRES

VIDEOANALYSIS

OPENCVFORVIDEOPROCESSING

Date	04 November2022
Team ID	PNT2022TMID30386
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.

Applying ImageDataGenerator functionality to testset

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

Found 121 images belonging to 2 classes.

Import model building libraries

```python
#To define Linear initialisation import Sequential
from keras.models import Sequential
#To add layers import Dense
from keras.layers import Dense
#To create Convolution kernel import Convolution2D
from keras.layers import Convolution2D
#import Maxpooling layer
from keras.layers import MaxPooling2D
#import flatten layer
from keras.layers import Flatten
import warnings
warnings.filterwarnings('ignore')
```

Initializing the model

```python
model=Sequential()
```

Add CNN Layer

```python
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())
```

AddHiddenLayer

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

Configurethelearningprocess

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

Trainthemodel

```python
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

#importcv2

importcv2

<keras.callbacks.Historyat0x7f05d66a9c90>

SaveTheModel

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

Predictions

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

0.173-2

0.154-6

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

img=image.load_img(r'/content/drive/MyDrive/Dataset/test_set/forest/
0.48007200_1530881924_final_forest.jpg')x=image.img_to_array(img)
res = cv2.resize(x, dsize=(128,
128),interpolation=cv2.INTER_CUBIC)#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

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

image*#importload_modelfromkeras*

fromkeras.modelsimportload_model
*#import client from twilio API*from twilio.rest import Client*#importplaysoundpackage*

fromplaysoundimportplaysound

WARNING:playsound:playsoundisrelyingonanotherpythonsubprocess.Pleaseuse`pipinstallpygobject`ifyouwantplaysoundtorun more efficiently.

*#load the saved model*model=load_model("forest1.h5") *#define video*video=cv2.VideoCapture(0)*#define the features*name=['forest','withfire']
]