

EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES

Video Analysis

Creating An Account In Twilio Service

Date	08 November 2022
Team ID	PNT2022TMID30907
Project Name	Emerging Methods for Early Detection of Forest Fires

Importing The ImageDataGenerator Library

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

Define the parameters/arguments for ImageDataGenerator class

```
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)
```

Applying ImageDataGenerator functionality to trainset

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

Found 117 images belonging to 2 classes.

Applying ImageDataGenerator functionality to testset

```
x_test=test_datagen.flow_from_directory(r'/content/drive/MyDrive/Colab
Notebooks/Dataset/testset' , target_size=(128,128),batch_size=32,
class_mode='binary') Found 117 images belonging to 2 classes.
```

Import model building libraries

```
#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

```
model=Sequential()
```

Add CNN Layer

```
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())
```

Add Dense Layer

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

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

Configure the learning process

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

Train the model

```
model.fit_generator(x_train,steps_per_epoch=14,epochs=10,validation_data=x_test,validation_steps=4)
```

Epoch 1/10

4/4 [=====] - 205s 15s/step - loss: 2.7344 - accuracy: 0.7454 - val_loss: 0.2016 - val_accuracy: 0.9256

Epoch 2/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.8945 - val_loss: 0.2290 - val_accuracy: 0.9339

Epoch 3/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.8922 - val_loss: 0.0524 - val_accuracy: 0.9835

Epoch 4/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.9174 - val_loss: 0.1570 - val_accuracy: 0.9421

Epoch 5/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.9083 - val_loss: 0.0767 - val_accuracy: 0.9752

Epoch 6/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.9335 - val_loss: 0.0749 - val_accuracy: 0.9752

Epoch 7/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.9312 - val_loss: 0.1264 - val_accuracy: 0.9421

Epoch 8/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.9266 - val_loss: 0.0652 - val_accuracy: 0.9835

Epoch 9/10

4/4 [=====] - 20s 1s/step - loss: accuracy: 0.9358 - val_loss: 0.0567 - val_accuracy: 0.9835

Epoch 10/10

4/4 [=====] - 20s 1s/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.History at 0x7f51fdf33610>

Save The Model

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

Predictions

```
#import load_model from keras.model from  
  
keras.models import load_model  
  
#import image class from keras from tensorflow.keras.preprocessing import image  
#import numpy import numpy as np  
#import cv2 import cv2  
  
#load the saved model 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 shape  
  
x=np.expand_dims(res,axis=0) pred=  
model.predict(x)  
1/1 [=====] - 0s 94ms/step pred array([[0.]],  
dtype=float32)
```

OpenCV For Video Processing

```
pip install twilio  
Looking in indexes: https://pypi.org/simple, https://us-  
python.pkg.dev/colabwheels/public/simple/  
Collecting twilio  
Downloading twilio-7.15.1-py2.py3-none-any.whl (1.4 MB) ent already satisfied:  
pytz in /usr/local/lib/python3.7/dist-packages (from twilio) (2022.5)  
Collecting PyJWT<3.0.0,>=2.0.0  
Downloading PyJWT-2.6.0-py3-none-any.whl (20 kB)
```

Requirement already satisfied: requests>=2.0.0 in
/usr/local/lib/python3.7/dist-packages (from twilio) (2.23.0) Requirement already
satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from
requests>=2.0.0->twilio) (3.0.4)
Requirement already satisfied: idna<3,>=2.5 in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0->twilio)
(2.10)
Requirement already satisfied: certifi>=2017.4.17 in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0->twilio) (2022.9.24)
Requirement already satisfied: urllib3!=1.25.0,!1.25.1,<1.26,>=1.21.1 in
/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0->twilio) (1.24.3)
Installing collected packages: PyJWT, twilio Successfully
installed PyJWT-2.6.0 twilio-7.15.1 pip install playsound
Looking in indexes: <https://pypi.org/simple>, [https://us-
python.pkg.dev/colabwheels/public/simple/](https://us-python.pkg.dev/colabwheels/public/simple/)
Collecting playsound
Downloading playsound-1.3.0.tar.gz (7.7 kB) Building wheels for collected
packages: playsound
Building wheel for playsound (setup.py) ... e=playsound-1.3.0-py3- none-any.whl
size=7035
sha256=e7e96c774a98522e182b59b7b292f0f932097658d8bfce86c922c363f862b0e
2
Stored in directory:
/root/.cache/pip/wheels/ba/f8/bb/ea57c0146b664dca3a0ada4199b0ecb5f9dfc
b7b7e22b65ba2
Successfully built playsound
Installing collected packages: playsound
Successfully installed playsound-1.3.0
#import opencv library import
cv2 #import
numpy import numpy
as np
#import image function from keras from
keras.preprocessing import image
#import load_model from keras from
keras.models import load_model #import
client from twilio API from twilio.rest
import Client #import playsound
package from playsound
import playsound
WARNING:playsound:playsound is relying on another python subprocess. Please
use `pip install pygobject` if you want playsound to run more efficiently.
#load the saved model

```
model=load_model("forest1.h5") #define video video=cv2.VideoCapture(0)
#define the features name=['forest','with fire']
```

Creating An Account In Twilio Service

```
account_sid='ACb2d4235f686873a722b463631f72f069'
auth_token='4420a201ee6d29c8bbf876084dd91405'
client=Client(account_sid,auth_token) message=client.messages
\
.create(      body='Forest Fire is detected,
stay alert',
from_='+17174938724',
to='+91 9843450890'
)
print(message.sid)
print("Fire Detected")
print("SMS sent")
```

SMb9229d438ff8e20514445c7b53c7839a

Fire Detected

SMS sent