

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/Dataset/train_set',  
target_size=(128,128), batch_size=32, class_mode='binary')
```

Found 436 images belonging to 2 classes.

Applying ImageDataGenerator functionality to testset

```
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

```
#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

14/14 [=====] - 205s 15s/step - loss: 2.7344 - accuracy: 0.7454 - val_loss: 0.2016 - val_accuracy: 0.9256

Epoch 2/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.8945 - val_loss: 0.2290 - val_accuracy: 0.9339

Epoch 3/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.8922 - val_loss: 0.0524 - val_accuracy: 0.9835

Epoch 4/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.9174 - val_loss: 0.1570 - val_accuracy: 0.9421

Epoch 5/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.9083 - val_loss: 0.0767 - val_accuracy: 0.9752

Epoch 6/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.9335 - val_loss: 0.0749 - val_accuracy: 0.9752

Epoch 7/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.9312 - val_loss: 0.1264 - val_accuracy: 0.9421

Epoch 8/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.9266 - val_loss: 0.0652 - val_accuracy: 0.9835

Epoch 9/10

14/14 [=====] - 20s 1s/step - loss: accuracy: 0.9358 - val_loss: 0.0567 - val_accuracy: 0.9835

Epoch 10/10

14/14 [=====] - 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/distpackages (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/distpackages (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/>

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=e7e96c774a98522e182b59b7b292f0f932097658d8bfce86c922c363f862b0e2

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")
```

SM4aa5a4751b7bcec159dc4c695752293d

Fire Detected

SMS sent