

EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES

VIDEO ANALYSIS

OPEN CV FOR VIDEO PROCESSING

Date	08 November 2022
Team ID	PNT2022TMID12327
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 Hidden 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 [=====] - 97s 7s/step - loss:

1.3060 -

accuracy: 0.7775 - val_loss: 0.5513 - val_accuracy: 0.8512Epoch 2/10

14/14 [=====] - 26s 2s/step - loss:

0.3178 -

accuracy: 0.8807 - val_loss: 0.1299 - val_accuracy: 0.9421Epoch 3/10

14/14 [=====] - 26s 2s/step - loss:

0.2226 -

accuracy: 0.9106 - val_loss: 0.1311 - val_accuracy: 0.9421Epoch 4/10

14/14 [=====] - 31s 2s/step - loss:

0.1836 -

accuracy: 0.9174 - val_loss: 0.1129 - val_accuracy: 0.9339Epoch 5/10

14/14 [=====] - 30s 2s/step - loss:

0.1675 -

```

accuracy: 0.9243 - val_loss: 0.0925 - val_accuracy: 0.9669Epoch 6/10
14/14 [=====] - 26s 2s/step - loss:
0.1884 -
accuracy: 0.9289 - val_loss: 0.1287 - val_accuracy: 0.9339Epoch 7/10
14/14 [=====] - 28s 2s/step - loss:
0.1724 -
accuracy: 0.9335 - val_loss: 0.0926 - val_accuracy: 0.9752Epoch 8/10
14/14 [=====] - 26s 2s/step - loss:
0.1510 -
accuracy: 0.9404 - val_loss: 0.0757 - val_accuracy: 0.9752Epoch 9/10
14/14 [=====] - 26s 2s/step - loss: 0.173 -2
accuracy: 0.9174 - val_loss: 0.0537 - val_accuracy: 0.9835
Epoch 10/10 0.154 -6
14/14 [=====] - 26s 2s/step - loss:
accuracy: 0.9312 - val_loss: 0.0573 - val_accuracy: 0.9835
<keras.callbacks.History at 0x7f05d66a9c90>

```

Save The Model

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

Predictions

```

#import load_model from
keras.model fromkeras.models
import load_model #import image
class from keras
from tensorflow.keras.preprocessing import image #importnumpy
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_di
```

```
ms(res,axis=0) pred=
```

```
model.predict(x)
```

```
1/1 [=====] - 0s
```

```
126ms/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/colab-wheels/public/simple/> Requirement already satisfied: twilio in

/usr/local/lib/python3.7/dist-packages (7.15.1)

Requirement already satisfied: pytz in /usr/local/lib/python3.7/dist-packages (from twilio) (2022.5)

Requirement already satisfied: requests>=2.0.0 in

/usr/local/lib/python3.7/dist-packages (from twilio) (2.23.0)Requirement

already satisfied: PyJWT<3.0.0,>=2.0.0 in

/usr/local/lib/python3.7/dist-packages (from twilio) (2.6.0) 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)

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: idna<3,>=2.5 in

/usr/local/lib/python3.7/dist-packages (from requests>=2.0.0->twilio)(2.10)

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)

pip install playsound

Looking in indexes: <https://pypi.org/simple>, <https://us-python.pkg.dev/colab-wheels/public/simple/> Requirement already satisfied: playsound in

/usr/local/lib/python3.7/dist-packages (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=cv2.VideoCapture(0) #define
the features name=['forest','with fire']
```

