

EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES

VIDEO ANALYSIS

OPEN CV FOR VIDEO PROCESSING

Date	07 November 2022
Team ID	PNT2022TMID40840
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,rot
ation_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: 0.8512

```

Epoch 2/10

```

14/14 [=====] - 26s 2s/step - loss:
0.3178 - accuracy: 0.8807 - val_loss: 0.1299 -
val_accuracy: 0.9421

```

Epoch 3/10

```

14/14 [=====] - 26s 2s/step - loss:
0.2226 - accuracy: 0.9106 - val_loss: 0.1311 -
val_accuracy: 0.9421

```

Epoch 4/10

```

14/14 [=====] - 31s 2s/step - loss:
0.1836 - accuracy: 0.9174 - val_loss: 0.1129 -
val_accuracy: 0.9339

```

Epoch 5/10

```

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

```

```

0.1675 -
accuracy: 0.9243 - val_loss: 0.0925 - val_accuracy: 0.9669
Epoch 6/10
14/14 [=====] - 26s 2s/step - loss:
0.1884 - accuracy: 0.9289 - val_loss: 0.1287 -
val_accuracy: 0.9339
Epoch 7/10
14/14 [=====] - 28s 2s/step - loss:
0.1724 - accuracy: 0.9335 - val_loss: 0.0926 -
val_accuracy: 0.9752
Epoch 8/10
14/14 [=====] - 26s 2s/step - loss:
0.1510 - accuracy: 0.9404 - val_loss: 0.0757 -
val_accuracy: 0.9752 Epoch 9/10
14/14 [=====] - 26s 0.173 -
2s/step - loss: 2
accuracy: 0.9174 - val_loss: 0.0537 - val_accuracy: 0.9835

Epoch 10/10 14/14 [=====]
- 26s 0.154 -
2s/step - loss: 6
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 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
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.h

5") *#define video*

video=cv2.VideoCapture(0) *#define
the features*

```
name=['forest','with fire']
```