EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES

Video Analysis

Creating An Account In Twilio Service

Date	16 November 2022
Team ID	PNT2022TMID47227
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=["ac curacy"])
```

Train the model

```
model.fit_generator(x_train,steps_per_epoch=14,epochs=10,validation_da
ta=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/ea57c0146b664dca3a0ada4199b0ecb5f9dfcb7b7e22b65ba2
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
```