!pip install tensorflow

!pip install opencv**-**python

!pip install opencv**-**contrib**-**python

**import** tensorflow **as** tf

**import** numpy **as** np

**from** tensorflow **import** keras

**import** os

**import** cv2

**from** tensorflow.keras.preprocessing.image **import** ImageDataGenerator

**from** tensorflow.keras.preprocessing **import** image

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/

Requirement already satisfied: tensorflow in /usr/local/lib/python3.7/dist-packages (2.9.2)

Requirement already satisfied: tensorboard<2.10,>=2.9 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.9.1)

Requirement already satisfied: tensorflow-estimator<2.10.0,>=2.9.0rc0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.9.0)

Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (0.2.0)

Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (3.3.0)

Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-packages (from tensorflow) (21.3)

Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (3.1.0)

Requirement already satisfied: keras<2.10.0,>=2.9.0rc0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.9.0)

Requirement already satisfied: numpy>=1.20 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.21.6)

Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (14.0.6)

Requirement already satisfied: gast<=0.4.0,>=0.2.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (0.4.0)

Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.1.0)

Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.15.0)

Requirement already satisfied: protobuf<3.20,>=3.9.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (3.19.6)

Requirement already satisfied: setuptools in /usr/local/lib/python3.7/dist-packages (from tensorflow) (57.4.0)

Requirement already satisfied: keras-preprocessing>=1.1.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.1.2)

Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.6.3)

Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (4.1.1)

Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.14.1)

Requirement already satisfied: absl-py>=1.0.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.3.0)

Requirement already satisfied: flatbuffers<2,>=1.12 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.12)

Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (0.27.0)

Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.50.0)

Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.7/dist-packages (from astunparse>=1.6.0->tensorflow) (0.38.3)

Requirement already satisfied: cached-property in /usr/local/lib/python3.7/dist-packages (from h5py>=2.9.0->tensorflow) (1.5.2)

Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (3.4.1)

Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (0.6.1)

Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (1.8.1)

Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (2.23.0)

Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (0.4.6)

Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (1.0.1)

Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (2.14.1)

Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (4.9)

Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (0.2.8)

Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (5.2.0)

Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.7/dist-packages (from google-auth-oauthlib<0.5,>=0.4.1->tensorboard<2.10,>=2.9->tensorflow) (1.3.1)

Requirement already satisfied: importlib-metadata>=4.4 in /usr/local/lib/python3.7/dist-packages (from markdown>=2.6.8->tensorboard<2.10,>=2.9->tensorflow) (4.13.0)

Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata>=4.4->markdown>=2.6.8->tensorboard<2.10,>=2.9->tensorflow) (3.10.0)

Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /usr/local/lib/python3.7/dist-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (0.4.8)

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<3,>=2.21.0->tensorboard<2.10,>=2.9->tensorflow) (1.24.3)

Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<2.10,>=2.9->tensorflow) (3.0.4)

Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<2.10,>=2.9->tensorflow) (2.10)

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<2.10,>=2.9->tensorflow) (2022.9.24)

Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.7/dist-packages (from requests-oauthlib>=0.7.0->google-auth-oauthlib<0.5,>=0.4.1->tensorboard<2.10,>=2.9->tensorflow) (3.2.2)

Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.7/dist-packages (from packaging->tensorflow) (3.0.9)

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/

Requirement already satisfied: opencv-python in /usr/local/lib/python3.7/dist-packages (4.6.0.66)

Requirement already satisfied: numpy>=1.14.5 in /usr/local/lib/python3.7/dist-packages (from opencv-python) (1.21.6)

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/

Requirement already satisfied: opencv-contrib-python in /usr/local/lib/python3.7/dist-packages (4.6.0.66)

Requirement already satisfied: numpy>=1.14.5 in /usr/local/lib/python3.7/dist-packages (from opencv-contrib-python) (1.21.6)

**Define the parameters/arguments for ImageDataGenerator class**

In [13]:

train**=**ImageDataGenerator(rescale**=**1.**/**255,

shear\_range**=**0.2,

rotation\_range**=**180,

zoom\_range**=**0.2,

horizontal\_flip**=True**)

train **=** ImageDataGenerator(rescale**=**1**/**255)

test **=** ImageDataGenerator(rescale**=**1**/**255)

**Applying ImageDataGenerator functionality to trainset**

In [15]:

train\_dataset **=** train**.**flow\_from\_directory("/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**

In [16]:

test\_dataset **=** test**.**flow\_from\_directory("/content/drive/MyDrive/Dataset/test\_set",

target\_size**=**(128,128),

batch\_size **=** 32,

class\_mode **=** 'binary' )

Found 121 images belonging to 2 classes.

In [17]:

test\_dataset**.**class\_indices

Out[17]:

{'forest': 0, 'with fire': 1}

**Import model building libraries**

In [18]:

*#to define linear initialisation import sequential*

**from** keras.models **import** Sequential

*#to add layer 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**

In [57]:

model **=**Sequential()

**Add CNN Layer**

In [58]:

model**.**add(Convolution2D(32,(3,3),input\_shape**=**(128,128,3),activation**=**'relu'))

model**.**add(MaxPooling2D(pool\_size**=**(2,2)))

model**.**add(Convolution2D(32,(3,3),activation**=**'relu'))

model**.**add(MaxPooling2D(pool\_size**=**(2,2)))

model**.**add(Convolution2D(32,(3,3),activation**=**'relu'))

model**.**add(MaxPooling2D(pool\_size**=**(2,2)))

model**.**add(Convolution2D(32,(3,3),activation**=**'relu'))

model**.**add(MaxPooling2D(pool\_size**=**(2,2)))

model**.**add(Flatten())

**Add Hidden Layer**

In [59]:

model**.**add(Dense(150,activation**=**'relu'))

model**.**add(Dense(1,activation**=**'sigmoid'))

**Configure the learning process**

In [60]:

model**.**compile(loss **=** 'binary\_crossentropy',

optimizer **=** "adam",

metrics **=** ["accuracy"])

**Train the model**

In [62]:

model**.**fit\_generator(x\_train,steps\_per\_epoch**=**14,epochs**=**5,validation\_data**=**x\_test,validation\_steps**=**4)

Epoch 1/5

14/14 [==============================] - 33s 2s/step - loss: 0.5697 - accuracy: 0.7018 - val\_loss: 0.2470 - val\_accuracy: 0.9421

Epoch 2/5

14/14 [==============================] - 36s 3s/step - loss: 0.3486 - accuracy: 0.8280 - val\_loss: 0.1461 - val\_accuracy: 0.9752

Epoch 3/5

14/14 [==============================] - 30s 2s/step - loss: 0.2088 - accuracy: 0.9060 - val\_loss: 0.0464 - val\_accuracy: 0.9917

Epoch 4/5

14/14 [==============================] - 34s 2s/step - loss: 0.1883 - accuracy: 0.9128 - val\_loss: 0.0730 - val\_accuracy: 0.9669

Epoch 5/5

14/14 [==============================] - 30s 2s/step - loss: 0.1682 - accuracy: 0.9220 - val\_loss: 0.0353 - val\_accuracy: 1.0000

Out[62]:

**Save The Model**

In [31]:

model**.**save("/content/drive/MyDrive/archive(1)/forest1.h5")

**Predictions**

In [32]:

predictions **=** model**.**predict(test\_dataset)

predictions **=** np**.**round(predictions)

4/4 [==============================] - 6s 1s/step

In [33]:

predictions

Out[33]:

array([[1.],

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[1.],

[1.]], dtype=float32)

In [34]:

print(len(predictions))

121

In [36]:

*#import load\_model from keras.model*

**from** keras.models **import** load\_model

*#import image class from keras*

**import** tensorflow **as** tf

**from** tensorflow.keras.preprocessing **import** image

*#import numpy*

**import** numpy **as** np

*#import cv2*

**import** cv2

In [37]:

*#load the saved model*

model **=** load\_model("/content/drive/MyDrive/archive(1)/forest1.h5")

In [38]:

**def** predictImage(filename):

img1 **=** image**.**load\_img(filename,target\_size**=**(128,128))

Y **=** image**.**img\_to\_array(img1)

X **=** np**.**expand\_dims(Y,axis**=**0)

val **=** model**.**predict(X)

print(val)

**if** val **==** 1:

print(" fire")

**elif** val **==** 0:

print("no fire")

In [39]:

predictImage("/content/drive/MyDrive/Dataset/test\_set/with fire/19464620\_401.jpg")

1/1 [==============================] - 0s 109ms/step

[[1.]]

fire

**OpenCV For Video Processing**

In [40]:

pip install twilio

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/

Collecting twilio

Downloading twilio-7.15.2-py2.py3-none-any.whl (1.4 MB)

|████████████████████████████████| 1.4 MB 7.6 MB/s

Requirement already satisfied: requests>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from twilio) (2.23.0)

Collecting PyJWT<3.0.0,>=2.0.0

Downloading PyJWT-2.6.0-py3-none-any.whl (20 kB)

Requirement already satisfied: pytz in /usr/local/lib/python3.7/dist-packages (from twilio) (2022.6)

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: 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)

Installing collected packages: PyJWT, twilio

Successfully installed PyJWT-2.6.0 twilio-7.15.2

In [41]:

pip install playsound

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/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) ... done

Created wheel for playsound: filename=playsound-1.3.0-py3-none-any.whl size=7035 sha256=81d5eaff42a76c8c818cc053e8955fc8ef345b03824112ae2c4da8cb45109e4d

Stored in directory: /root/.cache/pip/wheels/ba/f8/bb/ea57c0146b664dca3a0ada4199b0ecb5f9dfcb7b7e22b65ba2

Successfully built playsound

Installing collected packages: playsound

Successfully installed playsound-1.3.0

In [42]:

*#import opencv librariy*

**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

*#imort 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.

In [44]:

*#load the saved model*

model **=** load\_model(r'/content/drive/MyDrive/archive(1)/forest1.h5')

*#define video*

video **=** cv2**.**VideoCapture('/content/Fighting Fire with Fire \_ Explained in 30 Seconds.mp4')

*#define the features*

name **=** ['forest','with forest']

**Creating An Account In Twilio Service**

In [45]:

account\_sid**=**'ACfb4e6d0e7b0d25def63044919f1b96e3'

auth\_token**=**'f9ae4fc4a617a527da8672e97eefb2d8'

client**=**Client(account\_sid,auth\_token)

message**=**client**.**messages \

**.**create(

body**=**'Forest Fire is detected, stay alert',

from\_**=**'+1 302 248 4366',

to**=**'+91 99400 12164'

)

print(message**.**sid)

SMaf67c32f7d9ec38f512cb2c156f53076

**Sending Alert Message**

In [47]:

pip install pygobject

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/

Requirement already satisfied: pygobject in /usr/lib/python3/dist-packages (3.26.1)

In [91]:

**def** message(val):

**if** val**==**1:

**from** twilio.rest **import** Client

print('Forest fire')

account\_sid**=**'ACfb4e6d0e7b0d25def63044919f1b96e3'

auth\_token**=**'f9ae4fc4a617a527da8672e97eefb2d8'

client**=**Client(account\_sid,auth\_token)

message**=**client**.**messages \

**.**create(

body**=**'forest fire is detected, stay alert',

*#use twilio free number*

from\_**=**'+1 302 248 4366',

*#to number*

to**=**'+91 99400 12164')

print(message**.**sid)

print("Fire detected")

print("SMS Sent!")

**elif** val**==**0:

print('No Fire')

In [92]:

**from** matplotlib **import** pyplot **as** plt

*#import load model from keras.model*

**from** keras.models **import** load\_model

*#import image from keras*

**from** tensorflow.keras.preprocessing **import** image

img1 **=** image**.**load\_img('/content/drive/MyDrive/Dataset/test\_set/with fire/Wild\_fires.jpg',target\_size**=**(128,128))

Y **=** image**.**img\_to\_array(img1)

x **=** np**.**expand\_dims(Y,axis**=**0)

val **=** model**.**predict(x)

plt**.**imshow(img1)

plt**.**show()

message(val)

1/1 [==============================] - 0s 28ms/step



Forest fire

SMf2ce71b88007bab016938ac47f34eedf

Fire detected

SMS Sent!

In [93]:

img2 **=** image**.**load\_img('/content/drive/MyDrive/Dataset/test\_set/forest/1200px\_Mountainarea.jpg',target\_size**=**(128,128))

Y **=** image**.**img\_to\_array(img2)

x **=** np**.**expand\_dims(Y,axis**=**0)

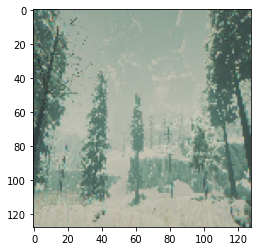
val **=** model**.**predict(x)

plt**.**imshow(img2)

plt**.**show()

message(val)

1/1 [==============================] - 0s 27ms/step



No Fire