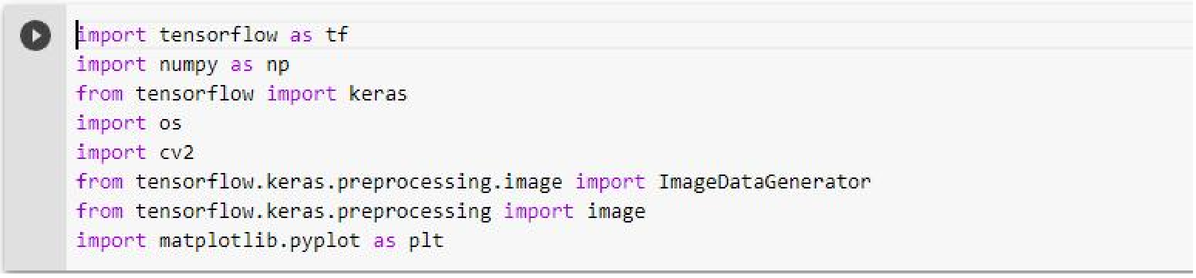
Sending Alert Message

Date	:	11 November 2022
Team ID	:	PNT2022TMID48059
Project Name	:	Emerging Methods For Early Detection of Forest Fires

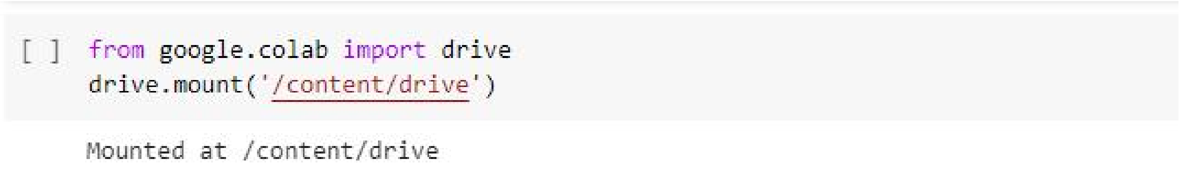
Download the dataset

Download Dataset

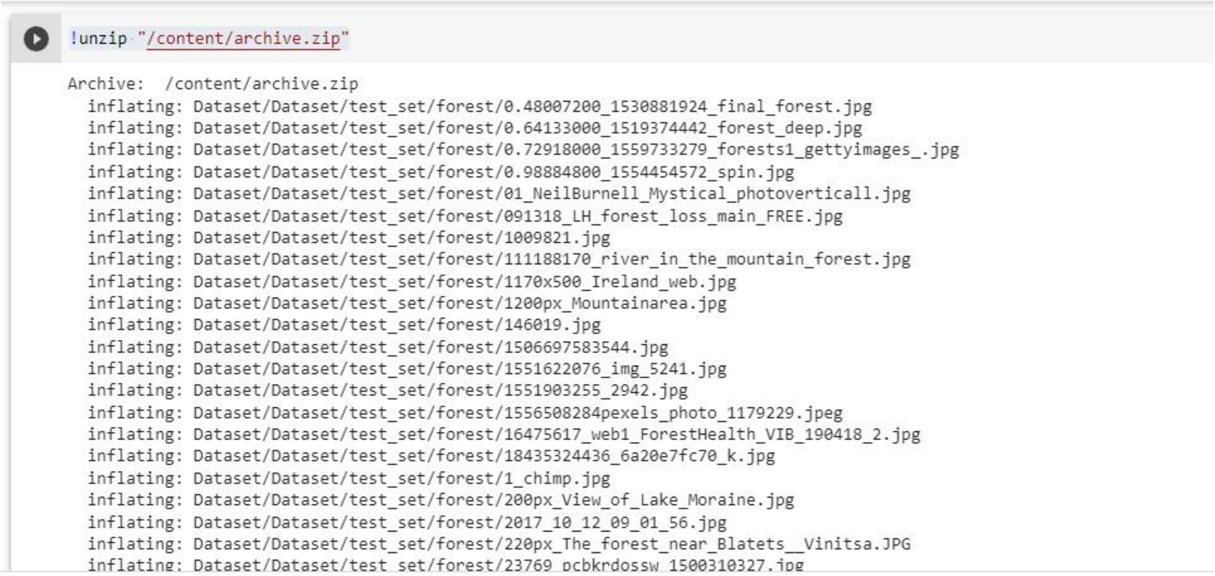
Import the necessary libraries



```
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
import matplotlib.pyplot as plt
```



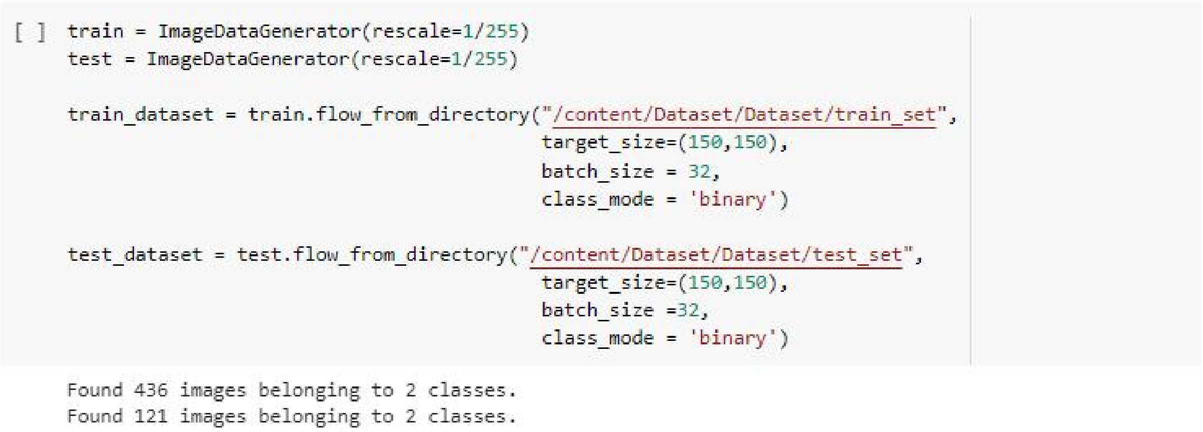
```
[ ]  from google.colab import drive
     drive.mount('/content/drive')

     Mounted at /content/drive
```



```
!unzip "/content/archive.zip"
```

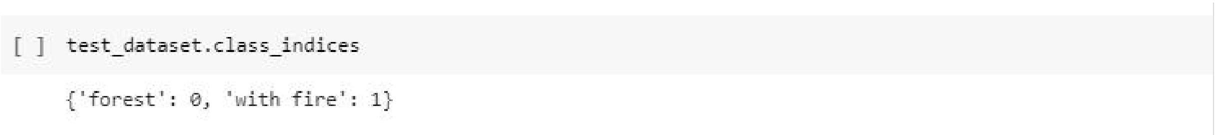
```
Archive:  /content/archive.zip
  inflating: Dataset/Dataset/test_set/forest/0.48007200_1530881924_final_forest.jpg
  inflating: Dataset/Dataset/test_set/forest/0.64133000_1519374442_forest_deep.jpg
  inflating: Dataset/Dataset/test_set/forest/0.72918000_1559733279_forests1_gettyimages_.jpg
  inflating: Dataset/Dataset/test_set/forest/0.98884800_1554454572_spin.jpg
  inflating: Dataset/Dataset/test_set/forest/01_NeilBurnell_Mystical_photoverticall.jpg
  inflating: Dataset/Dataset/test_set/forest/091318_LH_forest_loss_main_FREE.jpg
  inflating: Dataset/Dataset/test_set/forest/1009821.jpg
  inflating: Dataset/Dataset/test_set/forest/111188170_river_in_the_mountain_forest.jpg
  inflating: Dataset/Dataset/test_set/forest/1170x500_Ireland_web.jpg
  inflating: Dataset/Dataset/test_set/forest/1200px_Mountainarea.jpg
  inflating: Dataset/Dataset/test_set/forest/146019.jpg
  inflating: Dataset/Dataset/test_set/forest/1506697583544.jpg
  inflating: Dataset/Dataset/test_set/forest/1551622076_img_5241.jpg
  inflating: Dataset/Dataset/test_set/forest/1551903255_2942.jpg
  inflating: Dataset/Dataset/test_set/forest/1556508284pexels_photo_1179229.jpeg
  inflating: Dataset/Dataset/test_set/forest/16475617_web1_ForestHealth_VIB_190418_2.jpg
  inflating: Dataset/Dataset/test_set/forest/18435324436_6a20e7fc70_k.jpg
  inflating: Dataset/Dataset/test_set/forest/1_chimp.jpg
  inflating: Dataset/Dataset/test_set/forest/200px_View_of_Lake_Moraine.jpg
  inflating: Dataset/Dataset/test_set/forest/2017_10_12_09_01_56.jpg
  inflating: Dataset/Dataset/test_set/forest/220px_The_forest_near_Blatets__Vinitsa.JPG
  inflating: Dataset/Dataset/test_set/forest/23769_pcbkrdossw_1500310327.jpg
```

Split into training and test data



```
[ ]  train = ImageDataGenerator(rescale=1/255)
     test = ImageDataGenerator(rescale=1/255)

     train_dataset = train.flow_from_directory("/content/Dataset/Dataset/train_set",
                                               target_size=(150,150),
                                               batch_size = 32,
                                               class_mode = 'binary')

     test_dataset = test.flow_from_directory("/content/Dataset/Dataset/test_set",
                                               target_size=(150,150),
                                               batch_size =32,
                                               class_mode = 'binary')
```

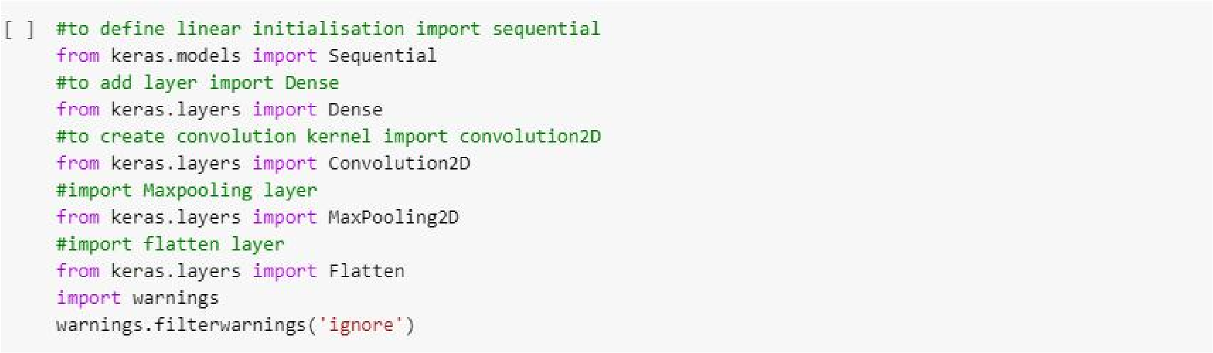
```
Found 436 images belonging to 2 classes.
Found 121 images belonging to 2 classes.
```



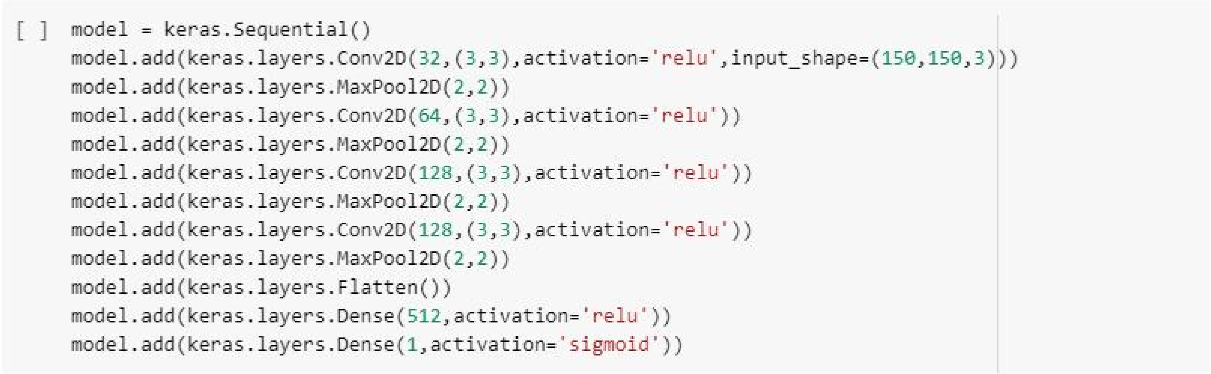
```
[ ]  test_dataset.class_indices
```

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

Create model for CNN

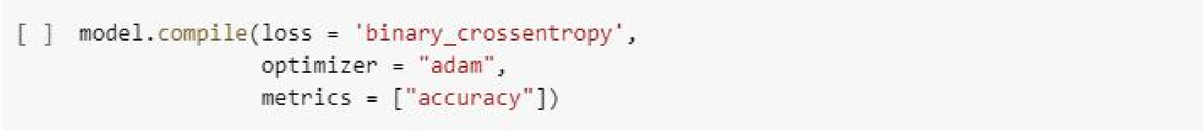


```
[ ]  #to define linear initialisation import sequential
     from keras.models import Sequential
     #to add layer import Dense
     from keras.layers import Dense
     #to create convolution kernel import convolution2D
     from keras.layers import Convolution2D
     #import Maxpooling layer
     from keras.layers import MaxPooling2D
     #import flatten layer
     from keras.layers import Flatten
     import warnings
     warnings.filterwarnings('ignore')
```



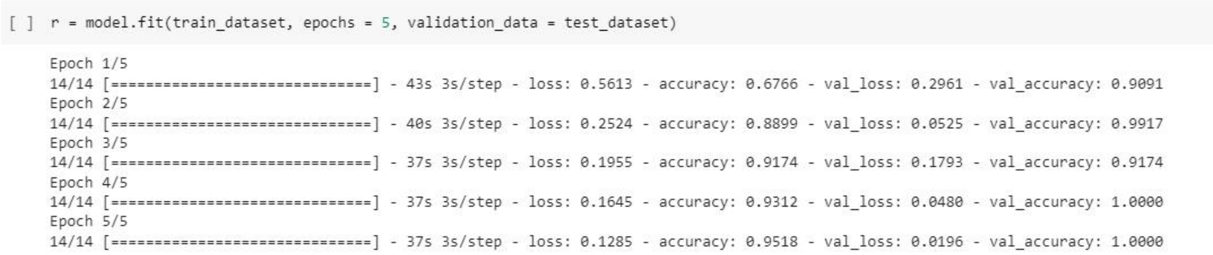
```
[ ]  model = keras.Sequential()
     model.add(keras.layers.Conv2D(32,(3,3),activation='relu',input_shape=(150,150,3)))
     model.add(keras.layers.MaxPool2D(2,2))
     model.add(keras.layers.Conv2D(64,(3,3),activation='relu'))
     model.add(keras.layers.MaxPool2D(2,2))
     model.add(keras.layers.Conv2D(128,(3,3),activation='relu'))
     model.add(keras.layers.MaxPool2D(2,2))
     model.add(keras.layers.Conv2D(128,(3,3),activation='relu'))
     model.add(keras.layers.MaxPool2D(2,2))
     model.add(keras.layers.Flatten())
     model.add(keras.layers.Dense(512,activation='relu'))
     model.add(keras.layers.Dense(1,activation='sigmoid'))
```

Compile the model



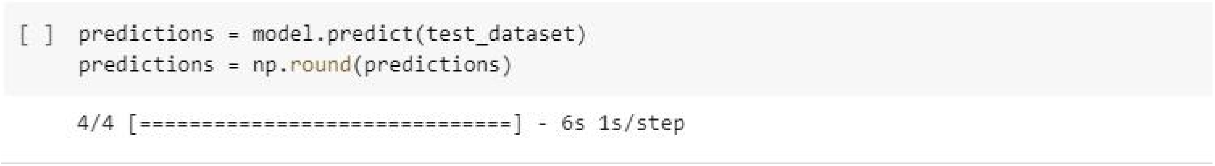
```
[ ]  model.compile(loss = 'binary_crossentropy',
                   optimizer = "adam",
                   metrics = ["accuracy"])
```

Fit the model

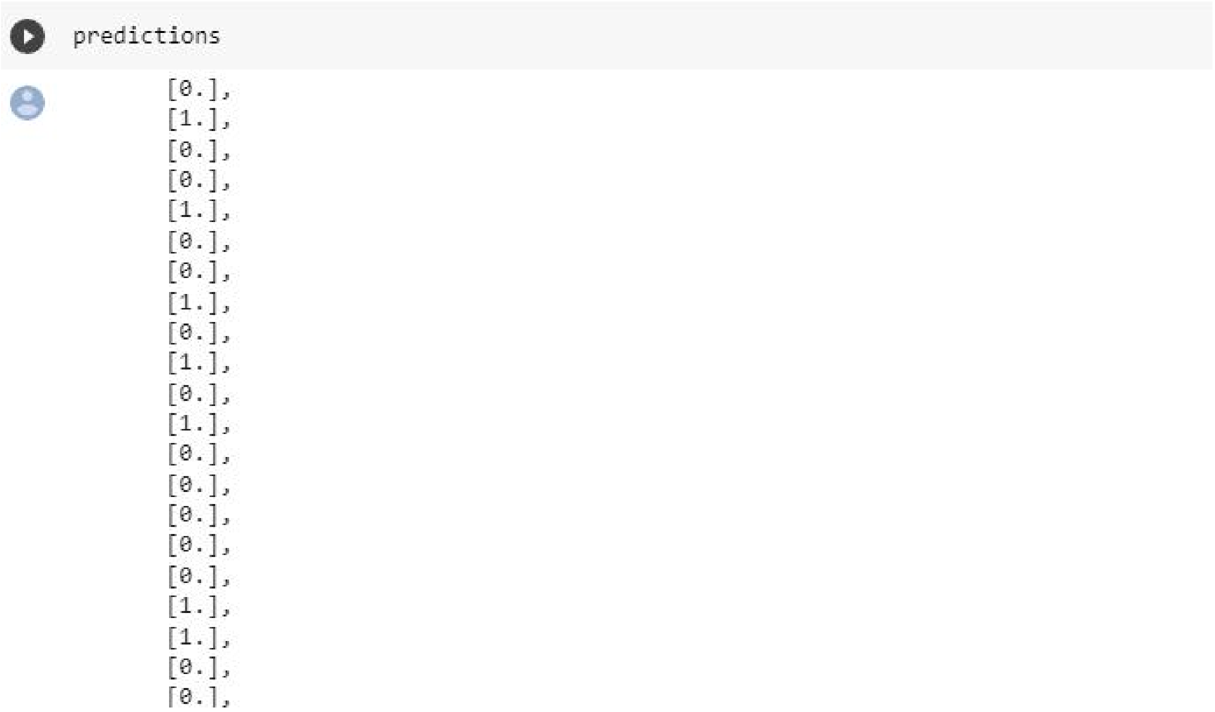


```
[ ]  r = model.fit(train_dataset, epochs = 5, validation_data = test_dataset)

     Epoch 1/5
     14/14 [==============================] - 43s 3s/step - loss: 0.5613 - accuracy: 0.6766 - val_loss: 0.2961 - val_accuracy: 0.9091
     Epoch 2/5
     14/14 [==============================] - 40s 3s/step - loss: 0.2524 - accuracy: 0.8899 - val_loss: 0.0525 - val_accuracy: 0.9917
     Epoch 3/5
     14/14 [==============================] - 37s 3s/step - loss: 0.1955 - accuracy: 0.9174 - val_loss: 0.1793 - val_accuracy: 0.9174
     Epoch 4/5
     14/14 [==============================] - 37s 3s/step - loss: 0.1645 - accuracy: 0.9312 - val_loss: 0.0480 - val_accuracy: 1.0000
     Epoch 5/5
     14/14 [==============================] - 37s 3s/step - loss: 0.1285 - accuracy: 0.9518 - val_loss: 0.0196 - val_accuracy: 1.0000
```

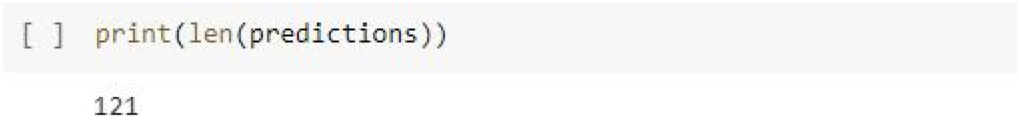
Predictions



```
[ ]  predictions = model.predict(test_dataset)
     predictions = np.round(predictions)

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

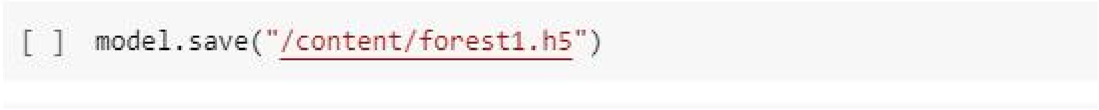


```
predictions

        [0.],
        [1.],
        [0.],
        [0.],
        [1.],
        [0.],
        [0.],
        [1.],
        [0.],
        [1.],
        [0.],
        [1.],
        [0.],
        [0.],
        [0.],
        [0.],
        [0.],
        [1.],
        [1.],
        [0.],
        [0.],
```



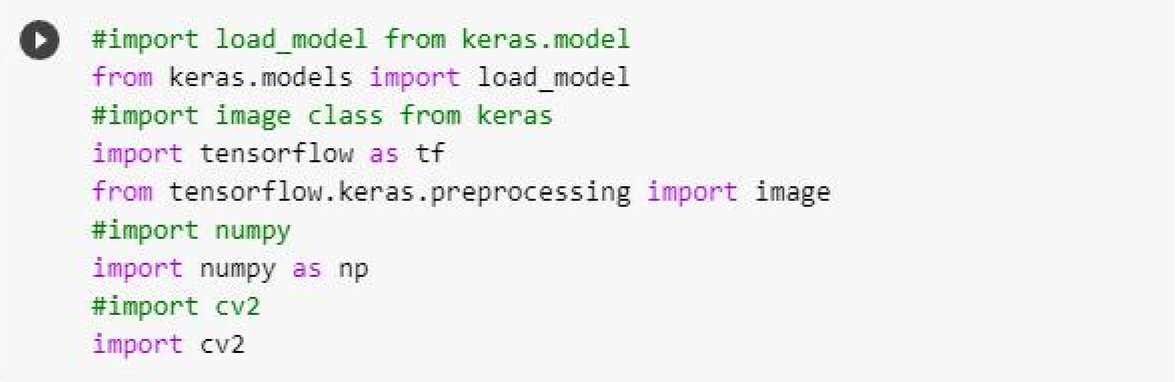
```
[ ]  print(len(predictions))

     121
```

Save the model

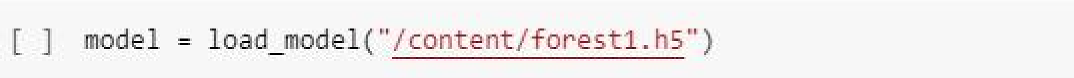


```
[ ]  model.save("/content/forest1.h5")
```

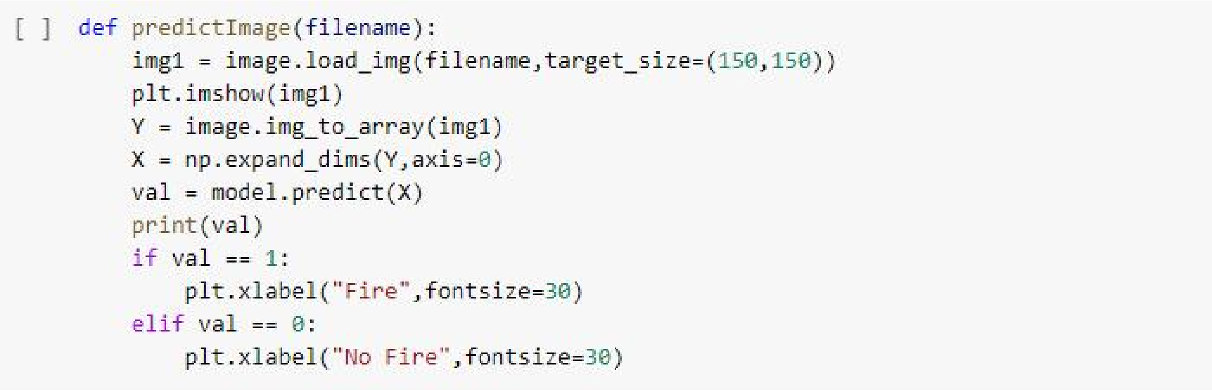
Predicting the images



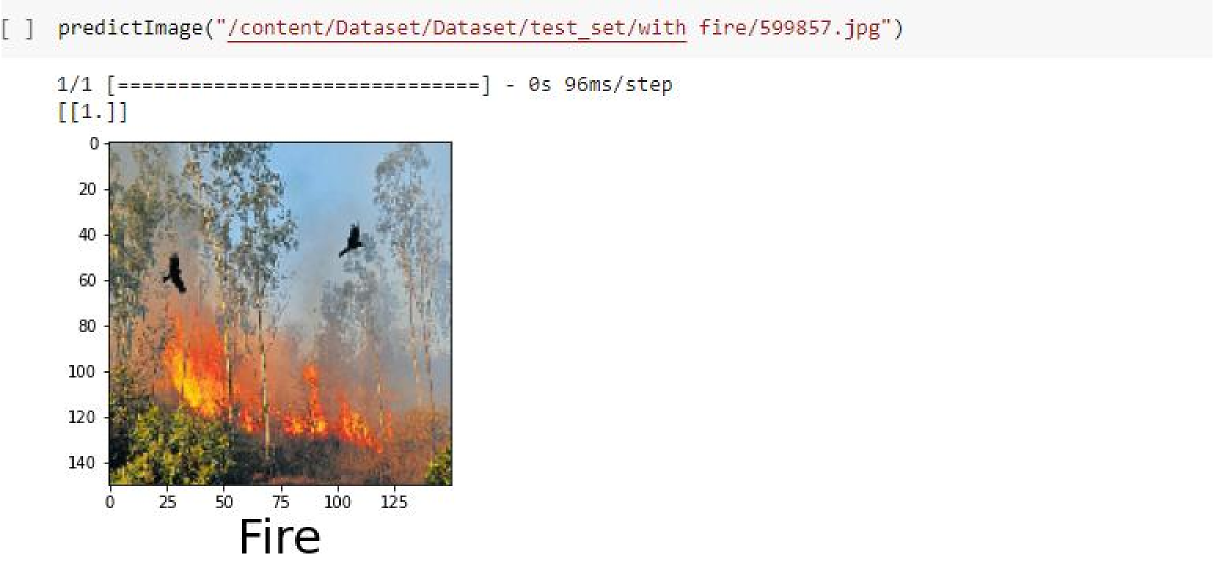
```
#import load_model from keras.model
from keras.models import load_model
#import image class from keras
import tensorflow as tf
from tensorflow.keras.preprocessing import image
#import numpy
import numpy as np
#import cv2
import cv2
```



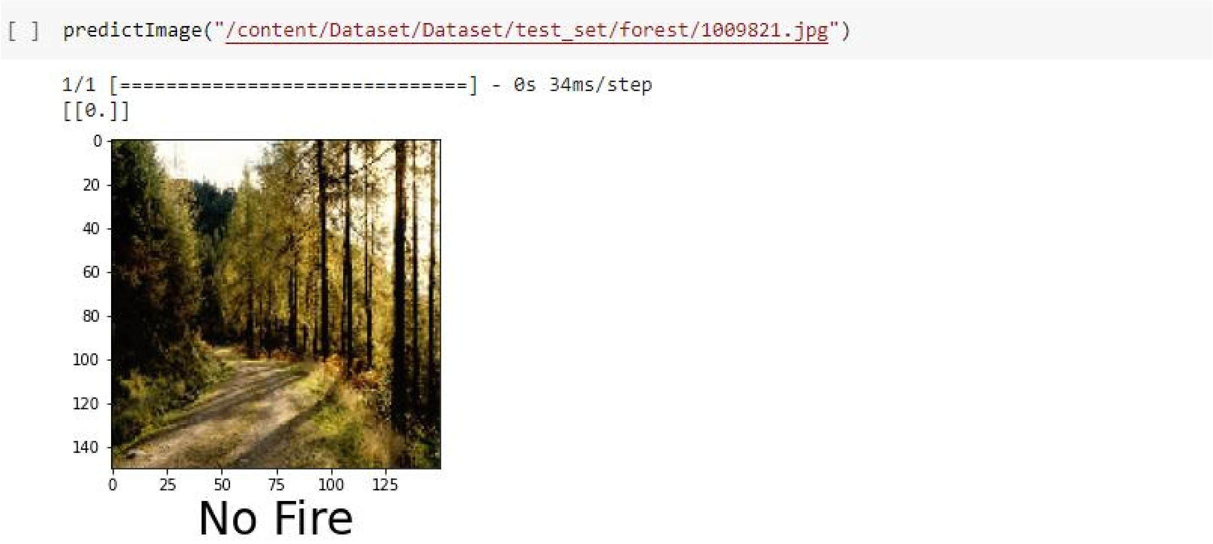
```
[ ]  model = load_model("/content/forest1.h5")
```



```
[ ]  def predictImage(filename):
         img1 = image.load_img(filename,target_size=(150,150))
         plt.imshow(img1)
         Y = image.img_to_array(img1)
         X = np.expand_dims(Y,axis=0)
         val = model.predict(X)
         print(val)
         if val == 1:
             plt.xlabel("Fire",fontsize=30)
         elif val == 0:
             plt.xlabel("No Fire",fontsize=30)
```

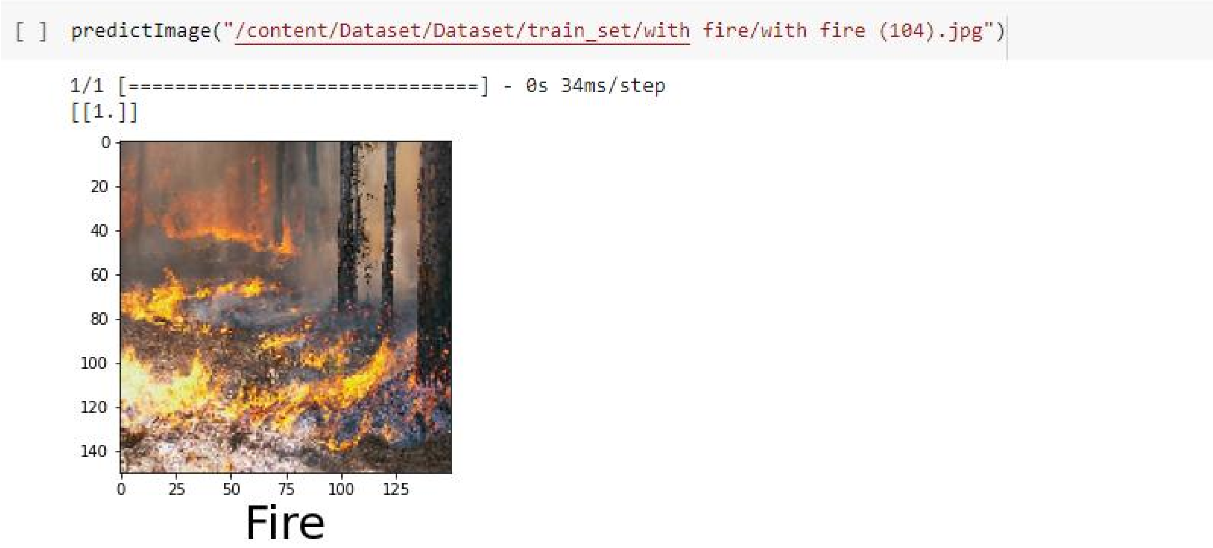


```
[ ]  predictImage("/content/Dataset/Dataset/test_set/with fire/599857.jpg")

     1/1 [==============================] - 0s 96ms/step
     [[1.]]
```



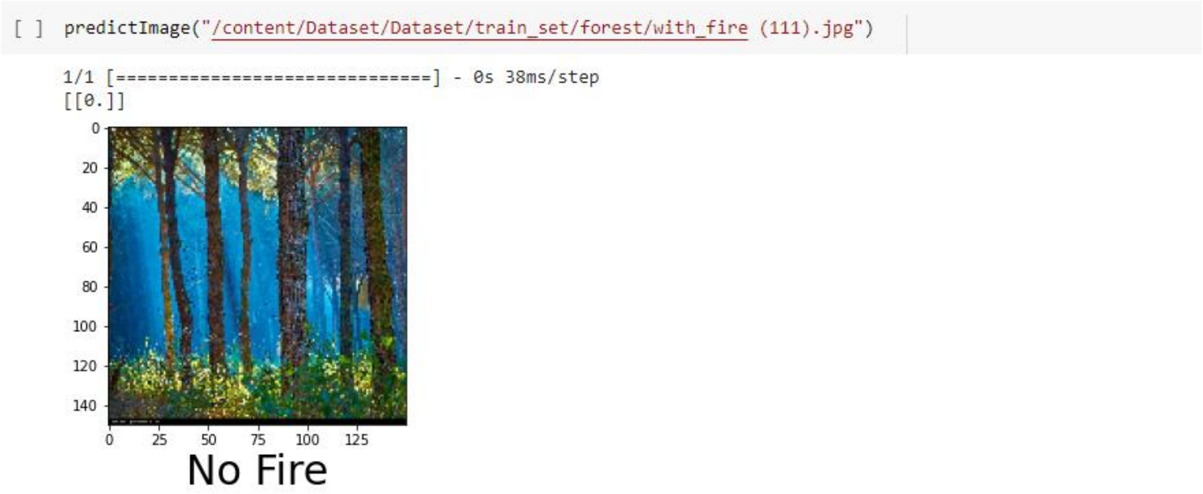
```
[ ]  predictImage("/content/Dataset/Dataset/test_set/forest/1009821.jpg")
```

```
1/1 [==============================] - 0s 34ms/step
[[0.]]
```



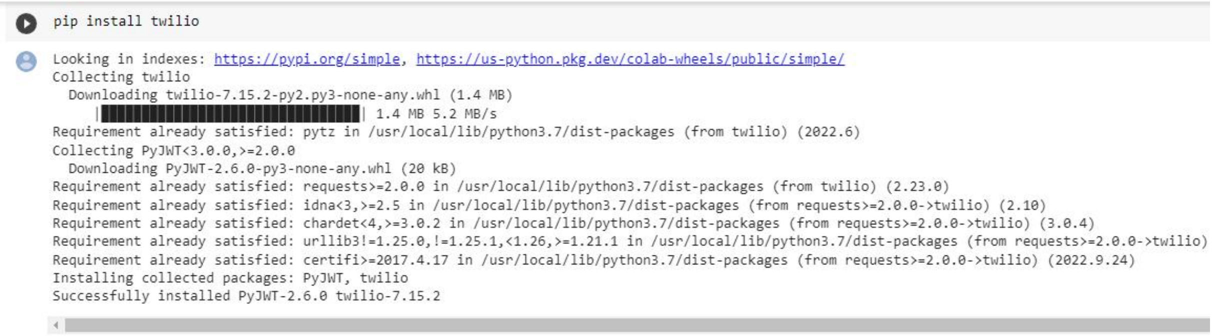
```
[ ]  predictImage("/content/Dataset/Dataset/train_set/with fire/with fire (104).jpg")
```

```
1/1 [==============================] - 0s 34ms/step
[[1.]]
```



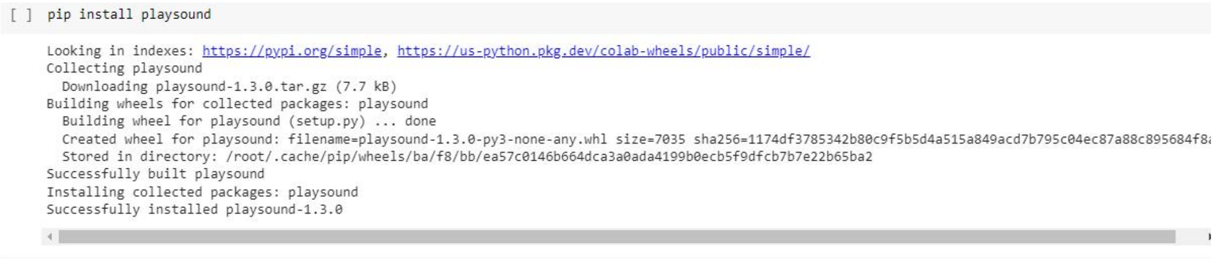
```
[ ]  predictImage("/content/Dataset/Dataset/train_set/forest/with_fire (111).jpg")

     1/1 [==============================] - 0s 38ms/step
     [[0.]]
```

Pip install twilio



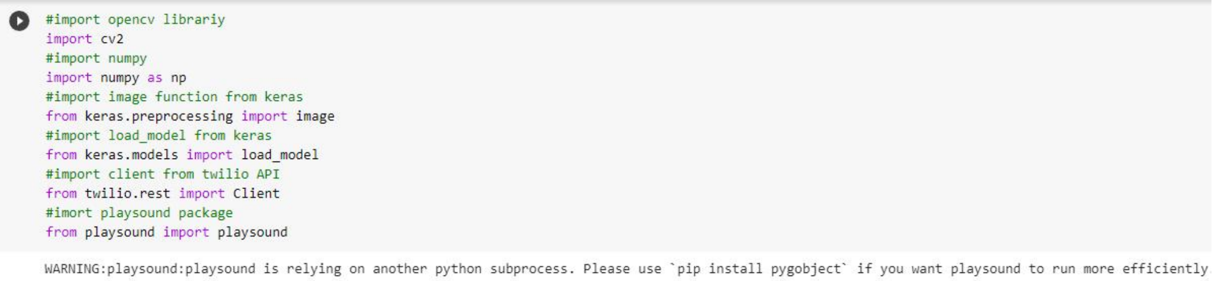
```
pip install twilio

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 5.2 MB/s
Requirement already satisfied: pytz in /usr/local/lib/python3.7/dist-packages (from twilio) (2022.6)
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/dist-packages (from twilio) (2.23.0)
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)
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)
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
```

Pip install playsound



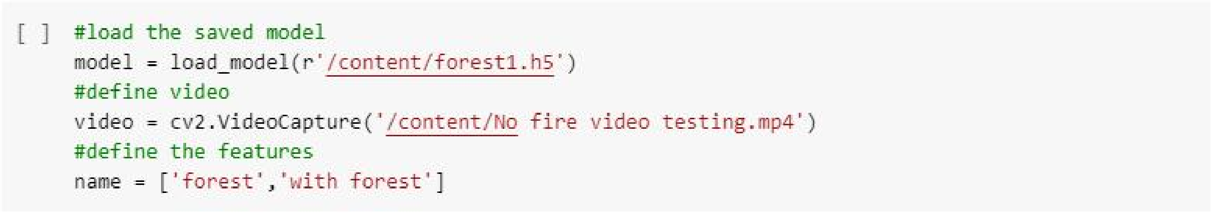
```
[ ]  pip install playsound

     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=1174df3785342b80c9f5b5d4a515a849acd7b795c04ec87a88c895684f8a
       Stored in directory: /root/.cache/pip/wheels/ba/f8/bb/ea57c0146b664dca3a0ada4199b0ecb5f9dfcb7b7e22b65ba2
     Successfully built playsound
     Installing collected packages: playsound
     Successfully installed playsound-1.3.0
```

OpenCV for video processing



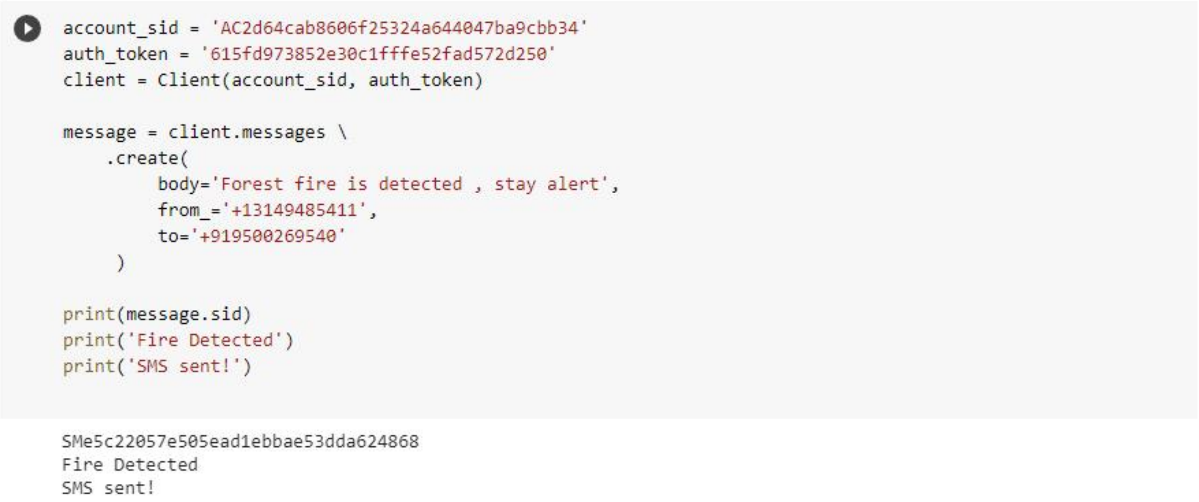
```
#import opencv librariy
import cv2
#import numpy
import numpy as np
#import image function from keras
from keras.preprocessing import image
#import load_model from keras
from keras.models import load_model
#import client from twilio API
from twilio.rest import Client
#imort playsound package
from 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
```



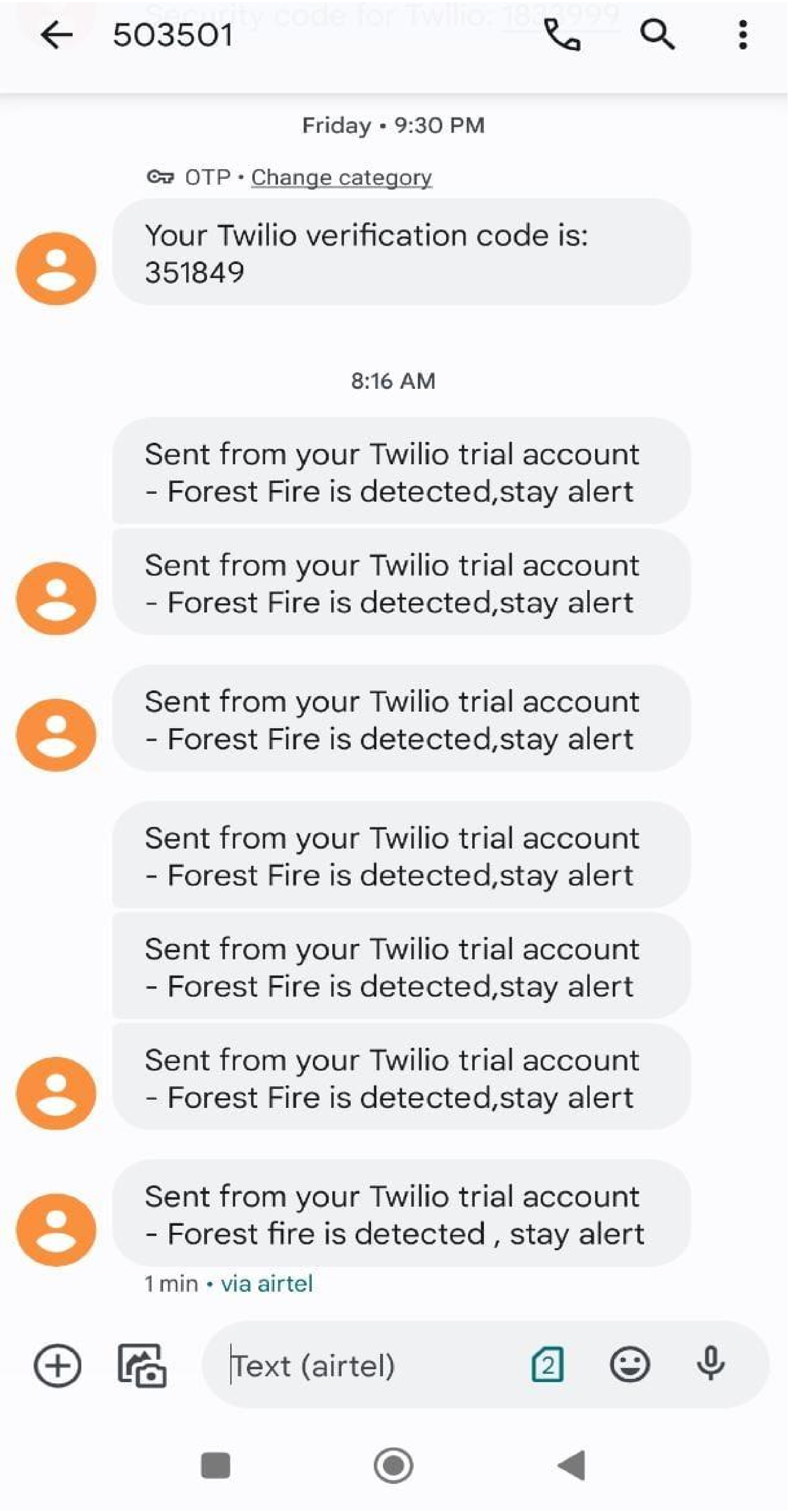
```
[ ]  #load the saved model
     model = load_model(r'/content/forest1.h5')
     #define video
     video = cv2.VideoCapture('/content/No fire video testing.mp4')
     #define the features
     name = ['forest','with forest']
```

Sending alert message



```
account_sid = 'AC2d64cab8606f25324a644047ba9cbb34'
auth_token = '615fd973852e30c1fffe52fad572d250'
client = Client(account_sid, auth_token)

message = client.messages \
    .create(
         body='Forest fire is detected , stay alert',
         from_='+13149485411',
         to='+919500269540'
     )

print(message.sid)
print('Fire Detected')
print('SMS sent!')
```

```
SMe5c22057e505ead1ebbae53dda624868
Fire Detected
SMS sent!
```



Security code for Twilio: 1833999

503501

Friday • 9:30 PM

OTP • Change category

Your Twilio verification code is: 351849

8:16 AM

Sent from your Twilio trial account - Forest Fire is detected,stay alert

Sent from your Twilio trial account - Forest Fire is detected,stay alert

Sent from your Twilio trial account - Forest Fire is detected,stay alert

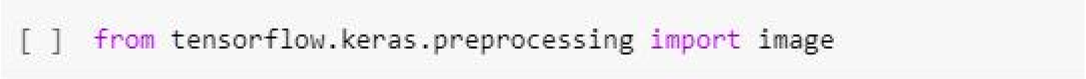
Sent from your Twilio trial account - Forest Fire is detected,stay alert

Sent from your Twilio trial account - Forest Fire is detected,stay alert

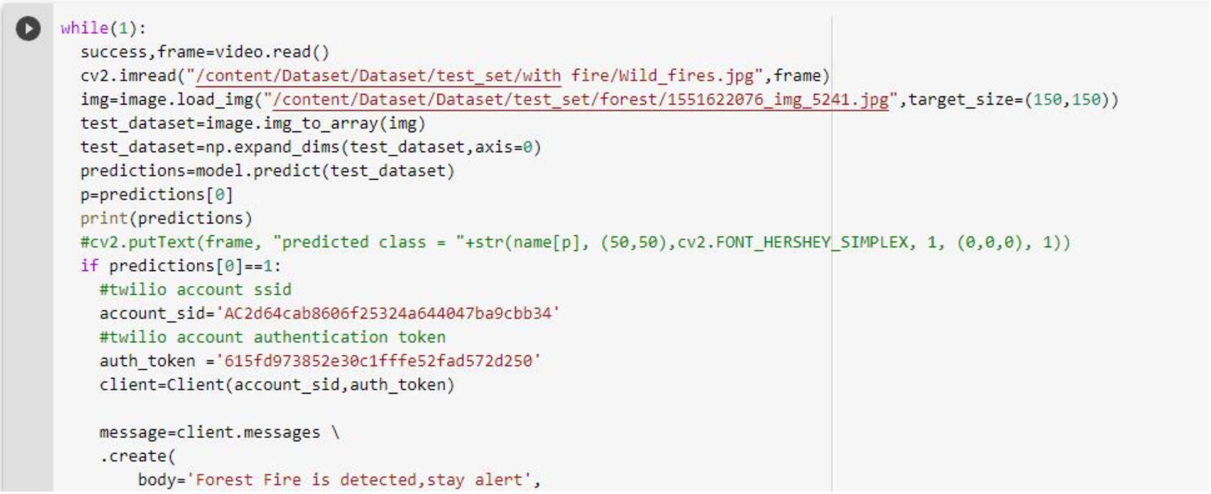
Sent from your Twilio trial account - Forest Fire is detected,stay alert

Sent from your Twilio trial account - Forest fire is detected , stay alert

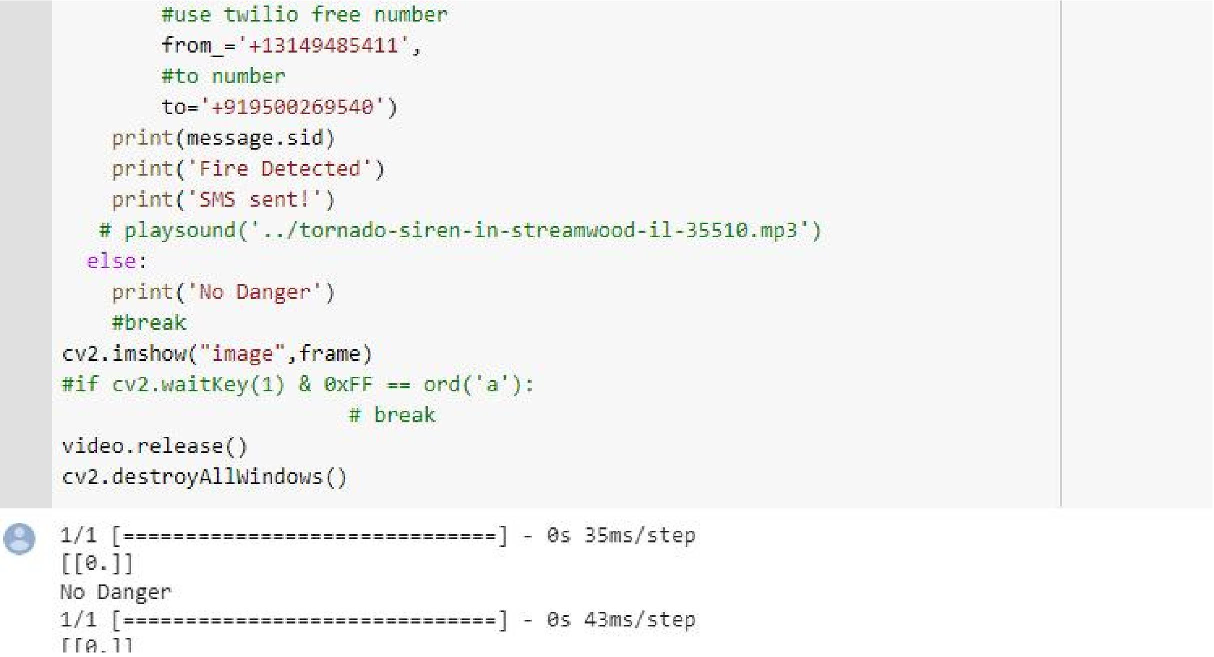
1 min • via airtel



```
[ ]  from tensorflow.keras.preprocessing import image
```

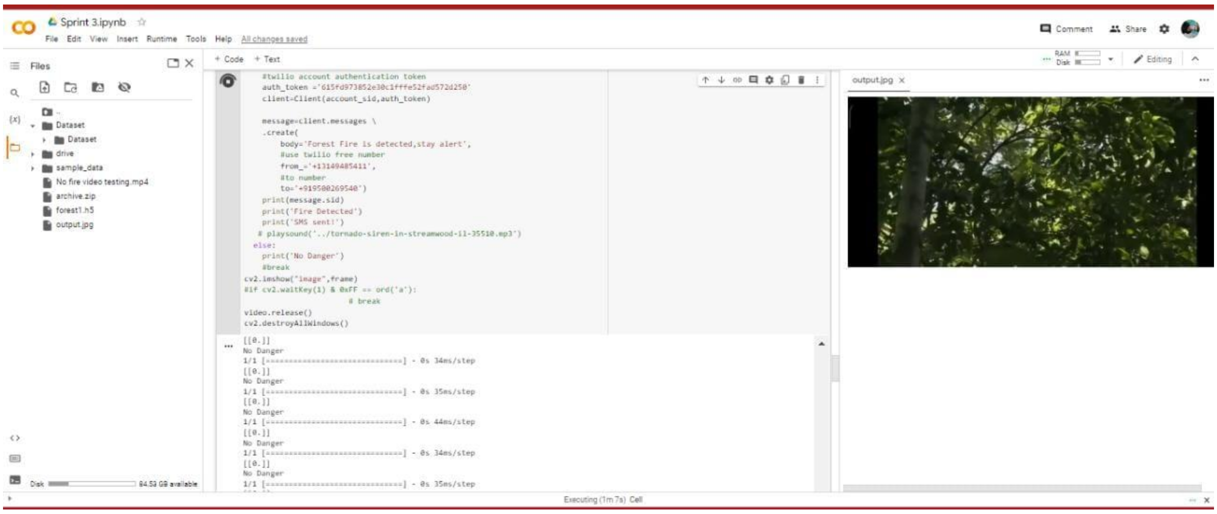


```
while(1):
  success,frame=video.read()
  cv2.imread("/content/Dataset/Dataset/test_set/with fire/Wild_fires.jpg",frame)
  img=image.load_img("/content/Dataset/Dataset/test_set/forest/1551622076_img_5241.jpg",target_size=(150,150))
  test_dataset=image.img_to_array(img)
  test_dataset=np.expand_dims(test_dataset,axis=0)
  predictions=model.predict(test_dataset)
  p=predictions[0]
  print(predictions)
  #cv2.putText(frame, "predicted class = "+str(name[p], (50,50),cv2.FONT_HERSHEY_SIMPLEX, 1, (0,0,0), 1))
  if predictions[0]==1:
    #twilio account ssid
    account_sid='AC2d64cab8606f25324a644047ba9cbb34'
    #twilio account authentication token
    auth_token ='615fd973852e30c1fffe52fad572d250'
    client=Client(account_sid,auth_token)

    message=client.messages \
    .create(
        body='Forest Fire is detected,stay alert',
```



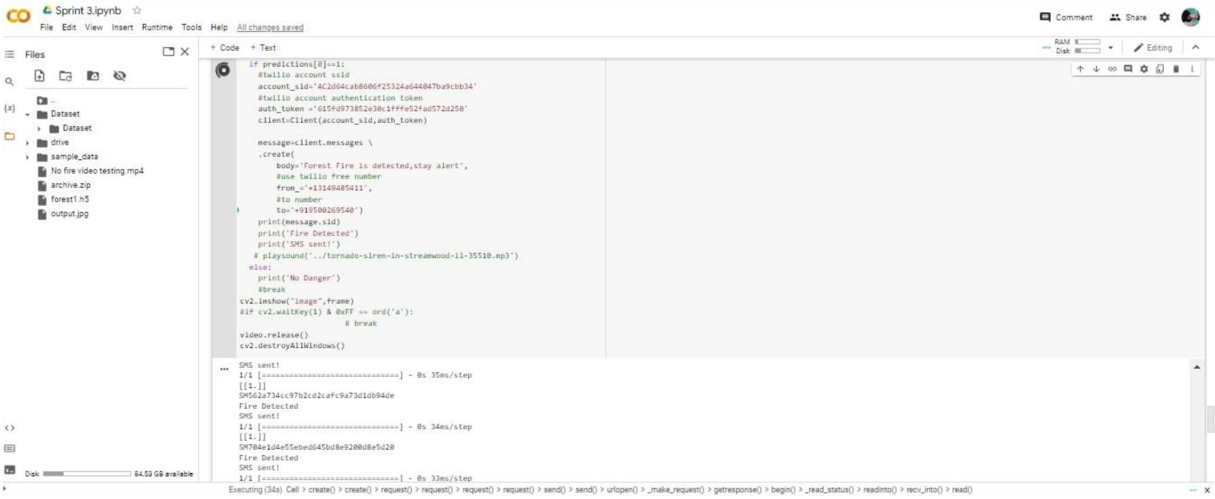
```
        #use twilio free number
        from_='+13149485411',
        #to number
        to='+919500269540')
    print(message.sid)
    print('Fire Detected')
    print('SMS sent!')
   # playsound('../tornado-siren-in-streamwood-il-35510.mp3')
  else:
    print('No Danger')
    #break
cv2.imshow("image",frame)
#if cv2.waitKey(1) & 0xFF == ord('a'):
                       # break
video.release()
cv2.destroyAllWindows()
```

```
1/1 [==============================] - 0s 35ms/step
[[0.]]
No Danger
1/1 [==============================] - 0s 43ms/step
[[0.]]
```



```
    #twilio account authentication token
    auth_token ='615fd973852e30c1fffe52fad572d250'
    client=Client(account_sid,auth_token)

    message=client.messages \
    .create(
        body='Forest Fire is detected,stay alert',
        #use twilio free number
        from_='+13149485411',
        #to number
        to='+919500269540')
    print(message.sid)
    print('Fire Detected')
    print('SMS sent!')
   # playsound('../tornado-siren-in-streamwood-il-35510.mp3')
  else:
    print('No Danger')
    #break
cv2.imshow("image",frame)
#if cv2.waitKey(1) & 0xFF == ord('a'):
                        # break
video.release()
cv2.destroyAllWindows()
```

```
[[0.]]
No Danger
1/1 [==============================] - 0s 34ms/step
[[0.]]
No Danger
1/1 [==============================] - 0s 35ms/step
[[0.]]
No Danger
1/1 [==============================] - 0s 44ms/step
[[0.]]
No Danger
1/1 [==============================] - 0s 34ms/step
[[0.]]
No Danger
1/1 [==============================] - 0s 35ms/step
```


Sprint 3.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
+ Code + Text
RAM Disk
Editing
..
Dataset
Dataset
drive
sample_data
No fire video testing.mp4
archive.zip
forest1.h5
output.jpg
Disk 84.53 GB available
Executing (34s) Cell > create() > create() > request() > request() > request() > request() > send() > send() > urlopen() > _make_request() > getresponse() > begin() > _read_status() > readinto() > recv_into() > read()

```
  if predictions[0]==1:
    #twilio account ssid
    account_sid='AC2d64cab8606f25324a644047ba9cbb34'
    #twilio account authentication token
    auth_token ='615fd973852e30c1fffe52fad572d250'
    client=Client(account_sid,auth_token)

    message=client.messages \
    .create(
        body='Forest Fire is detected,stay alert',
        #use twilio free number
        from_='+13149485411',
        #to number
        to='+919500269540')
    print(message.sid)
    print('Fire Detected')
    print('SMS sent!')
   # playsound('../tornado-siren-in-streamwood-il-35510.mp3')
  else:
    print('No Danger')
    #break
cv2.imshow("image",frame)
#if cv2.waitKey(1) & 0xFF == ord('a'):
                        # break
video.release()
cv2.destroyAllWindows()
```

```
SMS sent!
1/1 [==============================] - 0s 35ms/step
[[1.]]
SM562a734cc97b2cd2cafc9a73d1db94de
Fire Detected
SMS sent!
1/1 [==============================] - 0s 34ms/step
[[1.]]
SM704e1d4e55ebed645bd8e9200d8e5d20
Fire Detected
SMS sent!
1/1 [==============================] - 0s 33ms/step
```