In [ ]:

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

```
Mounted at /content/drive
```

In [ ]:

```
!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: wrapt>=1.11.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.14.1)
Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers<2,>=1.12 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.12)
Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (0.2.0)
Requirement already satisfied: setuptools in /usr/local/lib/python3.7/dist-packages (from tensorflow) (57.4.0)
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (3.3.0)
Requirement already satisfied: keras<2.10.0,>=2.9.0rc0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.9.0)
Requirement already satisfied: keras-preprocessing>=1.1.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.1.2)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.50.0)
Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (3.1.0)
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.1.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (4.1.1)
Requirement already satisfied: numpy>=1.20 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.21.6)
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: tensorboard<2.10,>=2.9 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (2.9.1)
Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-packages (from tensorflow) (21.3)
Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (14.0.6)
Requirement already satisfied: protobuf<3.20,>=3.9.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (3.17.3)
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: six>=1.12.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.15.0)
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: absl-py>=1.0.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow) (1.3.0)
Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.7/dist-packag
```

```
es (from astunparse>=1.6.0->tensorflow) (0.38.1)
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: google-auth<3,>=1.6.3 in /usr/local/lib/python3.7/dist-pac
kages (from tensorboard<2.10,>=2.9->tensorflow) (1.35.0)
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.7/dist-packa
ges (from tensorboard<2.10,>=2.9->tensorflow) (2.23.0)
Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /usr/local/lib/py
thon3.7/dist-packages (from tensorboard<2.10,>=2.9->tensorflow) (0.6.1)
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: 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-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: 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: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.7/dist-pac
kages (from google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (0.2.8)
Requirement already satisfied: cachetools<5.0,>=2.0.0 in /usr/local/lib/python3.7/dist-pa
ckages (from google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (4.2.4)
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.7/dist-packages (f
rom google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorflow) (4.9)
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-p
ackages (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-pack
ages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard<2.10,>=2.9->tensorfl
ow) (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: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (fr
om requests<3,>=2.21.0->tensorboard<2.10,>=2.9->tensorflow) (2.10)
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-package
s (from requests<3,>=2.21.0->tensorboard<2.10,>=2.9->tensorflow) (3.0.4)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packag
es (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/publi
c/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 (f
rom opencv-python) (1.21.6)
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/publi
c/simple/
Requirement already satisfied: opencv-contrib-python in /usr/local/lib/python3.7/dist-pac
kages (4.6.0.66)
Requirement already satisfied: numpy>=1.14.5 in /usr/local/lib/python3.7/dist-packages (f
rom opencv-contrib-python) (1.21.6)
```

In [ ]:

```
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)
```

In [ ]:

```
train_dataset = train.flow_from_directory("/content/drive/MyDrive/Dataset/Dataset/train_set",
                                          target_size=(128,128),
                                          batch_size = 32,
                                          class_mode = 'binary' )
```

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

In [ ]:

```
test_dataset = test.flow_from_directory("/content/drive/MyDrive/Dataset/Dataset/test_set",
                                          target_size=(128,128),
                                          batch_size = 32,
                                          class_mode = 'binary' )
```

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

In [ ]:

```
test_dataset.class_indices
```

Out[ ]:

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

In [ ]:

```
#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')
```

In [ ]:

```
model = keras.Sequential()
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())
```

In [ ]:

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

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

In [ ]:

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

In [ ]:

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

```
Epoch 1/5
14/14 [==============================] - 92s 7s/step - loss: 0.5798 - accuracy: 0.6628 -
```

```
val_loss: 0.3330 - val_accuracy: 0.8595
Epoch 2/5
14/14 [==============================] - 26s 2s/step - loss: 0.4139 - accuracy: 0.8280 -
val_loss: 0.1400 - val_accuracy: 0.9504
Epoch 3/5
14/14 [==============================] - 26s 2s/step - loss: 0.2800 - accuracy: 0.8922 -
val_loss: 0.1375 - val_accuracy: 0.9587
Epoch 4/5
14/14 [==============================] - 27s 2s/step - loss: 0.2440 - accuracy: 0.9014 -
val_loss: 0.1224 - val_accuracy: 0.9669
Epoch 5/5
14/14 [==============================] - 26s 2s/step - loss: 0.1856 - accuracy: 0.9243 -
val_loss: 0.0586 - val_accuracy: 0.9752
```

In [ ]:

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

```
4/4 [==============================] - 5s 1s/step
```

In [ ]:

```
predictions
```

Out[ ]:

```
array([[0.],
       [1.],
       [1.],
       [0.],
       [1.],
       [0.],
       [1.],
       [0.],
       [1.],
       [0.],
       [1.],
       [0.],
       [1.],
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       [1.],
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       [1.],
       [0.],
       [0.],
       [0.],
       [0.],
       [0.],
       [0.],
       [1.],
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       [1.],
       [0.],
       [0.],
       [0.],
       [0.],
       [0.],
       [0.],
       [0.],
       [0.],
```

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

```
       [1.],
       [0.],
       [1.],
       [0.]], dtype=float32)
```

In [ ]:

```
print(len(predictions))
```

```
121
```

In [ ]:

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

In [ ]:

```
#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 [ ]:

```
model = load_model("/content/drive/MyDrive/archive (1)/forest1.h5")
```

In [ ]:

```
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 [ ]:

```
predictImage("/content/drive/MyDrive/Dataset/Dataset/test_set/with fire/19464620_401.jpg"
)
```

```
1/1 [==============================] - 0s 125ms/step
[[1.]]
 fire
```

In [ ]:

```
pip install twilio
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/publi
c/simple/
Collecting twilio
  Downloading twilio-7.15.1-py2.py3-none-any.whl (1.4 MB)
     |████████████████████████████████| 1.4 MB 4.9 MB/s
Requirement already satisfied: requests>=2.0.0 in /usr/local/lib/python3.7/dist-packages
(from twilio) (2.23.0)
Requirement already satisfied: pytz in /usr/local/lib/python3.7/dist-packages (from twili
o) (2022.6)
Collecting PyJWT<3.0.0,>=2.0.0
  Downloading PyJWT-2.6.0-py3-none-any.whl (20 kB)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (fr
om requests>=2.0.0->twilio) (2.10)
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-package
```

```
s (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) (1.24.3)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packag
es (from requests>=2.0.0->twilio) (2022.9.24)
Installing collected packages: PyJWT, twilio
Successfully installed PyJWT-2.6.0 twilio-7.15.1
```

In [ ]:

```
pip install playsound
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/publi
c/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
=6cc8a594765dc045811d54129bc5e3fbe95669eecf509234f657cb6a9be4eb0c
  Stored in directory: /root/.cache/pip/wheels/ba/f8/bb/ea57c0146b664dca3a0ada4199b0ecb5f
9dfcb7b7e22b65ba2
Successfully built playsound
Installing collected packages: playsound
Successfully installed playsound-1.3.0
```

In [ ]:

```
#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 inst
all pygobject` if you want playsound to run more efficiently.
```

In [ ]:

```
#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']
```

In [ ]:

```
account_durai = 'AC04fd8c4ea21f7599b004db5c72066ee'
auth_token = '1928bb64202abc74a3ff94b70d5deec4'
client = Client(account_durai, auth_token)

message = client.messages \
    .create(
         body='Forest fire is detected , stay alert',
         from_='+16075363954',
         to='+919043062227'
     )

print(message.sid)
```

```
SMcd33e58fa6f60aa349ecba81dce9b48d
```

In [ ]:

In [ ]:

```
#import opencv library
import cv2
#import numpy
import numpy as np
#import images and load_model function from keras
from keras_preprocessing import image
from keras.models import load_model
#import client from twilio API
from  twilio.rest import Client
#import playsound package
from playsound import playsound

#load the saved model
model = load_model(r'/content/drive/MyDrive/archive (1)/forest1.h5')
video = cv2.VideoCapture('/content/Fighting Fire with Fire _ Explained in 30 Seconds.mp4'
)
name = ['forest','with fire']
```

In [ ]:

```

```