As our old twilio account has been expired.
we have done again with the new twilio account (authentication id)

Image Preprocessing

```
#importing keras library
import keras

#importing the image data generator
from matplotlib import pyplot as plt
from keras.preprocessing.image import ImageDataGenerator

#Defining the parameter for image generator class
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,rotati
on_range=180,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)

#Applying image data generator functionality to train set
x_train=train_datagen.flow_from_directory(r'D:\IBM\Dataset\train_set',
target_size=(128,128),batch_size=32,class_mode='binary')

Found 436 images belonging to 2 classes.

#Applying image data generator functionality to test set
x_test=test_datagen.flow_from_directory(r'D:\IBM\Dataset\test_set',
target_size=(128, 128),batch_size=32,class_mode='binary')

Found 121 images belonging to 2 classes.
```

Model Building

```
#To define linear intialisation import Sequential
from keras.models import Sequential
#To add layers import Dense
from keras.layers import Dense
#To creat Convolution kernal 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 convolution 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 convolution layer
model.add(Convolution2D(64,(3,3),activation='relu'))
```

```
#add maxpooling layer
model.add(MaxPooling2D(pool_size=(2,2)))
#add convolution layer
model.add(Convolution2D(128,(3,3),activation='relu'))
#add maxpooling layer
model.add(MaxPooling2D(pool_size=(2,2)))
#add convolution layer
model.add(Convolution2D(128,(3,3),activation='relu'))
#add maxpooling layer
model.add(MaxPooling2D(pool_size=(2,2)))
#add flatten layer
model.add(Flatten())

model.add(Dense(512,activation='relu'))
model.add(Dense(1,activation='sigmoid'))

#configuring the learning process
model.compile(loss='binary_crossentropy',optimizer="adam",metrics=["ac
curacy"])

#Training the model
r=model.fit(x_train,epochs=10,validation_data=x_test)
```

```
Epoch 1/10
14/14 [==============================] - 84s 6s/step - loss: 0.6308 -
accuracy: 0.7018 - val_loss: 0.2621 - val_accuracy: 0.8760
Epoch 2/10
14/14 [==============================] - 47s 3s/step - loss: 0.3211 -
accuracy: 0.8716 - val_loss: 0.0939 - val_accuracy: 0.9917
Epoch 3/10
14/14 [==============================] - 47s 3s/step - loss: 0.1914 -
accuracy: 0.9243 - val_loss: 0.0372 - val_accuracy: 0.9917
Epoch 4/10
14/14 [==============================] - 48s 3s/step - loss: 0.1565 -
accuracy: 0.9450 - val_loss: 0.0691 - val_accuracy: 0.9669
Epoch 5/10
14/14 [==============================] - 50s 4s/step - loss: 0.1557 -
accuracy: 0.9427 - val_loss: 0.0328 - val_accuracy: 0.9917
Epoch 6/10
14/14 [==============================] - 47s 3s/step - loss: 0.1514 -
accuracy: 0.9358 - val_loss: 0.0433 - val_accuracy: 0.9917
Epoch 7/10
14/14 [==============================] - 47s 3s/step - loss: 0.1670 -
accuracy: 0.9335 - val_loss: 0.0590 - val_accuracy: 0.9752
Epoch 8/10
14/14 [==============================] - 47s 3s/step - loss: 0.1394 -
accuracy: 0.9358 - val_loss: 0.0332 - val_accuracy: 0.9917
Epoch 9/10
14/14 [==============================] - 49s 4s/step - loss: 0.1704 -
accuracy: 0.9289 - val_loss: 0.0519 - val_accuracy: 1.0000
Epoch 10/10
```

```
14/14 [==============================] - 49s 3s/step - loss: 0.2227 -
accuracy: 0.9106 - val_loss: 0.0602 - val_accuracy: 1.0000
```

```
#save the model
model.save("forestalert.h5")
```

Video Analysis

```
from twilio.rest import Client

#import load model from keras.model
from keras.models import load_model
#import image from keras
from tensorflow.keras.preprocessing import image
import numpy as np
#import cv2
import cv2
#load the saved model
model=load_model(r"forestalert.h5")
img=image.load_img(r'D:\IBM\Dataset\test_set\with fire\
Uttarakhand_forest_fire.jpeg')
x=image.img_to_array(img)
# res=cv2.resize(x,dsize=(150,150),interpolation=cv2.INTER_CUBIC)
#expand the image shape
x=np.expand_dims(x,axis=0)

from logging import WARNING
#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

import cv2
import numpy as np
from matplotlib import pyplot as plt
import tensorflow
from tensorflow.keras.preprocessing import image
from keras.models import load_model

# Create a VideoCapture object and read from input file
# If the input is the camera, pass 0 instead of the video file name
video = cv2.VideoCapture(r'C:\Users\Dell\Downloads\Forest trees.mp4')
name=['no fire','with fire']
```

```
while(1):
 success,frame = video.read()
 cv2.imwrite("image.jpg",frame)
 img = tensorflow.keras.utils.load_img("image.jpg",target_size =
(128,128))
 x = image.img_to_array(img)
 x = np.expand_dims(x,axis = 0)
 pred = model.predict(x)
 pred = pred[0][0]
 if pred > 0.5:
   pred = 1
 else :
    pred = 0
 print(pred)
 cv2.putText(frame,"predicted class = "+str(name[pred]),
(50,50),cv2.FONT_HERSHEY_SIMPLEX,1,(255,255,255),1)
 if pred==1:
  account_sid='ACab5b7ac22466b88a9cda7cf5414b750a'
  auth_token='a1a37c4aceac1ccf7b4a5a0b36bc62e9'
  client=Client(account_sid,auth_token)
  message=client.messages \
  .create(
      body='forest fire is detected,stay alert',
      #use twilio free number
      from_='+17088477470',
      #to number
      to='+918825826199')
  print(message.sid)
  print("Fire detected")
  print("SMS Sent!")
  from playsound import playsound
  playsound(r"C:\Users\Dell\Downloads\alarm.mp3")
  cv2.imshow('image',frame)
  if cv2.waitKey(0)&0xFF == ord('a'):
        break
 else:
   print("No Danger")
   cv2.imshow('image',frame)
   if cv2.waitKey(0)&0xFF == ord('a'):
        break
 video.release()
 cv2.destroyAllWindows()
```

```
1/1 [==============================] - 0s 37ms/step
0
No Danger

--------------------------------------------------------------------------
-----
```

WITH FIRE

Here a video with forest fire is given as input

```
# Create a VideoCapture object and read from input file
# If the input is the camera, pass 0 instead of the video file name
video = cv2.VideoCapture(r'C:\Users\Dell\Downloads\fire in
forest.mp4')
name=['forest','with fire']

while(1):
 success,frame = video.read()
 cv2.imwrite("image.jpg",frame)
 img = tensorflow.keras.utils.load_img("image.jpg",target_size =
(128,128))
 x = image.img_to_array(img)
 x = np.expand_dims(x,axis = 0)
 pred = model.predict(x)
 pred = pred[0][0]
 if pred > 0.5:
   pred = 1
 else :
    pred = 0
 print(pred)
 cv2.putText(frame,"predicted class = "+str(name[pred]),
(50,50),cv2.FONT_HERSHEY_SIMPLEX,1,(255,255,255),1)
 if pred==1:
  account_sid='ACab5b7ac22466b88a9cda7cf5414b750a'
  auth_token='a1a37c4aceac1ccf7b4a5a0b36bc62e9'
  client=Client(account_sid,auth_token)
  message=client.messages \
  .create(
      body='forest fire is detected,stay alert',
      #use twilio free number
      from_='+17088477470',
      #to number
      to='+918825826199')
  print(message.sid)
  print("Fire detected")
  print("SMS Sent!")
  from playsound import playsound
```

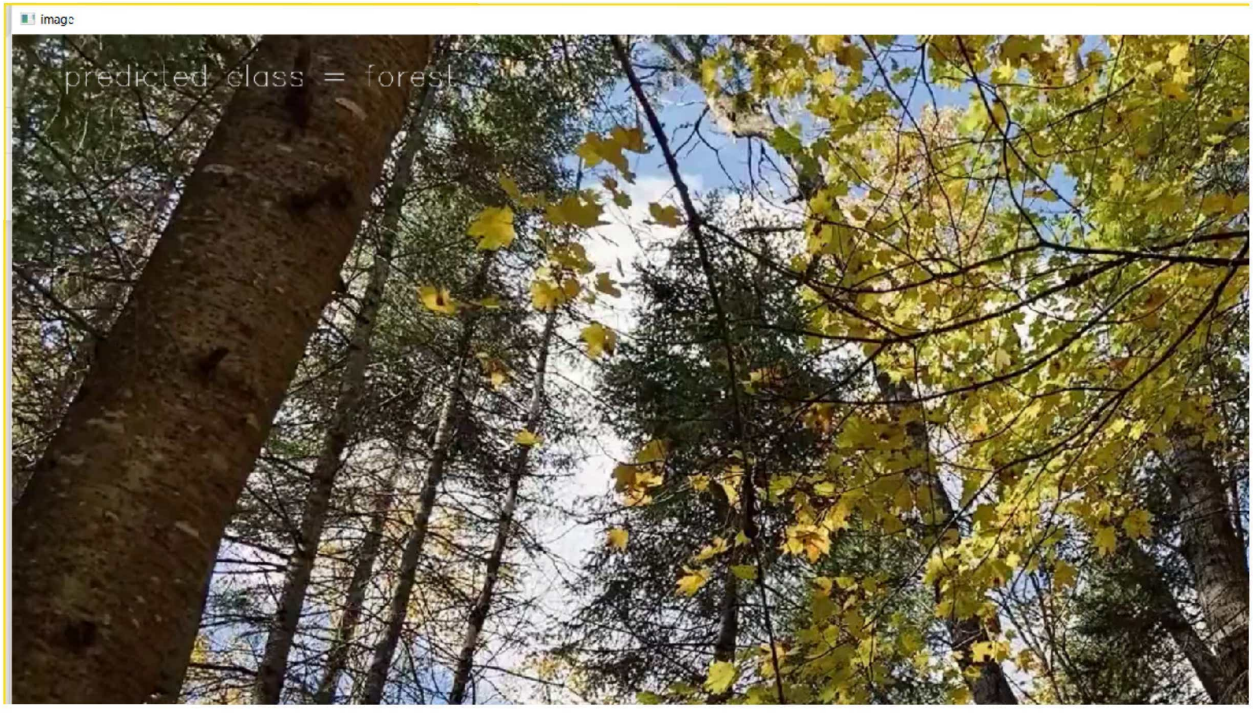
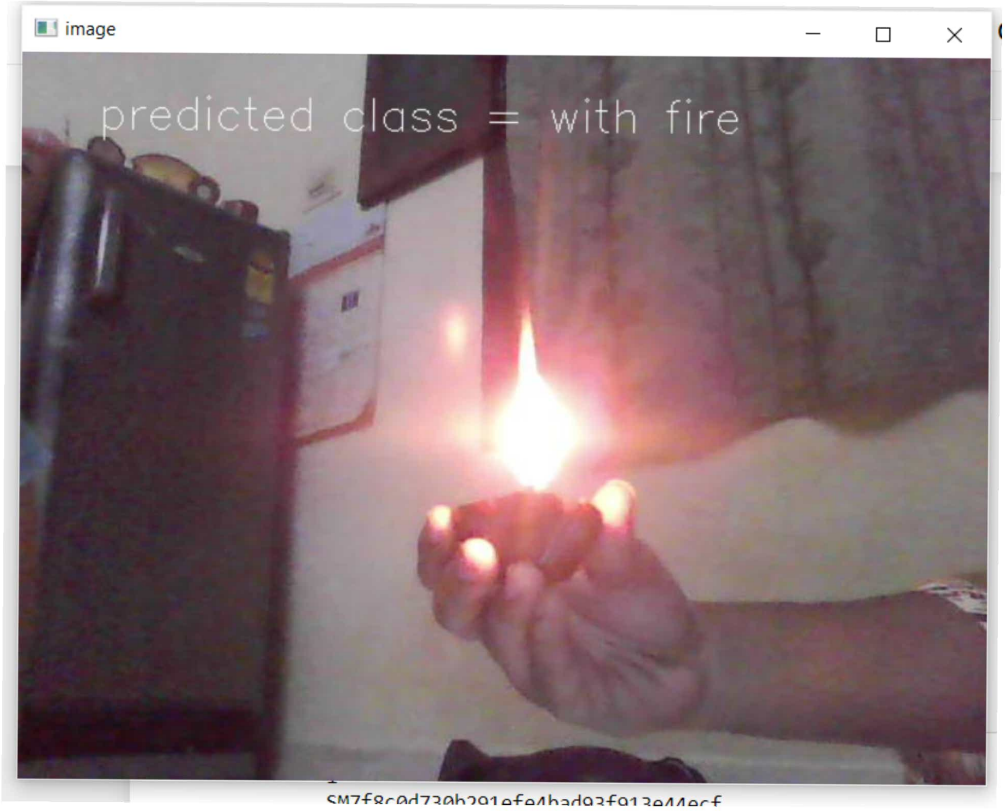
```
  playsound(r"C:\Users\Dell\Downloads\alarm.mp3")
  cv2.imshow('image',frame)
  if cv2.waitKey(0)&0xFF == ord('a'):
        break
 else:
   print("No Danger")
   cv2.imshow('image',frame)
   if cv2.waitKey(0)&0xFF == ord('a'):
        break
 video.release()
 cv2.destroyAllWindows()
```

```
1/1 [==============================] - 0s 84ms/step
1
SM4322be4e3e8f86b3711c28cc826212ce
Fire detected
SMS Sent!
```

Output

With fire

Without fire(forest)



Fire prediction using Web camera