

# EARLY DETECTION OF FOREST FIRE USING DEEP LEARNING

## MODEL BUILDING PREDICTIONS

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Project Name	Project-Early detection of forest fire using deep learning

### PREDICTIONS:

The last and final step is to make use of our saved model to do predictions. For that we have a class in keras called load\_model. Load\_model is used to load our saved model h5 file (alert.h5).

### IMPORT LIBRARIES:

11/7/22, 12:35 AM

Untitled8.ipynb - Colaboratory

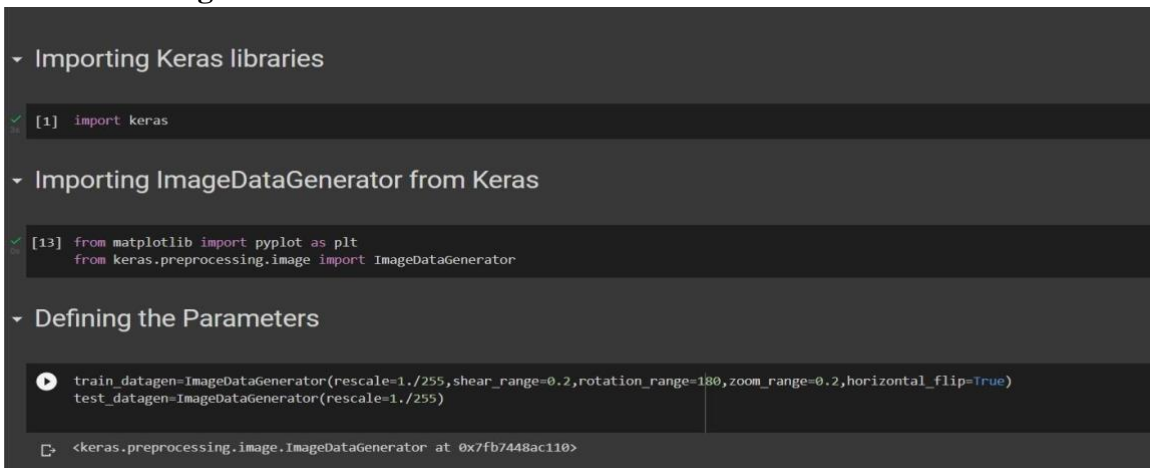
#### ▼ Importing Keras libraries

```
import keras
```

#### ▼ Importing ImageDataGenerator from Keras

```
from keras.preprocessing.image import ImageDataGenerator
```

### IMPORT ImageDataGenerator FROM KERAS:



The screenshot shows a Jupyter Notebook interface with three sections:

- Importing Keras libraries**: A code cell with the command `import keras` is shown with a green checkmark and the output `[1] import keras`.
- Importing ImageDataGenerator from Keras**: A code cell with the commands `from matplotlib import pyplot as plt` and `from keras.preprocessing.image import ImageDataGenerator` is shown with a green checkmark and the output `[13] from matplotlib import pyplot as plt` and `from keras.preprocessing.image import ImageDataGenerator`.
- Defining the Parameters**: A code cell with the commands `train_datagen=ImageDataGenerator(rescale=1./255, shear_range=0.2, rotation_range=180, zoom_range=0.2, horizontal_flip=True)` and `test_datagen=ImageDataGenerator(rescale=1./255)` is shown with a play button icon and the output `<keras.preprocessing.image.ImageDataGenerator at 0x7fb7448ac110>`.

### APPLYING ImageDataGenerator to train dataset:

`flow_from_directory()` method for Train folder.

```

- Defining the Parameters

[11] 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)

<keras.preprocessing.image.ImageDataGenerator at 0x7fb7448ac110>

- Applying ImageDataGenerator functionality to train dataset

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

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

[17] x_train=train_datagen.flow_from_directory('/content/drive/MyDrive/IBM PROJECT/dataset/DATA SET/archive/Dataset/Dataset/train_set', target_size=(128,128), batch_size=32, class_mode='binary')

Found 436 images belonging to 2 classes.
```

## APPLYING ImageDataGenerator to test dataset:

Applying the `flow_from_directory ( )` method for test folder.

```

- Applying ImageDataGenerator functionality to test dataset

x_test=test_datagen.flow_from_directory('/content/drive/MyDrive/IBM PROJECT/dataset/DATA SET/archive/Dataset/Dataset/test_set', target_size=(128,128), batch_size=32, class_mode='binary')

Found 121 images belonging to 2 classes.
```

## IMPORTING MODEL BUILDING LIBRARIES:

11/8/22, 1:16 AM

Main code - Colaboratory

### Importing Model Building Libraries

```
#to define the linear Initialisation import sequential
from keras.models import Sequential
#to add layers import Dense
from keras.layers import Dense
#to create Convolutional 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:

## ▼ Initializing the model

```
model=Sequential()
```

## ADDING CNN LAYERS:

### ▼ Adding CNN Layers

```
model.add(Convolution2D(32,(3,3),input_shape=(128,128,3),activation='relu'))
#add maxpooling layers
model.add(MaxPooling2D(pool_size=(2,2)))
#add faltten layer
model.add(Flatten())
```

## ADDING DENSE LAYERS:

### ▼ Add Dense layers

```
#add hidden layers
model.add(Dense(150,activation='relu'))
#add output layer
model.add(Dense(1,activation='sigmoid'))
```

## CONFIGURING THE LEARNING PROCESS:

### ▼ configuring the learning process

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

## TRAINING THE MODEL:

### ▼ Predictions

```
#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('forest.h5')
img=image.load_img('/content/drive/MyDrive/IBM PROJECT/dataset/DATA SET/archive/Dataset/Da
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)
```

## ▼ Training the model

```
model.fit_generator(x_train, steps_per_epoch=14, epochs=10, validation_data=x_test, validation_steps=14)
```

```
Epoch 1/10
14/14 [=====] - 322s 19s/step - loss: 1.5998 - accuracy: 0.71
Epoch 2/10
14/14 [=====] - 26s 2s/step - loss: 0.3427 - accuracy: 0.862
Epoch 3/10
14/14 [=====] - 32s 2s/step - loss: 0.2979 - accuracy: 0.885
Epoch 4/10
14/14 [=====] - 29s 2s/step - loss: 0.2585 - accuracy: 0.892
Epoch 5/10
14/14 [=====] - 29s 2s/step - loss: 0.1926 - accuracy: 0.924
Epoch 6/10
14/14 [=====] - 30s 2s/step - loss: 0.1971 - accuracy: 0.926
Epoch 7/10
14/14 [=====] - 32s 2s/step - loss: 0.1781 - accuracy: 0.928
Epoch 8/10
14/14 [=====] - 30s 2s/step - loss: 0.1796 - accuracy: 0.924
Epoch 9/10
14/14 [=====] - 31s 2s/step - loss: 0.2306 - accuracy: 0.896
Epoch 10/10
14/14 [=====] - 27s 2s/step - loss: 0.2593 - accuracy: 0.885
<keras.callbacks.History at 0x7fd537101390>
```

## SAVE THE MODEL:

### ▼ Save the model

```
model.save("forest.h5")
```

## PREDICTIONS:

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Main code - Colaboratory

```
pred=model.predict(x)
```

```
1/1 [=====] - 0s 118ms/step
```

```
pred
```

```
array([[0.]], dtype=float32)
```