

# EARLY DETECTION OF FOREST FIRE USING DEEP LEARNING

## MODEL BUILDING

### SAVE THE MODEL

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

### SAVE THE MODEL

The model should be saved for future use. This saved model is also integrated into Android applications or web applications to predict anything. 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:

```
▼ Importing Keras libraries

✓ [1] import keras

▼ Importing ImageDataGenerator from Keras

✓ [13] from matplotlib import pyplot as plt
      from keras.preprocessing.image import ImageDataGenerator

▼ Defining the Parameters

▶ 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 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/drives; 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:

### ▼ Training the model

```
model.fit_generator(x_train, steps_per_epoch=14, epochs=10, validation_data=x_test, validation_steps=7)
```

```
Epoch 1/10
14/14 [=====] - 322s 19s/step - loss: 1.5998 - accuracy: 0.70
Epoch 2/10
14/14 [=====] - 26s 2s/step - loss: 0.3427 - accuracy: 0.8625
Epoch 3/10
14/14 [=====] - 32s 2s/step - loss: 0.2979 - accuracy: 0.8857
Epoch 4/10
14/14 [=====] - 29s 2s/step - loss: 0.2585 - accuracy: 0.8929
Epoch 5/10
14/14 [=====] - 29s 2s/step - loss: 0.1926 - accuracy: 0.9243
Epoch 6/10
14/14 [=====] - 30s 2s/step - loss: 0.1971 - accuracy: 0.9264
Epoch 7/10
14/14 [=====] - 32s 2s/step - loss: 0.1781 - accuracy: 0.9285
Epoch 8/10
14/14 [=====] - 30s 2s/step - loss: 0.1796 - accuracy: 0.9243
Epoch 9/10
14/14 [=====] - 31s 2s/step - loss: 0.2306 - accuracy: 0.8964
Epoch 10/10
14/14 [=====] - 27s 2s/step - loss: 0.2593 - accuracy: 0.8857
<keras.callbacks.History at 0x7fd537101390>
```

## SAVE THE MODEL:

### ▼ Save the model

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