

# EARLY DETECTION OF FOREST FIRE USING DEEP LEARNING

## MODEL BUILDING

### ADDING CNN LAYERS

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

### ADDING CNN LAYERS:

We will be adding three layers for CNN

- Convolution layer
- Pooling layer
- Flattening layer

#### Adding Convolutional Layer:

The convolutional layer is the first and core layer of CNN. It is one of the building blocks of a CNN and is used for extracting important features from the image.

In the Convolution operation, the input image will be convolved with the feature detector/filters to get a feature map. The important role of the feature detector is to extract the features from the image. The group of feature maps is called a feature layer.

In the convolution2D function, we gave arguments that include 32,(3,3), that refers to we are applying 32 filters of 3x3 matrix filter, and input\_shape is the input image shape with RGB, here 64x64 is the size and 3 represent the channel, RGB colour images.

Activation Function: These are the functions that help us to decide if we need to activate the node or not. These functions introduce non-linearity in the networks.

#### Adding Pooling Layer

**Max Pooling** selects the maximum element from the region of the feature map covered by the filter. Thus, the output after max-pooling layer would be a feature map containing the most prominent features of the previous feature map.

After the convolution layer, a pooling layer is added. Max pooling layer can be added using MaxPooling2D class. It takes the pool size as a parameter. Efficient size of the pooling matrix is (2,2). It returns the pooled feature maps. (Note: Any number of convolution layers, pooling and dropout layers can be added)

In the above code, pool\_size refers to pooling filter or kernel size.

#### Task 3: Adding Flatten Layer

Now the pooled feature map from the pooling layer will be converted into one single dimension matrix or map, where each pixel in one single column, nothing but flattening. The flattening layer converts the multi-dimension matrix to one single dimension layer.

## IMPORT LIBRARIES:

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
```

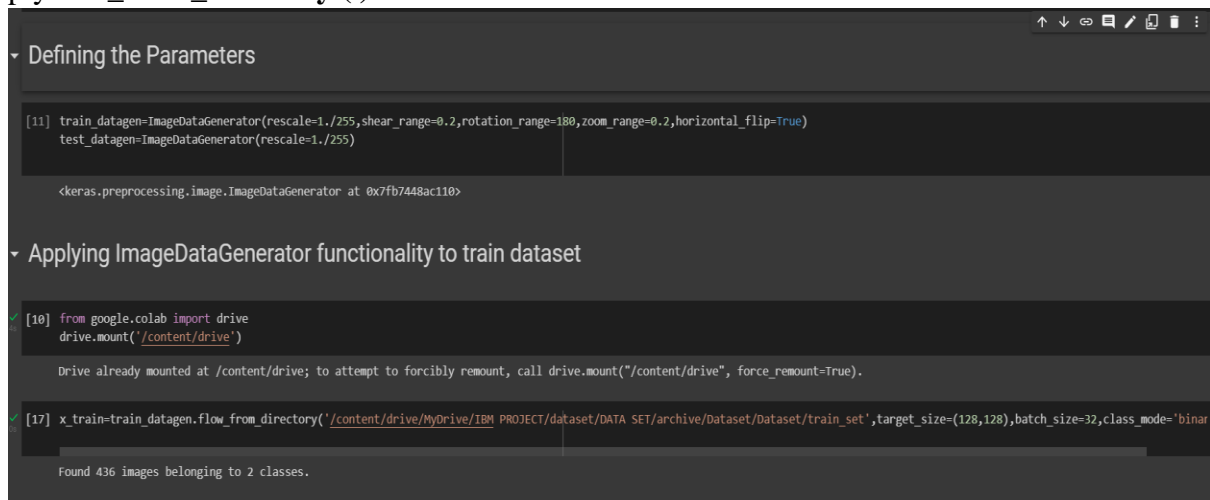
### ▼ Defining the Parameters

```
▶ 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:

plyflow\_from\_directory ( )methodfor Train folder.



The screenshot shows a Jupyter Notebook with two cells. The first cell, titled 'Defining the Parameters', contains code to create ImageDataGenerator objects for training and testing. The second cell, titled 'Applying ImageDataGenerator functionality to train dataset', contains code to mount Google Drive and use the flow\_from\_directory method to load training data. The output of the second cell shows that 436 images were found belonging to 2 classes.

```
[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>

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

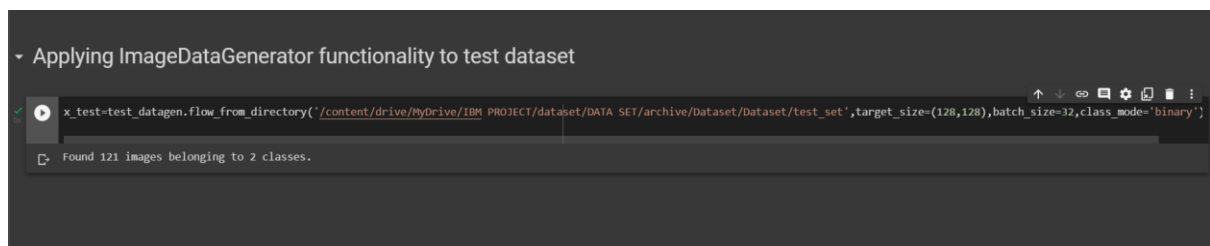
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

[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 ( ) methodfortest folder.



The screenshot shows a Jupyter Notebook with one cell titled 'Applying ImageDataGenerator functionality to test dataset'. The code uses the flow\_from\_directory method to load test data from Google Drive. The output shows that 121 images were found belonging to 2 classes.

```
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:

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())
```