

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

Mounted at /content/driveIn [130]:

# Extracting the zip folder

!unzip '/content/drive/MyDrive/Dataset/Forest.zip'
Archive:  /content/drive/MyDrive/Dataset/Forest.zip
  creating: Forest Fire Dataset/Testing/fire/
  inflating: Forest Fire Dataset/Testing/fire/fire_0002.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0015.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0027.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0038.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0040.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0048.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0063.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0072.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0084.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0091.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0097.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0107.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0124.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0139.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0143.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0145.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0153.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0158.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0169.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0174.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0179.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0188.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0198.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0205.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0211.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0217.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0224.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0229.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0234.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0239.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0247.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0253.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0258.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0271.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0275.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0277.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0280.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0289.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0297.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0300.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0305.jpg
  inflating: Forest Fire Dataset/Testing/fire/fire_0314.jpg
```

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```
inflating: Forest Fire Dataset/Training/nofire/nofire_0946.jpg
inflating: Forest Fire Dataset/Training/nofire/nofire_0947.jpg
inflating: Forest Fire Dataset/Training/nofire/nofire_0949.jpg
inflating: Forest Fire Dataset/Training/nofire/nofire_0950.jpg
```

Data Augmentation

It is a technique used to increase the image with some modification. To overcome overfitting we are using augmentation.

In [131]:

```
# Import required lib

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

In [132]:

```
# Initializing augmentation for training variable

train_datagen = ImageDataGenerator(rescale=1/255,
                                   zoom_range=0.2, shear_range=0.2, rotation_range=180,
                                   horizontal_flip=True)
```

In [134]:

```
# Initializing augmentation for testing variable

test_datagen = ImageDataGenerator(rescale=1/255)
```

In [142]:

```
# Passing training data for training variable (augmentation)

xtrain = train_datagen.flow_from_directory('/content/Forest Fire
Dataset/Training',
                                           target_size=(150,150),
                                           class_mode='binary',
                                           batch_size=32)
```

Found 1520 images belonging to 2 classes.

In [141]:

```
# Passing testing data for testing variable (augmentation)

xtest = test_datagen.flow_from_directory('/content/Forest Fire
Dataset/Testing',
                                         target_size=(150,150),
                                         class_mode='binary',
                                         batch_size=32)
```

Found 380 images belonging to 2 classes.

CNN Model

In [143]:

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
```

In [144]:

```
# CNN block

model = Sequential() # Initializing sequential model
model.add(Convolution2D(32, (3,3), activation='relu', input_shape=(150,150,3)))
# Convolution layer
model.add(MaxPooling2D(pool_size=(2, 2))) # Max pooling layer
model.add(Flatten()) # Flatten layer
model.add(Dense(100, activation='relu')) # Hidden layer
model.add(Dense(1, activation='sigmoid')) # Output layer
```

In [145]:

```
# Compile model

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

In [157]:

```
# Training model

model.fit_generator(xtrain, steps_per_epoch=len(xtrain), epochs=10, validation_data=xtest, validation_steps=len(xtest))

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:3: UserWarning:
`Model.fit_generator` is deprecated and will be removed in a future version.
Please use `Model.fit`, which supports generators.
This is separate from the ipykernel package so we can avoid doing imports until
Epoch 1/10
48/48 [=====] - 11s 230ms/step - loss: 0.1430 - accuracy: 0.9428 - val_loss: 0.1455 - val_accuracy: 0.9474
Epoch 2/10
48/48 [=====] - 11s 227ms/step - loss: 0.1364 - accuracy: 0.9539 - val_loss: 0.1512 - val_accuracy: 0.9500
Epoch 3/10
48/48 [=====] - 11s 226ms/step - loss: 0.1295 - accuracy: 0.9579 - val_loss: 0.1599 - val_accuracy: 0.9500
Epoch 4/10
48/48 [=====] - 11s 226ms/step - loss: 0.1749 - accuracy: 0.9414 - val_loss: 0.1906 - val_accuracy: 0.9316
Epoch 5/10
48/48 [=====] - 11s 226ms/step - loss: 0.1210 - accuracy: 0.9605 - val_loss: 0.1626 - val_accuracy: 0.9500
Epoch 6/10
48/48 [=====] - 11s 227ms/step - loss: 0.1360 - accuracy: 0.9513 - val_loss: 0.1500 - val_accuracy: 0.9500
Epoch 7/10
48/48 [=====] - 11s 224ms/step - loss: 0.1356 - accuracy: 0.9507 - val_loss: 0.1790 - val_accuracy: 0.9368
```

```
Epoch 8/10
48/48 [=====] - 11s 227ms/step - loss: 0.1249 - accu
racy: 0.9566 - val_loss: 0.1519 - val_accuracy: 0.9526
Epoch 9/10
48/48 [=====] - 11s 230ms/step - loss: 0.1305 - accu
racy: 0.9520 - val_loss: 0.2285 - val_accuracy: 0.9211
Epoch 10/10
48/48 [=====] - 11s 225ms/step - loss: 0.1149 - accu
racy: 0.9632 - val_loss: 0.2010 - val_accuracy: 0.9316
Out[157]:
```

```
n [147]:
```

```
# Save model
```

```
model.save('Forest_fire.h5')
```

Testing model

```
In [163]:
```

```
from tensorflow.keras.preprocessing import image # Importing req. lib
import numpy as np
```

```
n [164]:
```

```
xtrain.class_indices
```

```
Out[164]:
```

```
{'fire': 0, 'nofire': 1}
```

```
In [182]:
```

```
img = image.load_img('/content/Forest Fire
Dataset/Testing/fire/fire_0275.jpg',target_size=(150,150))
```

```
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = model.predict(x)
```

```
if(pred==0):
    print('fire')
```

```
else:
    print('no fire')
```

```
img
```

```
1/1 [=====] - 0s 16ms/step
```

```
fire
```

```
Out[182]:
```



In [183]:

```
img = image.load_img('/content/Forest Fire
Dataset/Testing/nofire/nofire_0010.jpg',target_size=(150,150))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = (model.predict(x))
if(pred==0):
    print('FIRE')
else:
    print('NO FIRE')
img
1/1 [=====] - 0s 17ms/step
NO FIRE
```

Out[183]:



In [186]:

```
img = image.load_img('/content/Forest Fire
Dataset/Testing/fire/fire_0910.jpg',target_size=(150,150))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = (model.predict(x))
if(pred==0):
    print('FIRE')
else:
    print('NO FIRE')
img
1/1 [=====] - 0s 15ms/step
FIRE
```

Out[186]:



In [181]:

```
img = image.load_img('/content/Forest Fire
Dataset/Testing/nofire/nofire_0051.jpg',target_size=(150,150))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = (model.predict(x))
if(pred==0):
    print('FIRE')
else:
    print('NO FIRE')
img
1/1 [=====] - 0s 17ms/step
NO FIRE
```

Out[181]:



In [180]:

```
img = image.load_img('/content/Forest Fire
Dataset/Testing/nofire/nofire_0006.jpg',target_size=(150,150))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = (model.predict(x))
if(pred==0):
    print('FIRE')
else:
    print('NO FIRE')
img
1/1 [=====] - 0s 16ms/step
NO FIRE
```

Out[180]:

