

MODEL BUILDING

```
#import keras libraries
import numpy as np
import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras import layers
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D,Dropout
from keras.layers import Flatten

model=Sequential()

# add Convolutional layer
model.add(Convolution2D(32, (3,3), activation = "relu", input_shape = (64,64,3) ))

#add maxpooling layer
model.add(MaxPooling2D(pool_size=(2,2)))

#add flatten layer
model.add(Flatten())

#add hidden layer
model.add(Dense(units=128,activation='relu'))

model.add(Dense(units=46, activation='softmax'))

model.summary()
```

Model: "sequential_2"

Layer (type)	Output Shape	Param #
=====		
conv2d_1 (Conv2D)	(None, 62, 62, 32)	896
conv2d_2 (Conv2D)	(None, 60, 60, 32)	9248
max_pooling2d_1 (MaxPooling 2D)	(None, 30, 30, 32)	0
flatten_1 (Flatten)	(None, 28800)	0
dense_4 (Dense)	(None, 128)	3686528
dense_5 (Dense)	(None, 46)	5934
=====		

```
Total params: 3,702,606
Trainable params: 3,702,606
Non-trainable params: 0
```

```
# configure the learning process
```

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

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

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

```
x_train = train_datagen.flow_from_directory(r"/content/drive/MyDrive/Dataset/train_set", target_size=(180, 180))
x_test = test_datagen.flow_from_directory(r"/content/drive/MyDrive/Dataset/test_set", target_size=(180, 180))
```

```
Found 436 images belonging to 2 classes.
Found 121 images belonging to 2 classes.
```

```
model.fit(x_train, epochs=10, steps_per_epoch=len(x_train))
```

```
Epoch 1/10
14/14 [=====] - 20s 1s/step - loss: 0.9067 - accuracy: 0.67
Epoch 2/10
14/14 [=====] - 22s 2s/step - loss: 0.2983 - accuracy: 0.86
Epoch 3/10
14/14 [=====] - 20s 1s/step - loss: 0.2174 - accuracy: 0.90
Epoch 4/10
14/14 [=====] - 20s 1s/step - loss: 0.1915 - accuracy: 0.92
Epoch 5/10
14/14 [=====] - 18s 1s/step - loss: 0.1371 - accuracy: 0.93
Epoch 6/10
14/14 [=====] - 19s 1s/step - loss: 0.1520 - accuracy: 0.94
Epoch 7/10
14/14 [=====] - 20s 1s/step - loss: 0.1285 - accuracy: 0.93
Epoch 8/10
14/14 [=====] - 19s 1s/step - loss: 0.1086 - accuracy: 0.95
Epoch 9/10
14/14 [=====] - 19s 1s/step - loss: 0.1293 - accuracy: 0.94
Epoch 10/10
14/14 [=====] - 21s 1s/step - loss: 0.1065 - accuracy: 0.95
<keras.callbacks.History at 0x7f6ad1517910>
```



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

```
model.save("forestfire15.h5")
```

```
# import load_model from keras.model
from keras.models import load_model
# import image class from keras
from tensorflow.keras.preprocessing import image
# import numpy
import numpy as np
# import cv2
import cv2
```

```
model = load_model("forestfire15.h5")
```

```
img = image.load_img(r'/content/drive/MyDrive/Dataset/train_set/with fire/with fire (100).
x = image.img_to_array(img)
res = cv2.resize(x,dsize=(128,128),interpolation=cv2.INTER_CUBIC)
```

```
img
```



```
x = np.expand_dims(x,axis = 0)
pred = model.predict(x_train)
pred
```

```
14/14 [=====] - 19s 1s/step
array([[1.7299268e-10, 9.9999994e-01, 2.1913892e-20, ..., 1.7268803e-18,
        1.8391364e-20, 2.8046383e-19],
       [9.9838322e-01, 1.6163106e-03, 7.5391108e-12, ..., 1.1522192e-09,
```

```

3.3259634e-10, 3.9158415e-10],
[8.1224078e-01, 1.8774912e-01, 1.4653252e-09, ..., 3.1743632e-08,
3.3986238e-09, 1.6251049e-08],
...,
[8.7637932e-04, 9.9912149e-01, 9.8467079e-10, ..., 1.0711914e-08,
9.6610453e-10, 5.0890057e-09],
[8.2050294e-01, 1.7949302e-01, 2.8614741e-10, ..., 6.9492931e-09,
6.8285005e-10, 4.0664965e-09],
[4.1998969e-06, 9.9999583e-01, 2.2605768e-15, ..., 1.1350116e-13,
2.3155623e-15, 3.9282529e-14]], dtype=float32)

```

```

img = image.load_img(r'/content/drive/MyDrive/Dataset/train_set/forest/with_fire (1).jpg')
x = image.img_to_array(img)
res = cv2.resize(x,dsize=(128,128),interpolation=cv2.INTER_CUBIC)

```

img



pred

```

array([[1.7299268e-10, 9.9999994e-01, 2.1913892e-20, ..., 1.7268803e-18,
1.8391364e-20, 2.8046383e-19],
[9.9838322e-01, 1.6163106e-03, 7.5391108e-12, ..., 1.1522192e-09,
3.3259634e-10, 3.9158415e-10],
[8.1224078e-01, 1.8774912e-01, 1.4653252e-09, ..., 3.1743632e-08,
3.3986238e-09, 1.6251049e-08],
...,
[8.7637932e-04, 9.9912149e-01, 9.8467079e-10, ..., 1.0711914e-08,
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6.8285005e-10, 4.0664965e-09],
[4.1998969e-06, 9.9999583e-01, 2.2605768e-15, ..., 1.1350116e-13,
2.3155623e-15, 3.9282529e-14]], dtype=float32)

```

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