

# **EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES**

## **MODEL BUILDING**

### **PREDICTIONS**

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<b>Project Name</b>	Emerging Methods for Early Detection of Forest Fires

*Importing The ImageDataGenerator Library* import keras from  
keras.preprocessing.image import ImageDataGenerator *Define the  
parameters/arguments for ImageDataGenerator class*  
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) *Applying  
ImageDataGenerator functionality to trainset*  
x\_train=train\_datagen.flow\_from\_directory(r'/content/drive/MyDrive/  
Dataset/train\_set',target\_size=(128,128),batch\_size=32,  
class\_mode='binary')

Found 436 images belonging to 2 classes.

### ***Applying ImageDataGenerator functionality to testset***

```
x_test=test_datagen.flow_from_directory(r'/content/drive/MyDrive  
/ Dataset/test_set',target_size=(128,128),batch_size=32,  
class_mode='binary')
```

Found 121 images belonging to 2 classes.

### ***Import model building libraries***

```
#To define Linear initialisation import Sequential  
from keras.models import Sequential #To add  
layers import Dense from keras.layers import  
Dense  
#To create Convolution 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***

```
model=Sequential()
```

### ***Add CNN Layer***

```
model.add(Convolution2D(32,  
(3,3),input_shape=(128,128,3),activation='relu'))
```

```
#add maxpooling layer
```

```
model.add(MaxPooling2D(pool_size=(2,2)))  
#add flatten layer model.add(Flatten())
```

### ***Add Hidden Layer***

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

### ***Configure the learning process***

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

```
model.fit_generator(x_train,steps_per_epoch=14,epochs=10,validation  
_data=x_test,validation_steps=4)
```

Epoch 1/10

14/14 [=====] - 97s 7s/step - loss:  
1.3060 - accuracy: 0.7775 - val\_loss: 0.5513 -  
val\_accuracy: 0.8512

Epoch 2/10

14/14 [=====] - 26s 2s/step - loss:  
0.3178 - accuracy: 0.8807 - val\_loss: 0.1299 -  
val\_accuracy: 0.9421

Epoch 3/10

14/14 [=====] - 26s 2s/step - loss:  
0.2226 - accuracy: 0.9106 - val\_loss: 0.1311 -  
val\_accuracy: 0.9421

Epoch 4/10

14/14 [=====] - 31s 2s/step - loss:  
0.1836 - accuracy: 0.9174 - val\_loss: 0.1129 -  
val\_accuracy: 0.9339

Epoch 5/10

14/14 [=====] - 30s 2s/step - loss:  
0.1675 - accuracy: 0.9243 - val\_loss: 0.0925 -  
val\_accuracy: 0.9669

Epoch 6/10

```

14/14 [=====] - 26s 2s/step - loss:
0.1884 - accuracy: 0.9289 - val_loss: 0.1287 -
val_accuracy: 0.9339
Epoch 7/10
14/14 [=====] - 28s 2s/step - loss:
0.1724 - accuracy: 0.9335 - val_loss: 0.0926 -
val_accuracy: 0.9752
Epoch 8/10
14/14 [=====] - 26s 2s/step - loss:
0.1510 - accuracy: 0.9404 - val_loss: 0.0757 -
val_accuracy: 0.9752 Epoch 9/10
14/14 [=====] - 26s 0.173 -
2s/step - loss: 2
accuracy: 0.9174 - val_loss: 0.0537 - val_accuracy: 0.9835
Epoch 10/10 14/14 [=====]
- 26s 0.154 -
2s/step - loss: 6
accuracy: 0.9312 - val_loss: 0.0573 - val_accuracy: 0.9835

<keras.callbacks.History at 0x7f05d66a9c90>

```

**Save The Model** `model.save("forest1.h5")`

## **Predictions**

```

#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

#load the saved model model = load_model("forest1.h5")
img=image.load_img(r'/content/drive/MyDrive/Dataset/test_set/forest

```

```
/ 0.48007200_1530881924_final_forest.jpg')
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) pred= model.predict(x)

1/1 [=====] - 0s 126ms/step
pred array([[0.]], dtype=float32)
```