

**Project Development Phase**  
**SPRINT 2**

<b>DATE</b>	09 November 2022
<b>TEAM ID</b>	PNT2022TMID29475
<b>PROJECT NAME</b>	Emerging Methods For the Early Detection Of Forest Fires

```
In [1]: import keras
        from keras.preprocessing.image import ImageDataGenerator
```

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

```
In [2]: #Define the parameters/arguments for ImageDataGenerator class
        train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,rotation_range=180,
        zoom_range
        test_datagen=ImageDataGenerator(rescale=1./255)
```

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train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,rotation_range=180,
zoom_range

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

```
In [3]: #Applying ImageDataGenerator functionality to trainset
        x_train=train_datagen.flow_from_directory(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\
        target_size=(128,128),
        batch_size=32,
        class_mode='binary')
```

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x_train=train_datagen.flow_from_directory(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\
        target_size=(128,128),
        batch_size=32,
        class_mode='binary')
```

Found 436 images belonging to 2 classes.

```
In [4]: #Applying ImageDataGenerator functionality to testset
        x_test=test_datagen.flow_from_directory(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\te
        target_size=(128,128),
        batch_size=32,
        class_mode='binary')
```

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#Applying ImageDataGenerator functionality to testset
x_test=test_datagen.flow_from_directory(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\te
        target_size=(128,128),
        batch_size=32,
        class_mode='binary')
```

Found 121 images belonging to 2 classes.

```
In [5]:#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

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#import Maxpooling Layer
from keras.layers import MaxPooling2D
#import flatten Layer
from keras.layers import Flatten
import warnings
warnings.filterwarnings('ignore')

```

In [7]: *#initializing the model*  
model=Sequential()

```

#initializing the model
model=Sequential()

```

In [8]: *#add convolutional 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 convolutional 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())

```

In [9]: *#add hidden Layer*  
model.add(Dense(150,activation='relu'))  
*#add output Layer*  
model.add(Dense(1,activation='sigmoid'))

```

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#add output Layer
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```

```
In [10]: #configure the Learning process
model.compile(loss='binary_crossentropy',optimizer="adam",metrics=["accuracy"])
```

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

```
In [11]: #Training the model
model.fit_generator(x_train,steps_per_epoch=14,epochs=10,
validation_data=x_test,validation_st
```

```
#Training the model
model.fit_generator(x_train,steps_per_epoch=14,epochs=10,
validation_data=x_test,validation_st
```

```
Epoch 1/10
14/14 [=====] - 84s 6s/step - loss: 4.2334 - accuracy: 0.5619 - val_
loss: 1.3686 - val_accuracy:
0.5950Epoch 2/10
14/14 [=====] - 74s 5s/step - loss: 0.5689 - accuracy: 0.7362 - val_
loss: 0.2423 - val_accuracy:
0.8926Epoch 3/10
14/14 [=====] - 123s 9s/step - loss: 0.2231 - accuracy: 0.9197 - val
_loss: 0.1323 - val_accuracy:
0.9669Epoch 4/10
14/14 [=====] - 75s 5s/step - loss: 0.2170 - accuracy: 0.9128 - val_
loss: 0.1082 - val_accuracy:
0.9669Epoch 5/10
14/14 [=====] - 129s 10s/step - loss: 0.1918 - accuracy: 0.9151 - va
l_loss: 0.1145 - val_accuracy:
0.9669Epoch 6/10
14/14 [=====] - 111s 8s/step - loss: 0.1938 - accuracy: 0.9037 - val
_loss: 0.1030 - val_accuracy: 0.9669

Epoch 7/10
14/14 [=====] - 88s 6s/step - loss: 0.1756 - accuracy: 0.9312 - val_
loss: 0.0831 - val_accuracy: 0.9752
Epoch 8/10
14/14 [=====] - 86s 6s/step - loss: 0.1564 - accuracy: 0.9404 - val_
loss: 0.1073 - val_accuracy: 0.9669
Epoch 9/10
14/14 [=====] - 77s 6s/step - loss: 0.1480 - accuracy: 0.9427 - val_
loss: 0.0754 - val_accuracy: 0.9835
Epoch 10/10
14/14 [=====] - 81s 6s/step - loss: 0.1641 - accuracy: 0.9289 - val_
loss: 0.0601 - val_accuracy: 0.9835
```

```
Out[11]: <keras.callbacks.History at 0x2546507bf10>
```

```
model.save("forest1.h5")
```

```
In [12]: model.save("forest1.h5")
```

```
In[13]: #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
```

```
#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
```

```
In [15]: #Load the saved model
model = load_model("forest1.h5")
```

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model = load_model("forest1.h5")
```

```
In [16]: img=image.load_img(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\test_set\with
fire\skynx=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)
```

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img=image.load_img(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\test_set\with
fire\skynx=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)
```

```
In [17]: pred=model.predict(x)
```

```
pred=model.predict(x)
```

```
1/1 [=====] - 5s 5s/step
```

In [18]: pred

```
pred
```

Out[18]: array([[1.]], dtype=float32)

In [21]: x\_train.class\_iundices

```
x_train.class_iundices
```

Out[21]: {'forest': 0, 'with fire': 1}

In [24]: `if (pred[0]>0.5):`  
          `print("forest with fire")`  
          `else:`  
          `print("forest without fire")`

```
if (pred[0]>0.5):  
    print("forest with fire")  
else:  
    print("forest without fire")
```

forest with fire