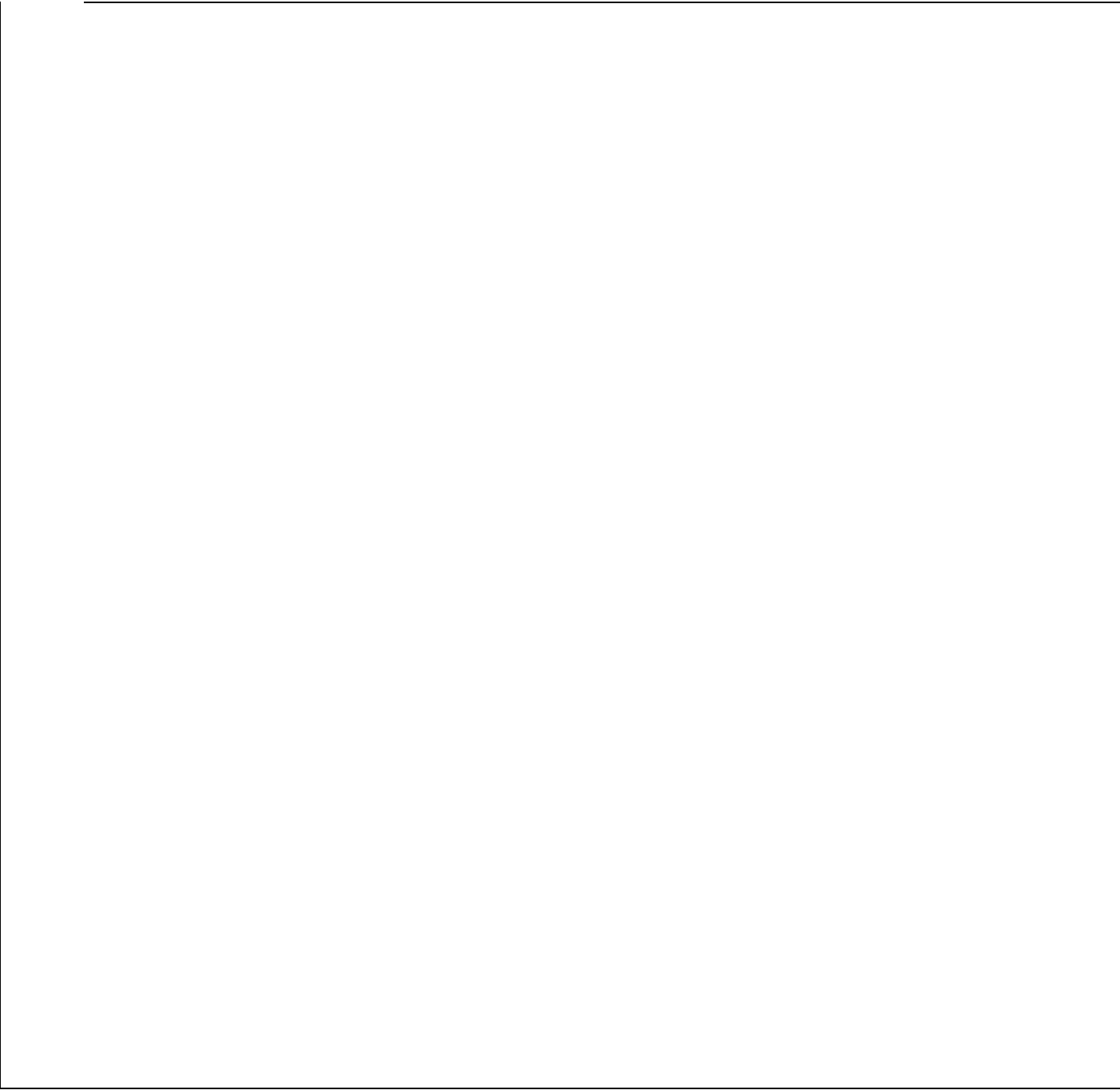


Project Development Phase
SPRINT 2

DATE	05 November 2022
TEAM ID	PNT2022TMID38957
PROJECT NAME	Emerging Methods For t Early Detection Of Forest Fires



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

```
import keras
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)
```

```
#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)
```

```
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')
```

```
#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')
```

Found 436 images belonging to 2 classes.

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

```
#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.

```
#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
In [5]: keras.layers import Convolution2D
```

```
#import Maxpooling Layer
from keras.layers import MaxPooling2D
#import flatten Layer from
keras.layers import Fl
```

```
#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')
```

```
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'))
```

```
#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"])
```

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

```
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
```

In [10]: *#configure the learning process*

```
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
```

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

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

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

```
#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
```

```
#load the saved model  
model = load_model("forest1.h5")
```

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

```
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 cv2
```

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

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

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

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

```
pred
```

```
x_train.class_indices
```

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

In [18]: pred

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

```
In[21]: x_train.class_indices
```

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

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

forest with fire