

```
In [1]: #!unzip dank_data-master.zip  
#!pip install tensorflow_addons  
#!wget http://nlp.stanford.edu/data/glove.6B.zip  
#!unzip glove*.zip
```

```
In [2]: import glob  
import pandas as pd  
import warnings  
warnings.filterwarnings("ignore")  
from tensorflow.keras.preprocessing.image import ImageDataGenerator  
from tensorflow.keras.layers import Dense, Input, Conv2D, MaxPool2D, Activation, Dropout, Flatten, Embedding, LSTM, concatenate  
from tensorflow.keras.models import Model  
import tensorflow as tf  
import numpy as np  
import tensorflow_addons as tfa  
import logging  
from tensorflow.keras.preprocessing.text import Tokenizer  
from sklearn.preprocessing import LabelEncoder  
from sklearn.preprocessing import StandardScaler  
from tensorflow.keras.applications.resnet50 import ResNet50  
from tensorflow.keras.applications.resnet50 import preprocess_input  
from tensorflow.keras.callbacks import LearningRateScheduler  
from tensorflow.keras.callbacks import ReduceLROnPlateau  
from tensorflow.keras.callbacks import ModelCheckpoint  
from tensorflow.keras.callbacks import EarlyStopping  
from sklearn.metrics import confusion_matrix, accuracy_score, f1_score  
import seaborn as sns  
import matplotlib.pyplot as plt
```

```
In [3]: training='/content/dank_data-master/data/training/*'  
test='/content/dank_data-master/data/test/*'  
validation='/content/dank_data-master/data/validation/*'
```

```
In [4]: training = glob.glob(training)  
test = glob.glob(test)  
validation = glob.glob(validation)
```

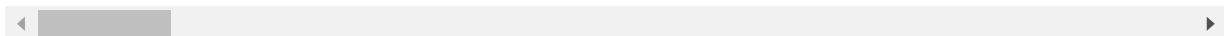
```
In [5]: final_dank=pd.read_csv('/content/dank_data-master/data/final_dank.csv')  
train_labels = [fn.split('/')[-1].split('.')[0].strip() for fn in training]  
validation_labels = [fn.split('/')[-1].split('.')[0].strip() for fn in validation]  
test_labels = [fn.split('/')[-1].split('.')[0].strip() for fn in test]
```

```
In [6]: for labels in train_labels:
    if labels==train_labels[0]:
        train_data =final_dank[final_dank['id']==labels]
    else :
        train_data =train_data.append(final_dank[final_dank['id']==labels],sort=False)
for labels in validation_labels:
    if labels==validation_labels[0]:
        val_data =final_dank[final_dank['id']==labels]
    else :
        val_data =val_data.append(final_dank[final_dank['id']==labels],sort=False)
for labels in test_labels:
    if labels==test_labels[0]:
        test_data =final_dank[final_dank['id']==labels]
    else :
        test_data =test_data.append(final_dank[final_dank['id']==labels],sort=False)
print(train_data.shape)
print(test_data.shape)
print(val_data.shape)
train_data.head(5)
```

(3405, 68)  
(1719, 68)  
(1688, 68)

Out[6]:

	Unnamed: 0	level_0	index	author	awards	processed_words	created_utc
53606	96606	1118.0	32771.0	SwiftScout4	[]	['dowk']	1.584914e+09
35469	61068	63931.0	63931.0	Captain_TrisI	[]	['boy', 'hang', 'quarantine', 'orona', 'extra']	1.584168e+09
11453	25253	26477.0	26477.0	Kenmoops	[]	['vehe', 'believ', 'lie', 'girl']	1.584383e+09
53276	96125	621.0	32274.0	fantastich_freidrich	[]	['human', 'come', 'futuretim', 'travel', 'trap...']	1.584917e+09
65568	129029	4832.0	66485.0	YashSSJB1	[]	['centr', 'attractionm', 'show', 'fulli', 'bui...']	1.584688e+09



```
In [7]: def file_extension(x):
    return x+".jpg"
train_data['id'] = train_data['id'].apply(file_extension)
val_data['id'] = val_data['id'].apply(file_extension)
test_data['id'] = test_data['id'].apply(file_extension)
```

```
In [8]: def numeric_to_string(x):
    if (x==1.0):
        return 'Not_dank'
    elif (x==0.0):
        return 'Dank'
train_data['dank_level_new'] = train_data['dank_level'].apply(numeric_to_string)
val_data['dank_level_new'] = val_data['dank_level'].apply(numeric_to_string)
test_data['dank_level_new'] = test_data['dank_level'].apply(numeric_to_string)
```

```
In [9]:  
logger = logging.getLogger()  
logger.disabled = False  
train_datagen = ImageDataGenerator(zoom_range=0.3, rotation_range=50,  
                                     width_shift_range=0.2, height_shift_range=  
                                     0.2, shear_range=0.2,  
                                     horizontal_flip=True, fill_mode='nearest')  
train_generator = train_datagen.flow_from_dataframe(  
    dataframe=train_data,  
    directory="/content/dank_data-master/data/training/",  
    x_col="id",  
    y_col="dank_level_new",  
    subset="training",  
    batch_size=30,  
    seed=42,  
    class_mode="binary",  
    target_size=(156,156))  
predict_datagen = ImageDataGenerator(preprocessing_function=preprocess_input  
)  
train_prediction_generator = predict_datagen.flow_from_dataframe(  
    dataframe=train_data,  
    directory="/content/dank_data-master/data/training/",  
    x_col="id",  
    y_col="dank_level_new",  
    batch_size=30,  
    seed=42,  
    class_mode="binary",  
    shuffle=False,  
    target_size=(156,156))  
validation_prediction_generator = predict_datagen.flow_from_dataframe(  
    dataframe=val_data,  
    directory="/content/dank_data-master/data/validation/",  
    x_col="id",  
    y_col="dank_level_new",  
    batch_size=30,  
    seed=42,  
    shuffle=False,  
    class_mode="binary",  
    target_size=(156,156))  
test_prediction_generator = predict_datagen.flow_from_dataframe(  
    dataframe=test_data,  
    directory="/content/dank_data-master/data/test/",  
    x_col="id",  
    y_col="dank_level_new",  
    batch_size=30,  
    seed=42,  
    shuffle=False,  
    class_mode="binary",  
    target_size=(156,156))
```

Found 3405 validated image filenames belonging to 2 classes.  
Found 3405 validated image filenames belonging to 2 classes.  
Found 1688 validated image filenames belonging to 2 classes.  
Found 1719 validated image filenames belonging to 2 classes.

```
In [10]: IMAGE_SIZE = [156,156]
ResNet50 = ResNet50(input_shape=IMAGE_SIZE + [3], weights='imagenet', include_
top=False)
```

Downloading data from [https://storage.googleapis.com/tensorflow/keras-applications/resnet/resnet50\\_weights\\_tf\\_dim\\_ordering\\_tf\\_kernels\\_notop.h5](https://storage.googleapis.com/tensorflow/keras-applications/resnet/resnet50_weights_tf_dim_ordering_tf_kernels_notop.h5)
94773248/94765736 [=====] - 0s 0us/step

```
In [11]: for layer in ResNet50.layers:
    layer.trainable = False
```

```
In [12]: #Flatten
flatten = Flatten(data_format='channels_last',name='Flatten')(ResNet50.output)

#FC Layer
FC1 = Dense(units=512,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=32),name='FC1')(flatten)
x = Dropout(0.3)(FC1)
#FC Layer
FC2 = Dense(units=256,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33),name='FC2')(x)
x = Dropout(0.3)(FC2)
#FC Layer
FC3 = Dense(units=128,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33),name='FC3')(x)
x = Dropout(0.3)(FC3)
#FC Layer
FC4 = Dense(units=64,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33),name='FC4')(x)
x = Dropout(0.3)(FC4)

#output Layer
Out = Dense(units=1,activation='sigmoid',kernel_initializer=tf.keras.initializers.glorot_normal(seed=3),name='Output')(x)

model = Model(inputs=ResNet50.input, outputs=Out)
model.summary()
```

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[None, 156, 156, 3]	0	
conv1_pad (ZeroPadding2D) [0]	(None, 162, 162, 3)	0	input_1[0]
conv1_conv (Conv2D) [0]	(None, 78, 78, 64)	9472	conv1_pad[0]
conv1_bn (BatchNormalization) [0][0]	(None, 78, 78, 64)	256	conv1_conv[0]
conv1_relu (Activation) [0]	(None, 78, 78, 64)	0	conv1_bn[0]
pool1_pad (ZeroPadding2D) [0][0]	(None, 80, 80, 64)	0	conv1_relu[0]
pool1_pool (MaxPooling2D) [0]	(None, 39, 39, 64)	0	pool1_pad[0]
conv2_block1_1_conv (Conv2D) [0][0]	(None, 39, 39, 64)	4160	pool1_pool[0]
conv2_block1_1_bn (BatchNormali conv2_block1_1_conv[0][0]	(None, 39, 39, 64)	256	conv2_block1_1_conv[0][0]
conv2_block1_1_relu (Activation conv2_block1_1_bn[0][0]	(None, 39, 39, 64)	0	conv2_block1_1_bn[0][0]
conv2_block1_2_conv (Conv2D) conv2_block1_1_relu[0][0]	(None, 39, 39, 64)	36928	conv2_block1_1_relu[0][0]
conv2_block1_2_bn (BatchNormali conv2_block1_2_conv[0][0]	(None, 39, 39, 64)	256	conv2_block1_2_conv[0][0]
conv2_block1_2_relu (Activation conv2_block1_2_bn[0][0]	(None, 39, 39, 64)	0	conv2_block1_2_bn[0][0]

conv2_block1_0_conv (Conv2D) [0][0]	(None, 39, 39, 256)	16640	pool1_pool
conv2_block1_3_conv (Conv2D) [0][0]	(None, 39, 39, 256)	16640	conv2_block1_2_relu[0][0]
conv2_block1_0_bn (BatchNormali _0_conv[0][0]	(None, 39, 39, 256)	1024	conv2_block1_0_conv[0][0]
conv2_block1_3_bn (BatchNormali _3_conv[0][0]	(None, 39, 39, 256)	1024	conv2_block1_3_conv[0][0]
conv2_block1_add (Add) _0_bn[0][0]	(None, 39, 39, 256)	0	conv2_block1_0_bn[0][0]
conv2_block1_out (Activation) _add[0][0]	(None, 39, 39, 256)	0	conv2_block1_out[0][0]
conv2_block2_1_conv (Conv2D) _out[0][0]	(None, 39, 39, 64)	16448	conv2_block1_out[0][0]
conv2_block2_1_bn (BatchNormali _1_conv[0][0]	(None, 39, 39, 64)	256	conv2_block2_1_conv[0][0]
conv2_block2_1_relu (Activation _1_bn[0][0]	(None, 39, 39, 64)	0	conv2_block2_1_bn[0][0]
conv2_block2_2_conv (Conv2D) _1_relu[0][0]	(None, 39, 39, 64)	36928	conv2_block2_1_relu[0][0]
conv2_block2_2_bn (BatchNormali _2_conv[0][0]	(None, 39, 39, 64)	256	conv2_block2_2_conv[0][0]
conv2_block2_2_relu (Activation _2_bn[0][0]	(None, 39, 39, 64)	0	conv2_block2_2_bn[0][0]
conv2_block2_3_conv (Conv2D) _2_relu[0][0]	(None, 39, 39, 256)	16640	conv2_block2_2_relu[0][0]
conv2_block2_3_bn (BatchNormali _3_conv[0][0]	(None, 39, 39, 256)	1024	conv2_block2_3_conv[0][0]

conv2_block2_add (Add) _out[0][0]	(None, 39, 39, 256) 0	conv2_block1
_3_bn[0][0]		conv2_block2
conv2_block2_out (Activation) _add[0][0]	(None, 39, 39, 256) 0	conv2_block2
conv2_block3_1_conv (Conv2D) _out[0][0]	(None, 39, 39, 64) 16448	conv2_block2
conv2_block3_1_bn (BatchNormali _1_conv[0][0]	(None, 39, 39, 64) 256	conv2_block3
conv2_block3_1_relu (Activation _1_bn[0][0]	(None, 39, 39, 64) 0	conv2_block3
conv2_block3_2_conv (Conv2D) _1_relu[0][0]	(None, 39, 39, 64) 36928	conv2_block3
conv2_block3_2_bn (BatchNormali _2_conv[0][0]	(None, 39, 39, 64) 256	conv2_block3
conv2_block3_2_relu (Activation _2_bn[0][0]	(None, 39, 39, 64) 0	conv2_block3
conv2_block3_3_conv (Conv2D) _2_relu[0][0]	(None, 39, 39, 256) 16640	conv2_block3
conv2_block3_3_bn (BatchNormali _3_conv[0][0]	(None, 39, 39, 256) 1024	conv2_block3
conv2_block3_add (Add) _out[0][0]	(None, 39, 39, 256) 0	conv2_block2
_3_bn[0][0]		conv2_block3
conv2_block3_out (Activation) _add[0][0]	(None, 39, 39, 256) 0	conv2_block3
conv3_block1_1_conv (Conv2D) _out[0][0]	(None, 20, 20, 128) 32896	conv2_block3

conv3_block1_1_bn (BatchNormali (None, 20, 20, 128) 512		conv3_block1
conv3_block1_1_conv[0][0]		
conv3_block1_1_relu (Activation (None, 20, 20, 128) 0		conv3_block1
conv3_block1_1_bn[0][0]		
conv3_block1_2_conv (Conv2D) (None, 20, 20, 128) 147584		conv3_block1
conv3_block1_2_relu[0][0]		
conv3_block1_2_bn (BatchNormali (None, 20, 20, 128) 512		conv3_block1
conv3_block1_2_conv[0][0]		
conv3_block1_2_relu (Activation (None, 20, 20, 128) 0		conv3_block1
conv3_block1_2_bn[0][0]		
conv3_block1_0_conv (Conv2D) (None, 20, 20, 512) 131584		conv2_block3
conv3_block1_out[0][0]		
conv3_block1_3_conv (Conv2D) (None, 20, 20, 512) 66048		conv3_block1
conv3_block1_2_relu[0][0]		
conv3_block1_0_bn (BatchNormali (None, 20, 20, 512) 2048		conv3_block1
conv3_block1_0_conv[0][0]		
conv3_block1_3_bn (BatchNormali (None, 20, 20, 512) 2048		conv3_block1
conv3_block1_3_conv[0][0]		
conv3_block1_add (Add) (None, 20, 20, 512) 0		conv3_block1
conv3_block1_0_bn[0][0]		
conv3_block1_3_bn[0][0]		
conv3_block1_out (Activation) (None, 20, 20, 512) 0		conv3_block1
conv3_block1_add[0][0]		
conv3_block2_1_conv (Conv2D) (None, 20, 20, 128) 65664		conv3_block1
conv3_block1_out[0][0]		
conv3_block2_1_bn (BatchNormali (None, 20, 20, 128) 512		conv3_block2
conv3_block2_1_conv[0][0]		
conv3_block2_1_relu (Activation (None, 20, 20, 128) 0		conv3_block2
conv3_block2_1_bn[0][0]		

conv3_block2_2_conv (Conv2D) (None, 20, 20, 128) 147584	conv3_block2_1_relu[0][0]	
conv3_block2_2_bn (BatchNormali (None, 20, 20, 128) 512	conv3_block2_2_conv[0][0]	
conv3_block2_2_relu (Activation (None, 20, 20, 128) 0	conv3_block2_2_bn[0][0]	
conv3_block2_3_conv (Conv2D) (None, 20, 20, 512) 66048	conv3_block2_2_relu[0][0]	
conv3_block2_3_bn (BatchNormali (None, 20, 20, 512) 2048	conv3_block2_3_conv[0][0]	
conv3_block2_add (Add) (None, 20, 20, 512) 0	conv3_block1_out[0][0]	conv3_block2_3_bn[0][0]
conv3_block2_out (Activation) (None, 20, 20, 512) 0	conv3_block2_add[0][0]	
conv3_block3_1_conv (Conv2D) (None, 20, 20, 128) 65664	conv3_block2_out[0][0]	
conv3_block3_1_bn (BatchNormali (None, 20, 20, 128) 512	conv3_block3_1_conv[0][0]	
conv3_block3_1_relu (Activation (None, 20, 20, 128) 0	conv3_block3_1_bn[0][0]	
conv3_block3_2_conv (Conv2D) (None, 20, 20, 128) 147584	conv3_block3_1_relu[0][0]	
conv3_block3_2_bn (BatchNormali (None, 20, 20, 128) 512	conv3_block3_2_conv[0][0]	
conv3_block3_2_relu (Activation (None, 20, 20, 128) 0	conv3_block3_2_bn[0][0]	
conv3_block3_3_conv (Conv2D) (None, 20, 20, 512) 66048	conv3_block3_2_relu[0][0]	

conv3_block3_3_bn (BatchNormali (None, 20, 20, 512) 2048 _3_conv[0][0]		conv3_block3
conv3_block3_add (Add) _out[0][0]	(None, 20, 20, 512) 0	conv3_block2 conv3_block3
conv3_block3_out (Activation) _add[0][0]	(None, 20, 20, 512) 0	conv3_block3
conv3_block4_1_conv (Conv2D) _out[0][0]	(None, 20, 20, 128) 65664	conv3_block3
conv3_block4_1_bn (BatchNormali (None, 20, 20, 128) 512 _1_conv[0][0]		conv3_block4
conv3_block4_1_relu (Activation (None, 20, 20, 128) 0 _1_bn[0][0]		conv3_block4
conv3_block4_2_conv (Conv2D) _1_relu[0][0]	(None, 20, 20, 128) 147584	conv3_block4
conv3_block4_2_bn (BatchNormali (None, 20, 20, 128) 512 _2_conv[0][0]		conv3_block4
conv3_block4_2_relu (Activation (None, 20, 20, 128) 0 _2_bn[0][0]		conv3_block4
conv3_block4_3_conv (Conv2D) _2_relu[0][0]	(None, 20, 20, 512) 66048	conv3_block4
conv3_block4_3_bn (BatchNormali (None, 20, 20, 512) 2048 _3_conv[0][0]		conv3_block4
conv3_block4_add (Add) _out[0][0]	(None, 20, 20, 512) 0	conv3_block3 conv3_block4
conv3_block4_out (Activation) _add[0][0]	(None, 20, 20, 512) 0	conv3_block4

conv4_block1_1_conv (Conv2D) _out[0][0]	(None, 10, 10, 256)	131328	conv3_block4
conv4_block1_1_bn (BatchNormali _conv[0][0]	(None, 10, 10, 256)	1024	conv4_block1
conv4_block1_1_relu (Activation _bn[0][0]	(None, 10, 10, 256)	0	conv4_block1
conv4_block1_2_conv (Conv2D) _relu[0][0]	(None, 10, 10, 256)	590080	conv4_block1
conv4_block1_2_bn (BatchNormali _conv[0][0]	(None, 10, 10, 256)	1024	conv4_block1
conv4_block1_2_relu (Activation _bn[0][0]	(None, 10, 10, 256)	0	conv4_block1
conv4_block1_0_conv (Conv2D) _out[0][0]	(None, 10, 10, 1024)	525312	conv3_block4
conv4_block1_3_conv (Conv2D) _relu[0][0]	(None, 10, 10, 1024)	263168	conv4_block1
conv4_block1_0_bn (BatchNormali _conv[0][0]	(None, 10, 10, 1024)	4096	conv4_block1
conv4_block1_3_bn (BatchNormali _conv[0][0]	(None, 10, 10, 1024)	4096	conv4_block1
conv4_block1_add (Add) _bn[0][0]	(None, 10, 10, 1024)	0	conv4_block1
conv4_block1_3_bn [0][0]			conv4_block1
conv4_block1_out (Activation) _add[0][0]	(None, 10, 10, 1024)	0	conv4_block1
conv4_block2_1_conv (Conv2D) _out[0][0]	(None, 10, 10, 256)	262400	conv4_block1
conv4_block2_1_bn (BatchNormali _conv[0][0]	(None, 10, 10, 256)	1024	conv4_block2

conv4_block2_1_relu (Activation (None, 10, 10, 256) 0		conv4_block2_1_bn[0][0]	
conv4_block2_2_conv (Conv2D) (None, 10, 10, 256) 590080		conv4_block2_1_relu[0][0]	
conv4_block2_2_bn (BatchNormali (None, 10, 10, 256) 1024		conv4_block2_2_conv[0][0]	
conv4_block2_2_relu (Activation (None, 10, 10, 256) 0		conv4_block2_2_bn[0][0]	
conv4_block2_3_conv (Conv2D) (None, 10, 10, 1024) 263168		conv4_block2_2_relu[0][0]	
conv4_block2_3_bn (BatchNormali (None, 10, 10, 1024) 4096		conv4_block2_3_conv[0][0]	
conv4_block2_add (Add) (None, 10, 10, 1024) 0		conv4_block1_out[0][0]	
		conv4_block2_3_bn[0][0]	
conv4_block2_out (Activation) (None, 10, 10, 1024) 0		conv4_block2_add[0][0]	
conv4_block3_1_conv (Conv2D) (None, 10, 10, 256) 262400		conv4_block2_out[0][0]	
conv4_block3_1_bn (BatchNormali (None, 10, 10, 256) 1024		conv4_block3_1_conv[0][0]	
conv4_block3_1_relu (Activation (None, 10, 10, 256) 0		conv4_block3_1_bn[0][0]	
conv4_block3_2_conv (Conv2D) (None, 10, 10, 256) 590080		conv4_block3_1_relu[0][0]	
conv4_block3_2_bn (BatchNormali (None, 10, 10, 256) 1024		conv4_block3_2_conv[0][0]	
conv4_block3_2_relu (Activation (None, 10, 10, 256) 0		conv4_block3_2_bn[0][0]	

\_2\_bn[0][0]


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conv4\_block3\_3\_conv (Conv2D) (None, 10, 10, 1024) 263168 conv4\_block3  
\_2\_relu[0][0]

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conv4\_block3\_3\_bn (BatchNormali (None, 10, 10, 1024) 4096 conv4\_block3  
\_3\_conv[0][0]

---

conv4\_block3\_add (Add) (None, 10, 10, 1024) 0 conv4\_block2  
\_out[0][0]

conv4\_block3  
\_3\_bn[0][0]

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conv4\_block3\_out (Activation) (None, 10, 10, 1024) 0 conv4\_block3  
\_add[0][0]

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conv4\_block4\_1\_conv (Conv2D) (None, 10, 10, 256) 262400 conv4\_block3  
\_out[0][0]

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conv4\_block4\_1\_bn (BatchNormali (None, 10, 10, 256) 1024 conv4\_block4  
\_1\_conv[0][0]

---

conv4\_block4\_1\_relu (Activation (None, 10, 10, 256) 0 conv4\_block4  
\_1\_bn[0][0]

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conv4\_block4\_2\_conv (Conv2D) (None, 10, 10, 256) 590080 conv4\_block4  
\_1\_relu[0][0]

---

conv4\_block4\_2\_bn (BatchNormali (None, 10, 10, 256) 1024 conv4\_block4  
\_2\_conv[0][0]

---

conv4\_block4\_2\_relu (Activation (None, 10, 10, 256) 0 conv4\_block4  
\_2\_bn[0][0]

---

conv4\_block4\_3\_conv (Conv2D) (None, 10, 10, 1024) 263168 conv4\_block4  
\_2\_relu[0][0]

---

conv4\_block4\_3\_bn (BatchNormali (None, 10, 10, 1024) 4096 conv4\_block4  
\_3\_conv[0][0]

---

conv4\_block4\_add (Add) (None, 10, 10, 1024) 0 conv4\_block3  
\_out[0][0]

conv4\_block4  
\_3\_bn[0][0]

conv4_block4_out (Activation) (None, 10, 10, 1024) 0		conv4_block4
conv4_block5_1_conv (Conv2D) (None, 10, 10, 256) 262400		conv4_block4
conv4_block5_1_bn (BatchNormali (None, 10, 10, 256) 1024		conv4_block5
conv4_block5_1_relu (Activation (None, 10, 10, 256) 0		conv4_block5
conv4_block5_2_conv (Conv2D) (None, 10, 10, 256) 590080		conv4_block5
conv4_block5_2_bn (BatchNormali (None, 10, 10, 256) 1024		conv4_block5
conv4_block5_2_relu (Activation (None, 10, 10, 256) 0		conv4_block5
conv4_block5_3_conv (Conv2D) (None, 10, 10, 1024) 263168		conv4_block5
conv4_block5_3_bn (BatchNormali (None, 10, 10, 1024) 4096		conv4_block5
conv4_block5_add (Add) (None, 10, 10, 1024) 0		conv4_block4
conv4_block5_3_bn[0][0]		conv4_block5
conv4_block5_out (Activation) (None, 10, 10, 1024) 0		conv4_block5
conv4_block6_1_conv (Conv2D) (None, 10, 10, 256) 262400		conv4_block5
conv4_block6_1_bn (BatchNormali (None, 10, 10, 256) 1024		conv4_block6
conv4_block6_1_relu (Activation (None, 10, 10, 256) 0		conv4_block6

<u>_1_bn[0][0]</u>			
<u>conv4_block6_2_conv</u> (Conv2D)	(None, 10, 10, 256)	590080	conv4_block6
<u>_1_relu[0][0]</u>			
<u>conv4_block6_2_bn</u> (BatchNormali	(None, 10, 10, 256)	1024	conv4_block6
<u>_2_conv[0][0]</u>			
<u>conv4_block6_2_relu</u> (Activation	(None, 10, 10, 256)	0	conv4_block6
<u>_2_bn[0][0]</u>			
<u>conv4_block6_3_conv</u> (Conv2D)	(None, 10, 10, 1024)	263168	conv4_block6
<u>_2_relu[0][0]</u>			
<u>conv4_block6_3_bn</u> (BatchNormali	(None, 10, 10, 1024)	4096	conv4_block6
<u>_3_conv[0][0]</u>			
<u>conv4_block6_add</u> (Add)	(None, 10, 10, 1024)	0	conv4_block5
<u>_out[0][0]</u>			conv4_block6
<u>_3_bn[0][0]</u>			
<u>conv4_block6_out</u> (Activation)	(None, 10, 10, 1024)	0	conv4_block6
<u>_add[0][0]</u>			
<u>conv5_block1_1_conv</u> (Conv2D)	(None, 5, 5, 512)	524800	conv4_block6
<u>_out[0][0]</u>			
<u>conv5_block1_1_bn</u> (BatchNormali	(None, 5, 5, 512)	2048	conv5_block1
<u>_1_conv[0][0]</u>			
<u>conv5_block1_1_relu</u> (Activation	(None, 5, 5, 512)	0	conv5_block1
<u>_1_bn[0][0]</u>			
<u>conv5_block1_2_conv</u> (Conv2D)	(None, 5, 5, 512)	2359808	conv5_block1
<u>_1_relu[0][0]</u>			
<u>conv5_block1_2_bn</u> (BatchNormali	(None, 5, 5, 512)	2048	conv5_block1
<u>_2_conv[0][0]</u>			
<u>conv5_block1_2_relu</u> (Activation	(None, 5, 5, 512)	0	conv5_block1
<u>_2_bn[0][0]</u>			

conv5_block1_0_conv (Conv2D) _out[0][0]	(None, 5, 5, 2048)	2099200	conv4_block6
conv5_block1_3_conv (Conv2D) _relu[0][0]	(None, 5, 5, 2048)	1050624	conv5_block1
conv5_block1_0_bn (BatchNormali _0_conv[0][0]	(None, 5, 5, 2048)	8192	conv5_block1
conv5_block1_3_bn (BatchNormali _3_conv[0][0]	(None, 5, 5, 2048)	8192	conv5_block1
conv5_block1_add (Add) _bn[0][0]	(None, 5, 5, 2048)	0	conv5_block1
conv5_block1_3_bn[0][0]			conv5_block1
conv5_block1_out (Activation) _add[0][0]	(None, 5, 5, 2048)	0	conv5_block1
conv5_block2_1_conv (Conv2D) _out[0][0]	(None, 5, 5, 512)	1049088	conv5_block1
conv5_block2_1_bn (BatchNormali _1_conv[0][0]	(None, 5, 5, 512)	2048	conv5_block2
conv5_block2_1_relu (Activation _1_bn[0][0]	(None, 5, 5, 512)	0	conv5_block2
conv5_block2_2_conv (Conv2D) _1_relu[0][0]	(None, 5, 5, 512)	2359808	conv5_block2
conv5_block2_2_bn (BatchNormali _2_conv[0][0]	(None, 5, 5, 512)	2048	conv5_block2
conv5_block2_2_relu (Activation _2_bn[0][0]	(None, 5, 5, 512)	0	conv5_block2
conv5_block2_3_conv (Conv2D) _2_relu[0][0]	(None, 5, 5, 2048)	1050624	conv5_block2
conv5_block2_3_bn (BatchNormali _3_conv[0][0]	(None, 5, 5, 2048)	8192	conv5_block2

conv5_block2_add (Add) _out[0][0]	(None, 5, 5, 2048) 0		conv5_block1
_3_bn[0][0]			conv5_block2
conv5_block2_out (Activation) _add[0][0]	(None, 5, 5, 2048) 0		conv5_block2
conv5_block3_1_conv (Conv2D) _out[0][0]	(None, 5, 5, 512) 1049088		conv5_block2
conv5_block3_1_bn (BatchNormali _1_conv[0][0]	(None, 5, 5, 512) 2048		conv5_block3
conv5_block3_1_relu (Activation _1_bn[0][0]	(None, 5, 5, 512) 0		conv5_block3
conv5_block3_2_conv (Conv2D) _1_relu[0][0]	(None, 5, 5, 512) 2359808		conv5_block3
conv5_block3_2_bn (BatchNormali _2_conv[0][0]	(None, 5, 5, 512) 2048		conv5_block3
conv5_block3_2_relu (Activation _2_bn[0][0]	(None, 5, 5, 512) 0		conv5_block3
conv5_block3_3_conv (Conv2D) _2_relu[0][0]	(None, 5, 5, 2048) 1050624		conv5_block3
conv5_block3_3_bn (BatchNormali _3_conv[0][0]	(None, 5, 5, 2048) 8192		conv5_block3
conv5_block3_add (Add) _out[0][0]	(None, 5, 5, 2048) 0		conv5_block2
_3_bn[0][0]			conv5_block3
conv5_block3_out (Activation) _add[0][0]	(None, 5, 5, 2048) 0		conv5_block3
Flatten (Flatten) _out[0][0]	(None, 51200) 0		conv5_block3

FC1 (Dense) [0]	(None, 512)	26214912	Flatten[0]
dropout (Dropout)	(None, 512)	0	FC1[0][0]
FC2 (Dense) [0]	(None, 256)	131328	dropout[0]
dropout_1 (Dropout)	(None, 256)	0	FC2[0][0]
FC3 (Dense) [0]	(None, 128)	32896	dropout_1[0]
dropout_2 (Dropout)	(None, 128)	0	FC3[0][0]
FC4 (Dense) [0]	(None, 64)	8256	dropout_2[0]
dropout_3 (Dropout)	(None, 64)	0	FC4[0][0]
Output (Dense) [0]	(None, 1)	65	dropout_3[0]
<hr/>			
<hr/>			
Total params: 49,975,169			
Trainable params: 26,387,457			
Non-trainable params: 23,587,712			

In [13]: `def scheduler(epoch,lr):  
 if((epoch+1)%3==0):  
 lr=lr*0.95  
 return lr  
 else:  
 return lr`

```
In [14]: filepath="model_save/weights-{epoch:02d}-{val_accuracy:.4f}.h5"
checkpoint = ModelCheckpoint(filepath=filepath, monitor='val_accuracy', mode='auto')

lrschedule = tf.keras.callbacks.LearningRateScheduler(scheduler, verbose=0.1)

#stop the training if your validation accuracy is not increased in last 2 epochs.
early_stop= EarlyStopping(monitor='val_accuracy', patience=3, verbose=1)

#If your validation accuracy at that epoch is Less than previous epoch accuracy, you have to decrease the
#Learning rate by 10%
reduce_lr = ReduceLROnPlateau(monitor='val_accuracy', factor=0.75,
                             patience=3, min_lr=0.001, verbose=1)

model.compile(
    loss='binary_crossentropy',
    optimizer=tf.keras.optimizers.RMSprop(lr=1e-5),
    metrics=[ 'accuracy',tf.keras.metrics.Precision(),tf.keras.metrics.Recall(),tf.keras.metrics.F1Score(num_classes=1)]
)
```

```
In [15]: history=model.fit_generator(train_generator,steps_per_epoch=len(train_generator),epochs=50,validation_data=test_prediction_generator,validation_steps=len(test_prediction_generator),use_multiprocessing=False,workers=12,callbacks=[lrschedule,checkpoint,reduce_lr])
```

Epoch 1/50

Epoch 00001: LearningRateScheduler reducing learning rate to 9.9999974737875  
2e-06.

114/114 [=====] - 130s 801ms/step - loss: 1.1197 - accuracy: 0.4827 - precision: 0.4840 - recall: 0.5203 - f1\_score: 0.6667 - val\_loss: 0.7194 - val\_accuracy: 0.5148 - val\_precision: 0.4980 - val\_recall: 0.4609 - val\_f1\_score: 0.6518

Epoch 2/50

Epoch 00002: LearningRateScheduler reducing learning rate to 9.9999974737875  
2e-06.

114/114 [=====] - 93s 769ms/step - loss: 0.8855 - accuracy: 0.5021 - precision: 0.4940 - recall: 0.5124 - f1\_score: 0.6593 - val\_loss: 0.7038 - val\_accuracy: 0.5166 - val\_precision: 0.5000 - val\_recall: 0.3791 - val\_f1\_score: 0.6518

Epoch 3/50

Epoch 00003: LearningRateScheduler reducing learning rate to 9.4999976000981  
3e-06.

114/114 [=====] - 93s 773ms/step - loss: 0.8143 - accuracy: 0.5035 - precision: 0.4951 - recall: 0.5156 - f1\_score: 0.6589 - val\_loss: 0.6965 - val\_accuracy: 0.5346 - val\_precision: 0.5220 - val\_recall: 0.4416 - val\_f1\_score: 0.6518

Epoch 4/50

Epoch 00004: LearningRateScheduler reducing learning rate to 9.4999957811087  
4e-06.

114/114 [=====] - 94s 775ms/step - loss: 0.7757 - accuracy: 0.5286 - precision: 0.5141 - recall: 0.5123 - f1\_score: 0.6533 - val\_loss: 0.6941 - val\_accuracy: 0.5329 - val\_precision: 0.5172 - val\_recall: 0.5054 - val\_f1\_score: 0.6518

Epoch 5/50

Epoch 00005: LearningRateScheduler reducing learning rate to 9.4999957811087  
4e-06.

114/114 [=====] - 94s 771ms/step - loss: 0.7714 - accuracy: 0.5190 - precision: 0.4990 - recall: 0.5373 - f1\_score: 0.6477 - val\_loss: 0.6956 - val\_accuracy: 0.5317 - val\_precision: 0.5187 - val\_recall: 0.4344 - val\_f1\_score: 0.6518

Epoch 6/50

Epoch 00006: LearningRateScheduler reducing learning rate to 9.02499959920533  
e-06.

114/114 [=====] - 93s 772ms/step - loss: 0.7543 - accuracy: 0.5262 - precision: 0.5105 - recall: 0.5067 - f1\_score: 0.6513 - val\_loss: 0.6921 - val\_accuracy: 0.5462 - val\_precision: 0.5369 - val\_recall: 0.4465 - val\_f1\_score: 0.6518

Epoch 7/50

Epoch 00007: LearningRateScheduler reducing learning rate to 9.02499959920533  
e-06.

114/114 [=====] - 94s 782ms/step - loss: 0.7481 - accuracy: 0.5115 - precision: 0.5063 - recall: 0.5218 - f1\_score: 0.6619 - val\_loss: 0.6895 - val\_accuracy: 0.5416 - val\_precision: 0.5308 - val\_recall: 0.4452 - val\_f1\_score: 0.6518

Epoch 8/50

Epoch 00008: LearningRateScheduler reducing learning rate to 9.02499959920533e-06.  
114/114 [=====] - 93s 768ms/step - loss: 0.7484 - accuracy: 0.5358 - precision: 0.5295 - recall: 0.5389 - f1\_score: 0.6609 - val\_loss: 0.6895 - val\_accuracy: 0.5544 - val\_precision: 0.5631 - val\_recall: 0.3490 - val\_f1\_score: 0.6518  
Epoch 9/50

Epoch 00009: LearningRateScheduler reducing learning rate to 8.573749619245064e-06.  
114/114 [=====] - 95s 780ms/step - loss: 0.7352 - accuracy: 0.5293 - precision: 0.5285 - recall: 0.5131 - f1\_score: 0.6647 - val\_loss: 0.6881 - val\_accuracy: 0.5556 - val\_precision: 0.5519 - val\_recall: 0.4284 - val\_f1\_score: 0.6518  
Epoch 10/50

Epoch 00010: LearningRateScheduler reducing learning rate to 8.573749255447183e-06.  
114/114 [=====] - 94s 774ms/step - loss: 0.7216 - accuracy: 0.5354 - precision: 0.5236 - recall: 0.5069 - f1\_score: 0.6539 - val\_loss: 0.6859 - val\_accuracy: 0.5474 - val\_precision: 0.5332 - val\_recall: 0.5126 - val\_f1\_score: 0.6518  
Epoch 11/50

Epoch 00011: LearningRateScheduler reducing learning rate to 8.573749255447183e-06.  
114/114 [=====] - 96s 784ms/step - loss: 0.7032 - accuracy: 0.5560 - precision: 0.5505 - recall: 0.5796 - f1\_score: 0.6640 - val\_loss: 0.6865 - val\_accuracy: 0.5567 - val\_precision: 0.5557 - val\_recall: 0.4140 - val\_f1\_score: 0.6518  
Epoch 12/50

Epoch 00012: LearningRateScheduler reducing learning rate to 8.145061792674824e-06.  
114/114 [=====] - 94s 777ms/step - loss: 0.7274 - accuracy: 0.5421 - precision: 0.5460 - recall: 0.5372 - f1\_score: 0.6691 - val\_loss: 0.6829 - val\_accuracy: 0.5625 - val\_precision: 0.5601 - val\_recall: 0.4428 - val\_f1\_score: 0.6518  
Epoch 13/50

Epoch 00013: LearningRateScheduler reducing learning rate to 8.145061656250618e-06.  
114/114 [=====] - 94s 773ms/step - loss: 0.7214 - accuracy: 0.5510 - precision: 0.5385 - recall: 0.5171 - f1\_score: 0.6534 - val\_loss: 0.6815 - val\_accuracy: 0.5678 - val\_precision: 0.5655 - val\_recall: 0.4573 - val\_f1\_score: 0.6518  
Epoch 14/50

Epoch 00014: LearningRateScheduler reducing learning rate to 8.145061656250618e-06.  
114/114 [=====] - 97s 810ms/step - loss: 0.7145 - accuracy: 0.5475 - precision: 0.5406 - recall: 0.5172 - f1\_score: 0.6582 - val\_loss: 0.6831 - val\_accuracy: 0.5643 - val\_precision: 0.5672 - val\_recall: 0.4164 - val\_f1\_score: 0.6518  
Epoch 15/50

Epoch 00015: LearningRateScheduler reducing learning rate to 7.73780857343808 7e-06.  
114/114 [=====] - 97s 807ms/step - loss: 0.7129 - accuracy: 0.5542 - precision: 0.5490 - recall: 0.5694 - f1\_score: 0.6636 - val\_loss: 0.6820 - val\_accuracy: 0.5649 - val\_precision: 0.5563 - val\_recall: 0.4934 - val\_f1\_score: 0.6518  
Epoch 16/50

Epoch 00016: LearningRateScheduler reducing learning rate to 7.73780811869073 7e-06.  
114/114 [=====] - 97s 808ms/step - loss: 0.7047 - accuracy: 0.5560 - precision: 0.5546 - recall: 0.5698 - f1\_score: 0.6667 - val\_loss: 0.6821 - val\_accuracy: 0.5608 - val\_precision: 0.5557 - val\_recall: 0.4561 - val\_f1\_score: 0.6518  
Epoch 17/50

Epoch 00017: LearningRateScheduler reducing learning rate to 7.73780811869073 7e-06.  
114/114 [=====] - 99s 819ms/step - loss: 0.7015 - accuracy: 0.5732 - precision: 0.5696 - recall: 0.5600 - f1\_score: 0.6616 - val\_loss: 0.6814 - val\_accuracy: 0.5666 - val\_precision: 0.5592 - val\_recall: 0.4886 - val\_f1\_score: 0.6518  
Epoch 18/50

Epoch 00018: LearningRateScheduler reducing learning rate to 7.3509177127562e -06.  
114/114 [=====] - 97s 803ms/step - loss: 0.7168 - accuracy: 0.5530 - precision: 0.5424 - recall: 0.5384 - f1\_score: 0.6558 - val\_loss: 0.6817 - val\_accuracy: 0.5602 - val\_precision: 0.5459 - val\_recall: 0.5367 - val\_f1\_score: 0.6518  
Epoch 19/50

Epoch 00019: LearningRateScheduler reducing learning rate to 7.3509177127562e -06.  
114/114 [=====] - 96s 799ms/step - loss: 0.7174 - accuracy: 0.5387 - precision: 0.5336 - recall: 0.5536 - f1\_score: 0.6629 - val\_loss: 0.6820 - val\_accuracy: 0.5596 - val\_precision: 0.5483 - val\_recall: 0.5054 - val\_f1\_score: 0.6518  
Epoch 20/50

Epoch 00020: LearningRateScheduler reducing learning rate to 7.3509177127562e -06.  
114/114 [=====] - 96s 792ms/step - loss: 0.7004 - accuracy: 0.5624 - precision: 0.5509 - recall: 0.5773 - f1\_score: 0.6578 - val\_loss: 0.6832 - val\_accuracy: 0.5538 - val\_precision: 0.5427 - val\_recall: 0.4898 - val\_f1\_score: 0.6518  
Epoch 21/50

Epoch 00021: LearningRateScheduler reducing learning rate to 6.98337182711838 9e-06.  
114/114 [=====] - 95s 792ms/step - loss: 0.6986 - accuracy: 0.5623 - precision: 0.5543 - recall: 0.5787 - f1\_score: 0.6607 - val\_loss: 0.6837 - val\_accuracy: 0.5585 - val\_precision: 0.5552 - val\_recall: 0.4356 - val\_f1\_score: 0.6518  
Epoch 22/50

Epoch 00022: LearningRateScheduler reducing learning rate to 6.98337180438102

2e-06.  
114/114 [=====] - 94s 779ms/step - loss: 0.7069 - accuracy: 0.5571 - precision: 0.5474 - recall: 0.5467 - f1\_score: 0.6570 - val\_loss: 0.6871 - val\_accuracy: 0.5515 - val\_precision: 0.5498 - val\_recall: 0.3983 - val\_f1\_score: 0.6518  
Epoch 23/50

Epoch 00023: LearningRateScheduler reducing learning rate to 6.983371804381022e-06.  
114/114 [=====] - 94s 782ms/step - loss: 0.6900 - accuracy: 0.5693 - precision: 0.5597 - recall: 0.5595 - f1\_score: 0.6569 - val\_loss: 0.6874 - val\_accuracy: 0.5585 - val\_precision: 0.5550 - val\_recall: 0.4368 - val\_f1\_score: 0.6518  
Epoch 24/50

Epoch 00024: LearningRateScheduler reducing learning rate to 6.6342032141619704e-06.  
114/114 [=====] - 94s 779ms/step - loss: 0.6928 - accuracy: 0.5727 - precision: 0.5613 - recall: 0.5571 - f1\_score: 0.6544 - val\_loss: 0.6868 - val\_accuracy: 0.5649 - val\_precision: 0.5594 - val\_recall: 0.4705 - val\_f1\_score: 0.6518  
Epoch 25/50

Epoch 00025: LearningRateScheduler reducing learning rate to 6.6342031459498685e-06.  
114/114 [=====] - 94s 775ms/step - loss: 0.6887 - accuracy: 0.5729 - precision: 0.5759 - recall: 0.5935 - f1\_score: 0.6724 - val\_loss: 0.6871 - val\_accuracy: 0.5544 - val\_precision: 0.5534 - val\_recall: 0.4055 - val\_f1\_score: 0.6518  
Epoch 26/50

Epoch 00026: LearningRateScheduler reducing learning rate to 6.6342031459498685e-06.  
114/114 [=====] - 95s 777ms/step - loss: 0.6843 - accuracy: 0.5837 - precision: 0.5857 - recall: 0.5672 - f1\_score: 0.6661 - val\_loss: 0.6842 - val\_accuracy: 0.5625 - val\_precision: 0.5614 - val\_recall: 0.4344 - val\_f1\_score: 0.6518  
Epoch 27/50

Epoch 00027: LearningRateScheduler reducing learning rate to 6.302492988652374e-06.  
114/114 [=====] - 96s 780ms/step - loss: 0.6922 - accuracy: 0.5593 - precision: 0.5528 - recall: 0.5487 - f1\_score: 0.6593 - val\_loss: 0.6871 - val\_accuracy: 0.5614 - val\_precision: 0.5591 - val\_recall: 0.4380 - val\_f1\_score: 0.6518  
Epoch 28/50

Epoch 00028: LearningRateScheduler reducing learning rate to 6.302493147813948e-06.  
114/114 [=====] - 94s 767ms/step - loss: 0.6918 - accuracy: 0.5705 - precision: 0.5629 - recall: 0.5760 - f1\_score: 0.6602 - val\_loss: 0.6880 - val\_accuracy: 0.5695 - val\_precision: 0.5723 - val\_recall: 0.4332 - val\_f1\_score: 0.6518  
Epoch 29/50

Epoch 00029: LearningRateScheduler reducing learning rate to 6.302493147813948e-06.

```
114/114 [=====] - 93s 769ms/step - loss: 0.6821 - accuracy: 0.5852 - precision: 0.5838 - recall: 0.5829 - f1_score: 0.6657 - val_loss: 0.6868 - val_accuracy: 0.5678 - val_precision: 0.5679 - val_recall: 0.4428 - val_f1_score: 0.6518
Epoch 30/50

Epoch 00030: LearningRateScheduler reducing learning rate to 5.98736849042325e-06.
114/114 [=====] - 93s 775ms/step - loss: 0.6803 - accuracy: 0.5804 - precision: 0.5698 - recall: 0.5695 - f1_score: 0.6554 - val_loss: 0.6895 - val_accuracy: 0.5631 - val_precision: 0.5585 - val_recall: 0.4597 - val_f1_score: 0.6518
Epoch 31/50

Epoch 00031: LearningRateScheduler reducing learning rate to 5.98736869505955e-06.
114/114 [=====] - 93s 769ms/step - loss: 0.6763 - accuracy: 0.5933 - precision: 0.5821 - recall: 0.5929 - f1_score: 0.6556 - val_loss: 0.6958 - val_accuracy: 0.5695 - val_precision: 0.5723 - val_recall: 0.4332 - val_f1_score: 0.6518
Epoch 32/50

Epoch 00032: LearningRateScheduler reducing learning rate to 5.98736869505955e-06.
114/114 [=====] - 94s 779ms/step - loss: 0.6774 - accuracy: 0.5835 - precision: 0.5777 - recall: 0.5776 - f1_score: 0.6605 - val_loss: 0.7047 - val_accuracy: 0.5654 - val_precision: 0.5671 - val_recall: 0.4272 - val_f1_score: 0.6518
Epoch 33/50

Epoch 00033: LearningRateScheduler reducing learning rate to 5.68800026030658e-06.
114/114 [=====] - 93s 771ms/step - loss: 0.6726 - accuracy: 0.5973 - precision: 0.5877 - recall: 0.5761 - f1_score: 0.6543 - val_loss: 0.7014 - val_accuracy: 0.5649 - val_precision: 0.5684 - val_recall: 0.4152 - val_f1_score: 0.6518
Epoch 34/50

Epoch 00034: LearningRateScheduler reducing learning rate to 5.68800032851868e-06.
114/114 [=====] - 92s 757ms/step - loss: 0.6788 - accuracy: 0.6046 - precision: 0.5868 - recall: 0.6049 - f1_score: 0.6497 - val_loss: 0.6966 - val_accuracy: 0.5765 - val_precision: 0.5739 - val_recall: 0.4813 - val_f1_score: 0.6518
Epoch 35/50

Epoch 00035: LearningRateScheduler reducing learning rate to 5.68800032851868e-06.
114/114 [=====] - 92s 760ms/step - loss: 0.6808 - accuracy: 0.5707 - precision: 0.5642 - recall: 0.5936 - f1_score: 0.6631 - val_loss: 0.7035 - val_accuracy: 0.5637 - val_precision: 0.5699 - val_recall: 0.3971 - val_f1_score: 0.6518
Epoch 36/50

Epoch 00036: LearningRateScheduler reducing learning rate to 5.403600312092749e-06.
114/114 [=====] - 91s 761ms/step - loss: 0.6788 - ac
```

```
curacy: 0.5869 - precision: 0.5723 - recall: 0.6029 - f1_score: 0.6550 - val_loss: 0.6996 - val_accuracy: 0.5695 - val_precision: 0.5717 - val_recall: 0.4368 - val_f1_score: 0.6518
Epoch 37/50

Epoch 00037: LearningRateScheduler reducing learning rate to 5.40360042577958e-06.
114/114 [=====] - 93s 772ms/step - loss: 0.6710 - accuracy: 0.6041 - precision: 0.5969 - recall: 0.6084 - f1_score: 0.6610 - val_loss: 0.7006 - val_accuracy: 0.5689 - val_precision: 0.5701 - val_recall: 0.4404 - val_f1_score: 0.6518
Epoch 38/50

Epoch 00038: LearningRateScheduler reducing learning rate to 5.40360042577958e-06.
114/114 [=====] - 92s 760ms/step - loss: 0.6691 - accuracy: 0.5786 - precision: 0.5725 - recall: 0.5996 - f1_score: 0.6636 - val_loss: 0.7067 - val_accuracy: 0.5660 - val_precision: 0.5680 - val_recall: 0.4272 - val_f1_score: 0.6518
Epoch 39/50

Epoch 00039: LearningRateScheduler reducing learning rate to 5.13342040449060e-06.
114/114 [=====] - 93s 761ms/step - loss: 0.6804 - accuracy: 0.5684 - precision: 0.5691 - recall: 0.5866 - f1_score: 0.6689 - val_loss: 0.7076 - val_accuracy: 0.5689 - val_precision: 0.5738 - val_recall: 0.4212 - val_f1_score: 0.6518
Epoch 40/50

Epoch 00040: LearningRateScheduler reducing learning rate to 5.13342047270271e-06.
114/114 [=====] - 92s 767ms/step - loss: 0.6704 - accuracy: 0.5832 - precision: 0.5569 - recall: 0.5832 - f1_score: 0.6425 - val_loss: 0.6980 - val_accuracy: 0.5701 - val_precision: 0.5602 - val_recall: 0.5150 - val_f1_score: 0.6518
Epoch 41/50

Epoch 00041: LearningRateScheduler reducing learning rate to 5.13342047270271e-06.
114/114 [=====] - 93s 764ms/step - loss: 0.6854 - accuracy: 0.5691 - precision: 0.5493 - recall: 0.6028 - f1_score: 0.6511 - val_loss: 0.7031 - val_accuracy: 0.5753 - val_precision: 0.5790 - val_recall: 0.4452 - val_f1_score: 0.6518
Epoch 42/50

Epoch 00042: LearningRateScheduler reducing learning rate to 4.8767494449067574e-06.
114/114 [=====] - 92s 766ms/step - loss: 0.6802 - accuracy: 0.5872 - precision: 0.5819 - recall: 0.5685 - f1_score: 0.6589 - val_loss: 0.7049 - val_accuracy: 0.5777 - val_precision: 0.5809 - val_recall: 0.4537 - val_f1_score: 0.6518
Epoch 43/50

Epoch 00043: LearningRateScheduler reducing learning rate to 4.8767492444312666e-06.
114/114 [=====] - 93s 754ms/step - loss: 0.6760 - accuracy: 0.5919 - precision: 0.5955 - recall: 0.5875 - f1_score: 0.6688 - val_
```

```
loss: 0.7079 - val_accuracy: 0.5753 - val_precision: 0.5827 - val_recall: 0.4  
284 - val_f1_score: 0.6518  
Epoch 44/50  
  
Epoch 00044: LearningRateScheduler reducing learning rate to 4.87674924443126  
66e-06.  
114/114 [=====] - 93s 768ms/step - loss: 0.6753 - accuracy: 0.5744 - precision: 0.5571 - recall: 0.5605 - f1_score: 0.6494 - val_loss: 0.7164 - val_accuracy: 0.5806 - val_precision: 0.5996 - val_recall: 0.3983 - val_f1_score: 0.6518  
Epoch 45/50  
  
Epoch 00045: LearningRateScheduler reducing learning rate to 4.63291178220970  
3e-06.  
114/114 [=====] - 93s 776ms/step - loss: 0.6881 - accuracy: 0.5820 - precision: 0.5639 - recall: 0.5676 - f1_score: 0.6478 - val_loss: 0.7105 - val_accuracy: 0.5777 - val_precision: 0.5804 - val_recall: 0.4561 - val_f1_score: 0.6518  
Epoch 46/50  
  
Epoch 00046: LearningRateScheduler reducing learning rate to 4.63291189589654  
1e-06.  
114/114 [=====] - 92s 761ms/step - loss: 0.6663 - accuracy: 0.5934 - precision: 0.5756 - recall: 0.6023 - f1_score: 0.6512 - val_loss: 0.7100 - val_accuracy: 0.5777 - val_precision: 0.5819 - val_recall: 0.4489 - val_f1_score: 0.6518  
Epoch 47/50  
  
Epoch 00047: LearningRateScheduler reducing learning rate to 4.63291189589654  
1e-06.  
114/114 [=====] - 94s 762ms/step - loss: 0.6747 - accuracy: 0.5827 - precision: 0.5816 - recall: 0.5884 - f1_score: 0.6667 - val_loss: 0.7213 - val_accuracy: 0.5835 - val_precision: 0.6003 - val_recall: 0.4140 - val_f1_score: 0.6518  
Epoch 48/50  
  
Epoch 00048: LearningRateScheduler reducing learning rate to 4.40126630110171  
36e-06.  
114/114 [=====] - 93s 780ms/step - loss: 0.6721 - accuracy: 0.5796 - precision: 0.5719 - recall: 0.5713 - f1_score: 0.6584 - val_loss: 0.7205 - val_accuracy: 0.5829 - val_precision: 0.6014 - val_recall: 0.4067 - val_f1_score: 0.6518  
Epoch 49/50  
  
Epoch 00049: LearningRateScheduler reducing learning rate to 4.40126632383908  
15e-06.  
114/114 [=====] - 92s 761ms/step - loss: 0.6709 - accuracy: 0.5869 - precision: 0.5577 - recall: 0.5954 - f1_score: 0.6401 - val_loss: 0.7186 - val_accuracy: 0.5794 - val_precision: 0.5909 - val_recall: 0.4224 - val_f1_score: 0.6518  
Epoch 50/50  
  
Epoch 00050: LearningRateScheduler reducing learning rate to 4.40126632383908  
15e-06.  
114/114 [=====] - 92s 768ms/step - loss: 0.6617 - accuracy: 0.6004 - precision: 0.5853 - recall: 0.5923 - f1_score: 0.6513 - val_
```

```
loss: 0.7135 - val_accuracy: 0.5794 - val_precision: 0.5894 - val_recall: 0.4
284 - val_f1_score: 0.6518
```

In [41]:

```
model_checkpoint = Model(inputs=ResNet50.input, outputs=FC4)
model_checkpoint.save('bestmodel_resnert_lstm.h5')
new_model = tf.keras.models.load_model('bestmodel_resnert_lstm.h5')
```

WARNING:tensorflow:No training configuration found in the save file, so the model was \*not\* compiled. Compile it manually.

In [42]:

```
predict_train=new_model.predict_generator(train_prediction_generator,steps=len(train_prediction_generator),workers=12)
predict_test=new_model.predict_generator(test_prediction_generator,steps=len(test_prediction_generator),workers=12)
predict_train.shape
```

Out[42]: (3405, 64)

In [22]:

```
train_data_words=train_data['processed_words'].values
validation_words=val_data['processed_words'].values
test_data_words=test_data['processed_words'].values

tokenizer = Tokenizer()
tokenizer.fit_on_texts(train_data_words)
vocab_size=len(tokenizer.word_index)
encoded_Xtrain_words = [tf.keras.preprocessing.text.one_hot(d, vocab_size,filters='!"#%&()*+,-./:;<=>?@[\\]^{|}~\\t\\n') for d in train_data_words]
encoded_validation_words = [tf.keras.preprocessing.text.one_hot(d, vocab_size,filters='!"#%&()*+,-./:;<=>?@[\\]^{|}~\\t\\n') for d in validation_words]
encoded_Xtest_words = [tf.keras.preprocessing.text.one_hot(d, vocab_size,filters='!"#%&()*+,-./:;<=>?@[\\]^{|}~\\t\\n') for d in test_data_words]

padded_Xtrain_words = tf.keras.preprocessing.sequence.pad_sequences(encoded_Xtrain_words, maxlen=20, padding='post')
padded_Xvalidation_words = tf.keras.preprocessing.sequence.pad_sequences(encoded_validation_words, maxlen=20, padding='post')
padded_Xtest_words = tf.keras.preprocessing.sequence.pad_sequences(encoded_Xtest_words, maxlen=20, padding='post')
```

In [23]:

```
embeddings_index = dict()
f = open('/content/glove.6B.300d.txt')

for line in f:
    values = line.split()
    word = values[0]
    coefs = np.asarray(values[1:], dtype='float32')
    embeddings_index[word] = coefs

f.close()
print('Loaded %s word vectors.' % len(embeddings_index))
```

Loaded 400000 word vectors.

```
In [24]: embedding_matrix = np.zeros((vocab_size+1, 300))
for word, i in tokenizer.word_index.items():
    embedding_vector = embeddings_index.get(word)
    if embedding_vector is not None:
        embedding_matrix[i] = embedding_vector
```

```
In [25]: labelencoder = LabelEncoder()
labelencoder.fit(train_data[' subreddit'].values)
subreddit_train=labelencoder.transform(train_data[' subreddit'].values).reshape(-1,1)
subreddit_validation=labelencoder.transform(val_data[' subreddit'].values).reshape(-1,1)
subreddit_test=labelencoder.transform(test_data[' subreddit'].values).reshape(-1, 1)

print(subreddit_train.shape)
print(subreddit_test.shape)
print(subreddit_validation.shape)
```

(3405, 1)  
(1719, 1)  
(1688, 1)

```
In [26]: labelencoder = LabelEncoder()
labelencoder.fit(train_data[' is_nsfw'].values)
is_nsfw_train=labelencoder.transform(train_data[' is_nsfw'].values).reshape(-1, 1)
is_nsfw_validation=labelencoder.transform(val_data[' is_nsfw'].values).reshape(-1,1)
is_nsfw_test=labelencoder.transform(test_data[' is_nsfw'].values).reshape(-1,1)

print(is_nsfw_train.shape)
print(is_nsfw_test.shape)
print(is_nsfw_validation.shape)
```

(3405, 1)  
(1719, 1)  
(1688, 1)

```
In [27]: time_of_day_train=(train_data['time_of_day'].values).reshape(-1,1)
time_of_day_validation=(val_data['time_of_day'].values).reshape(-1,1)
time_of_day_test=(test_data['time_of_day'].values).reshape(-1,1)

print(time_of_day_train.shape)
print(time_of_day_validation.shape)
print(time_of_day_test.shape)
```

(3405, 1)  
(1688, 1)  
(1719, 1)

```
In [28]: scaler = StandardScaler()
scaler=scaler.fit(train_data['created_utc'].values.reshape(-1, 1))

created_utc_train=scaler.transform(train_data['created_utc'].values.reshape(-1, 1))
created_utc_validation=scaler.transform(val_data['created_utc'].values.reshape(-1, 1))
created_utc_test=scaler.transform(test_data['created_utc'].values.reshape(-1, 1))

print(created_utc_train.shape)
print(created_utc_test.shape)
print(created_utc_validation.shape)
```

```
(3405, 1)
(1719, 1)
(1688, 1)
```

```
In [29]: scaler = StandardScaler()
scaler=scaler.fit(train_data['subscribers'].values.reshape(-1, 1))

subscribers_train=scaler.transform(train_data['subscribers'].values.reshape(-1, 1))
subscribers_validation=scaler.transform(val_data['subscribers'].values.reshape(-1, 1))
subscribers_test=scaler.transform(test_data['subscribers'].values.reshape(-1, 1))

print(subscribers_train.shape)
print(subscribers_validation.shape)
print(subscribers_test.shape)
```

```
(3405, 1)
(1688, 1)
(1719, 1)
```

```
In [43]: #words embedding layer
words = Input(shape=(20,),name="words")
embedding=Embedding(vocab_size+1,300,weights=[embedding_matrix],input_length=20,trainable=False)(words)
lstm_layer=LSTM(500)(embedding)
flatten1 = Flatten(data_format='channels_last')(lstm_layer)

image_predicted =Input(shape=(predict_train.shape[1],),name="image_predicted")
flatten2= Flatten(data_format='channels_last')(image_predicted)

#categore_data
subreddit_train_layer =Input(shape=(subreddit_train.shape[1],),name="subreddit_train_layer")
flatten3= Flatten(data_format='channels_last')(subreddit_train_layer)
#####
is_nsfw_train_layer =Input(shape=(is_nsfw_train.shape[1],),name="is_nsfw_train_layer")
flatten4 = Flatten(data_format='channels_last')(is_nsfw_train_layer)
#####
time_of_day_train_layer =Input(shape=(time_of_day_train.shape[1],),name="time_of_day_train_layer")
flatten5 = Flatten(data_format='channels_last')(time_of_day_train_layer)

#numeric_data
created_utc_train_layer =Input(shape=(created_utc_train.shape[1],),name="created_utc_train_layer")
created_utc_dence = Dense(units=3,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(created_utc_train_layer)

#numeric_data
subscribers_train_layer =Input(shape=(subscribers_train.shape[1],),name="subscribers_train_layer")
subscribers_dence = Dense(units=3,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(subscribers_train_layer)

#concat layer
concatenated = concatenate([subscribers_train_layer,created_utc_dence,flatten5,flatten4,flatten3,flatten2,flatten1],axis = -1)

dense_layer1 = Dense(units=420,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(concatenated)
dropout1=Dropout(0.3)(dense_layer1)

dense_layer2 = Dense(units=210,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(dropout1)
dropout2=Dropout(0.3)(dense_layer2)

dense_layer3 = Dense(units=105,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(dropout2)
dropout3=Dropout(0.3)(dense_layer3)

dense_layer4 = Dense(units=60,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(dropout3)
dropout4=Dropout(0.3)(dense_layer4)

dense_layer5 = Dense(units=30,activation='relu',kernel_initializer=tf.keras.in
```

```
initializers.glorot_normal(seed=33))(dropout4)
dropout5=Dropout(0.3)(dense_layer5)

dense_layer6 = Dense(units=15,activation='relu',kernel_initializer=tf.keras.initializers.glorot_normal(seed=33))(dropout5)

Out = Dense(units=1,activation='sigmoid',kernel_initializer=tf.keras.initializers.glorot_normal(seed=3),name='Output')(dense_layer6)

model = Model(inputs=[image_predicted,words,subreddit_train_layer,is_nsfw_train_layer,time_of_day_train_layer,created_utc_train_layer,subscribers_train_layer],outputs=Out)
model.summary()
```

Model: "model\_6"

Layer (type)	Output Shape	Param #	Connected to
words (InputLayer)	[None, 20]	0	
embedding_1 (Embedding)	(None, 20, 300)	2712000	words[0][0]
created_utc_train_layer (InputLayer)	[None, 1]	0	
time_of_day_train_layer (InputLayer)	[None, 1]	0	
is_nsfw_train_layer (InputLayer)	[None, 1]	0	
subreddit_train_layer (InputLayer)	[None, 1]	0	
image_predicted (InputLayer)	[None, 64]	0	
lstm_1 (LSTM)	(None, 500)	1602000	embedding_1[0][0]
subscribers_train_layer (InputLayer)	[None, 1]	0	
dense_8 (Dense)	(None, 3)	6	created_utc_train_layer[0][0]
flatten_9 (Flatten)	(None, 1)	0	time_of_day_train_layer[0][0]
flatten_8 (Flatten)	(None, 1)	0	is_nsfw_train_layer[0][0]
flatten_7 (Flatten)	(None, 1)	0	subreddit_train_layer[0][0]
flatten_6 (Flatten)	(None, 64)	0	image_predicted[0][0]
flatten_5 (Flatten)	(None, 500)	0	lstm_1[0][0]

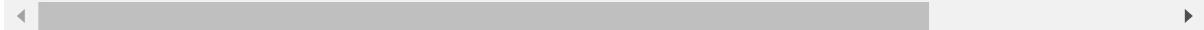
	8.FE_resnet_lstm		
concatenate_1 (Concatenate)	(None, 571)	0	subscribers_
train_layer[0][0]			dense_8[0]
[0]			flatten_9[0]
[0]			flatten_8[0]
[0]			flatten_7[0]
[0]			flatten_6[0]
[0]			flatten_5[0]
[0]			
dense_10 (Dense)	(None, 420)	240240	concatenate_
1[0][0]			
dropout_9 (Dropout)	(None, 420)	0	dense_10[0]
[0]			
dense_11 (Dense)	(None, 210)	88410	dropout_9[0]
[0]			
dropout_10 (Dropout)	(None, 210)	0	dense_11[0]
[0]			
dense_12 (Dense)	(None, 105)	22155	dropout_10
[0][0]			
dropout_11 (Dropout)	(None, 105)	0	dense_12[0]
[0]			
dense_13 (Dense)	(None, 60)	6360	dropout_11
[0][0]			
dropout_12 (Dropout)	(None, 60)	0	dense_13[0]
[0]			
dense_14 (Dense)	(None, 30)	1830	dropout_12
[0][0]			
dropout_13 (Dropout)	(None, 30)	0	dense_14[0]
[0]			
dense_15 (Dense)	(None, 15)	465	dropout_13

[0][0]

---

Output (Dense) [0]	(None, 1)	16	dense_15[0]
=====			
=====			
Total params: 4,673,482			
Trainable params: 1,961,482			
Non-trainable params: 2,712,000			

---



```
In [44]: filepath="model_save/weights-{epoch:02d}-{val_accuracy:.4f}.h5"
checkpoint = ModelCheckpoint(filepath=filepath, monitor='val_accuracy', mode='auto')
```

```
lrschedule = tf.keras.callbacks.LearningRateScheduler(scheduler, verbose=0.1)

#stop the training if your validation accuracy is not increased in last 2 epochs.
early_stop= EarlyStopping(monitor='val_accuracy', patience=2, verbose=1)

#If your validation accuracy at that epoch is less than previous epoch accuracy, you have to decrease the learning rate by 10%
reduce_lr = ReduceLROnPlateau(monitor='val_accuracy', factor=0.9,
                             patience=0, min_lr=0.001, verbose=1)

model.compile(
    loss='binary_crossentropy',
    optimizer=tf.keras.optimizers.RMSprop(lr=1e-5),
    metrics=[ 'accuracy',tf.keras.metrics.Precision(),tf.keras.metrics.Recall(),tf.keras.metrics.F1Score(num_classes=1)]
)
```

```
In [45]: y_train =train_data['dank_level'].values
y_test =test_data['dank_level'].values
y_train.shape
```

Out[45]: (3405,)

```
In [48]: history=model.fit({"image_predicted":predict_train,"words":padded_Xtrain_words,
," subreddit_train_layer":subreddit_train,"is_nsfw_train_layer":is_nsfw_train,
"time_of_day_train_layer":time_of_day_train,
"created_utc_train_layer":created_utc_train,"subscribers_train_layer":subscribers_train},
y_train,epochs=100,batch_size=30,
validation_data=( {"image_predicted":predict_test,"words":padded_Xtest_words," subreddit_train_layer":subreddit_test,"is_nsfw_train_layer":is_nsfw_test,"time_of_day_train_layer":time_of_day_test,
"created_utc_train_layer":created_utc_test,"subscribers_train_layer":subscribers_test},y_test),callbacks=[lrschedule,reduce_lr])
```

Epoch 1/100

Epoch 00001: LearningRateScheduler reducing learning rate to 1.35275945467583  
37e-06.

114/114 [=====] - 2s 14ms/step - loss: 0.6778 - accuracy: 0.5742 - precision\_2: 0.5745 - recall\_2: 0.5259 - f1\_score: 0.6605 - val\_loss: 0.6840 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5440 - val\_recall\_2: 0.5499 - val\_f1\_score: 0.6518

Epoch 2/100

Epoch 00002: LearningRateScheduler reducing learning rate to 1.35275945467583  
37e-06.

114/114 [=====] - 2s 13ms/step - loss: 0.6791 - accuracy: 0.5674 - precision\_2: 0.5671 - recall\_2: 0.5188 - f1\_score: 0.6605 - val\_loss: 0.6840 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5439 - val\_recall\_2: 0.5511 - val\_f1\_score: 0.6518

Epoch 3/100

Epoch 00003: LearningRateScheduler reducing learning rate to 1.28512148194204  
2e-06.

114/114 [=====] - 1s 13ms/step - loss: 0.6738 - accuracy: 0.5856 - precision\_2: 0.5866 - recall\_2: 0.5408 - f1\_score: 0.6605 - val\_loss: 0.6839 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5440 - val\_recall\_2: 0.5499 - val\_f1\_score: 0.6518

Epoch 4/100

Epoch 00004: LearningRateScheduler reducing learning rate to 1.28512147057335  
82e-06.

114/114 [=====] - 1s 13ms/step - loss: 0.6802 - accuracy: 0.5727 - precision\_2: 0.5711 - recall\_2: 0.5360 - f1\_score: 0.6605 - val\_loss: 0.6839 - val\_accuracy: 0.5579 - val\_precision\_2: 0.5425 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518

Epoch 5/100

Epoch 00005: LearningRateScheduler reducing learning rate to 1.28512147057335  
82e-06.

114/114 [=====] - 1s 13ms/step - loss: 0.6753 - accuracy: 0.5812 - precision\_2: 0.5836 - recall\_2: 0.5259 - f1\_score: 0.6605 - val\_loss: 0.6839 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5443 - val\_recall\_2: 0.5475 - val\_f1\_score: 0.6518

Epoch 6/100

Epoch 00006: LearningRateScheduler reducing learning rate to 1.22086539704469  
03e-06.

114/114 [=====] - 1s 13ms/step - loss: 0.6758 - accuracy: 0.5932 - precision\_2: 0.5960 - recall\_2: 0.5438 - f1\_score: 0.6605 - val\_loss: 0.6839 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5446 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 7/100

Epoch 00007: LearningRateScheduler reducing learning rate to 1.22086544251942  
54e-06.

114/114 [=====] - 2s 13ms/step - loss: 0.6752 - accuracy: 0.5806 - precision\_2: 0.5806 - recall\_2: 0.5384 - f1\_score: 0.6605 - val\_loss: 0.6839 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5447 - val\_recall\_2: 0.5499 - val\_f1\_score: 0.6518

Epoch 8/100

```
Epoch 00008: LearningRateScheduler reducing learning rate to 1.22086544251942
54e-06.
114/114 [=====] - 2s 13ms/step - loss: 0.6755 - accuracy: 0.5797 - precision_2: 0.5800 - recall_2: 0.5354 - f1_score: 0.6605 - val_loss: 0.6839 - val_accuracy: 0.5585 - val_precision_2: 0.5427 - val_recall_2: 0.5511 - val_f1_score: 0.6518
Epoch 9/100

Epoch 00009: LearningRateScheduler reducing learning rate to 1.15982217039345
4e-06.
114/114 [=====] - 1s 13ms/step - loss: 0.6762 - accuracy: 0.5762 - precision_2: 0.5762 - recall_2: 0.5313 - f1_score: 0.6605 - val_loss: 0.6839 - val_accuracy: 0.5590 - val_precision_2: 0.5433 - val_recall_2: 0.5511 - val_f1_score: 0.6518
Epoch 10/100

Epoch 00010: LearningRateScheduler reducing learning rate to 1.15982220449950
55e-06.
114/114 [=====] - 2s 13ms/step - loss: 0.6754 - accuracy: 0.5844 - precision_2: 0.5839 - recall_2: 0.5473 - f1_score: 0.6605 - val_loss: 0.6839 - val_accuracy: 0.5596 - val_precision_2: 0.5439 - val_recall_2: 0.5511 - val_f1_score: 0.6518
Epoch 11/100

Epoch 00011: LearningRateScheduler reducing learning rate to 1.15982220449950
55e-06.
114/114 [=====] - 1s 13ms/step - loss: 0.6750 - accuracy: 0.5836 - precision_2: 0.5853 - recall_2: 0.5331 - f1_score: 0.6605 - val_loss: 0.6838 - val_accuracy: 0.5602 - val_precision_2: 0.5449 - val_recall_2: 0.5475 - val_f1_score: 0.6518
Epoch 12/100

Epoch 00012: LearningRateScheduler reducing learning rate to 1.10183109427453
e-06.
114/114 [=====] - 1s 13ms/step - loss: 0.6793 - accuracy: 0.5648 - precision_2: 0.5643 - recall_2: 0.5146 - f1_score: 0.6605 - val_loss: 0.6838 - val_accuracy: 0.5608 - val_precision_2: 0.5455 - val_recall_2: 0.5487 - val_f1_score: 0.6518
Epoch 13/100

Epoch 00013: LearningRateScheduler reducing learning rate to 1.10183111701189
77e-06.
114/114 [=====] - 1s 13ms/step - loss: 0.6768 - accuracy: 0.5794 - precision_2: 0.5774 - recall_2: 0.5485 - f1_score: 0.6605 - val_loss: 0.6838 - val_accuracy: 0.5608 - val_precision_2: 0.5455 - val_recall_2: 0.5487 - val_f1_score: 0.6518
Epoch 14/100

Epoch 00014: LearningRateScheduler reducing learning rate to 1.10183111701189
77e-06.
114/114 [=====] - 1s 13ms/step - loss: 0.6745 - accuracy: 0.5841 - precision_2: 0.5862 - recall_2: 0.5325 - f1_score: 0.6605 - val_loss: 0.6837 - val_accuracy: 0.5620 - val_precision_2: 0.5471 - val_recall_2: 0.5451 - val_f1_score: 0.6518
Epoch 15/100
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Epoch 00015: LearningRateScheduler reducing learning rate to 1.04673956116130  
27e-06.  
114/114 [=====] - 2s 13ms/step - loss: 0.6759 - accuracy: 0.5836 - precision\_2: 0.5844 - recall\_2: 0.5384 - f1\_score: 0.6605 - val\_loss: 0.6837 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5464 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 16/100

Epoch 00016: LearningRateScheduler reducing learning rate to 1.04673961232037  
98e-06.  
114/114 [=====] - 1s 13ms/step - loss: 0.6745 - accuracy: 0.5847 - precision\_2: 0.5870 - recall\_2: 0.5325 - f1\_score: 0.6605 - val\_loss: 0.6837 - val\_accuracy: 0.5625 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5499 - val\_f1\_score: 0.6518  
Epoch 17/100

Epoch 00017: LearningRateScheduler reducing learning rate to 1.04673961232037  
98e-06.  
114/114 [=====] - 2s 13ms/step - loss: 0.6794 - accuracy: 0.5824 - precision\_2: 0.5846 - recall\_2: 0.5289 - f1\_score: 0.6605 - val\_loss: 0.6837 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5464 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 18/100

Epoch 00018: LearningRateScheduler reducing learning rate to 9.94402631704360  
7e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6765 - accuracy: 0.5768 - precision\_2: 0.5772 - recall\_2: 0.5301 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 19/100

Epoch 00019: LearningRateScheduler reducing learning rate to 9.94402626020019  
e-07.  
114/114 [=====] - 2s 13ms/step - loss: 0.6769 - accuracy: 0.5812 - precision\_2: 0.5823 - recall\_2: 0.5331 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 20/100

Epoch 00020: LearningRateScheduler reducing learning rate to 9.94402626020019  
e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6772 - accuracy: 0.5789 - precision\_2: 0.5786 - recall\_2: 0.5372 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 21/100

Epoch 00021: LearningRateScheduler reducing learning rate to 9.44682494719018  
e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6785 - accuracy: 0.5794 - precision\_2: 0.5813 - recall\_2: 0.5259 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 22/100

Epoch 00022: LearningRateScheduler reducing learning rate to 9.44682483350334

2e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6782 - accuracy: 0.5815 - precision\_2: 0.5844 - recall\_2: 0.5235 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 23/100

Epoch 00023: LearningRateScheduler reducing learning rate to 9.44682483350334 2e-07.  
114/114 [=====] - 2s 13ms/step - loss: 0.6739 - accuracy: 0.5824 - precision\_2: 0.5827 - recall\_2: 0.5390 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5471 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 24/100

Epoch 00024: LearningRateScheduler reducing learning rate to 8.97448359182817 5e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6773 - accuracy: 0.5809 - precision\_2: 0.5829 - recall\_2: 0.5277 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5463 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 25/100

Epoch 00025: LearningRateScheduler reducing learning rate to 8.97448330761108 1e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6760 - accuracy: 0.5927 - precision\_2: 0.5966 - recall\_2: 0.5372 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5473 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 26/100

Epoch 00026: LearningRateScheduler reducing learning rate to 8.97448330761108 1e-07.  
114/114 [=====] - 1s 12ms/step - loss: 0.6748 - accuracy: 0.5815 - precision\_2: 0.5818 - recall\_2: 0.5378 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5625 - val\_precision\_2: 0.5478 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 27/100

Epoch 00027: LearningRateScheduler reducing learning rate to 8.52575914223052 7e-07.  
114/114 [=====] - 1s 12ms/step - loss: 0.6733 - accuracy: 0.5897 - precision\_2: 0.5926 - recall\_2: 0.5372 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5470 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 28/100

Epoch 00028: LearningRateScheduler reducing learning rate to 8.52575908538710 8e-07.  
114/114 [=====] - 1s 12ms/step - loss: 0.6737 - accuracy: 0.5865 - precision\_2: 0.5869 - recall\_2: 0.5450 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5457 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 29/100

Epoch 00029: LearningRateScheduler reducing learning rate to 8.52575908538710 8e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6777 - accuracy: 0.5847 - precision\_2: 0.5869 - recall\_2: 0.5331 - f1\_score: 0.6605 - val\_loss: 0.6836 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5474 - val\_recall\_2: 0.5415 - val\_f1\_score: 0.6518  
Epoch 30/100

Epoch 00030: LearningRateScheduler reducing learning rate to 8.09947113111775 2e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6783 - accuracy: 0.5718 - precision\_2: 0.5723 - recall\_2: 0.5211 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5471 - val\_recall\_2: 0.5379 - val\_f1\_score: 0.6518

Epoch 31/100

Epoch 00031: LearningRateScheduler reducing learning rate to 8.09947096058749 6e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6774 - accuracy: 0.5815 - precision\_2: 0.5855 - recall\_2: 0.5182 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5631 - val\_precision\_2: 0.5493 - val\_recall\_2: 0.5367 - val\_f1\_score: 0.6518

Epoch 32/100

Epoch 00032: LearningRateScheduler reducing learning rate to 8.09947096058749 6e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6780 - accuracy: 0.5783 - precision\_2: 0.5797 - recall\_2: 0.5265 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5631 - val\_precision\_2: 0.5493 - val\_recall\_2: 0.5367 - val\_f1\_score: 0.6518

Epoch 33/100

Epoch 00033: LearningRateScheduler reducing learning rate to 7.69449741255812 1e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6776 - accuracy: 0.5836 - precision\_2: 0.5878 - recall\_2: 0.5205 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5625 - val\_precision\_2: 0.5487 - val\_recall\_2: 0.5355 - val\_f1\_score: 0.6518

Epoch 34/100

Epoch 00034: LearningRateScheduler reducing learning rate to 7.69449741255812 1e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6766 - accuracy: 0.5850 - precision\_2: 0.5876 - recall\_2: 0.5313 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5631 - val\_precision\_2: 0.5493 - val\_recall\_2: 0.5367 - val\_f1\_score: 0.6518

Epoch 35/100

Epoch 00035: LearningRateScheduler reducing learning rate to 7.69449741255812 1e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6774 - accuracy: 0.5853 - precision\_2: 0.5889 - recall\_2: 0.5265 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5631 - val\_precision\_2: 0.5493 - val\_recall\_2: 0.5367 - val\_f1\_score: 0.6518

Epoch 36/100

Epoch 00036: LearningRateScheduler reducing learning rate to 7.30977254193021 5e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6739 - accu

```
racy: 0.5841 - precision_2: 0.5881 - recall_2: 0.5229 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5625 - val_precision_2: 0.5486 - val_recall_
2: 0.5367 - val_f1_score: 0.6518
Epoch 37/100

Epoch 00037: LearningRateScheduler reducing learning rate to 7.30977262719534
3e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6750 - accu
racy: 0.5856 - precision_2: 0.5887 - recall_2: 0.5295 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5620 - val_precision_2: 0.5479 - val_recall_
2: 0.5367 - val_f1_score: 0.6518
Epoch 38/100

Epoch 00038: LearningRateScheduler reducing learning rate to 7.30977262719534
3e-07.
114/114 [=====] - 1s 12ms/step - loss: 0.6774 - accu
racy: 0.5794 - precision_2: 0.5808 - recall_2: 0.5289 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5614 - val_precision_2: 0.5472 - val_recall_
2: 0.5367 - val_f1_score: 0.6518
Epoch 39/100

Epoch 00039: LearningRateScheduler reducing learning rate to 6.94428399583557
6e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6787 - accu
racy: 0.5683 - precision_2: 0.5713 - recall_2: 0.4985 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5614 - val_precision_2: 0.5472 - val_recall_
2: 0.5367 - val_f1_score: 0.6518
Epoch 40/100

Epoch 00040: LearningRateScheduler reducing learning rate to 6.94428422320925
2e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6773 - accu
racy: 0.5774 - precision_2: 0.5789 - recall_2: 0.5241 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5614 - val_precision_2: 0.5471 - val_recall_
2: 0.5379 - val_f1_score: 0.6518
Epoch 41/100

Epoch 00041: LearningRateScheduler reducing learning rate to 6.94428422320925
2e-07.
114/114 [=====] - 1s 12ms/step - loss: 0.6776 - accu
racy: 0.5830 - precision_2: 0.5838 - recall_2: 0.5372 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5614 - val_precision_2: 0.5471 - val_recall_
2: 0.5379 - val_f1_score: 0.6518
Epoch 42/100

Epoch 00042: LearningRateScheduler reducing learning rate to 6.59707001204878
8e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6741 - accu
racy: 0.5880 - precision_2: 0.5924 - recall_2: 0.5271 - f1_score: 0.6605 - va
l_loss: 0.6835 - val_accuracy: 0.5620 - val_precision_2: 0.5477 - val_recall_
2: 0.5391 - val_f1_score: 0.6518
Epoch 43/100

Epoch 00043: LearningRateScheduler reducing learning rate to 6.59706984151853
2e-07.
114/114 [=====] - 1s 12ms/step - loss: 0.6757 - accu
racy: 0.5809 - precision_2: 0.5840 - recall_2: 0.5217 - f1_score: 0.6605 - va
```

l\_loss: 0.6835 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5469 - val\_recall\_2: 0.5403 - val\_f1\_score: 0.6518  
Epoch 44/100

Epoch 00044: LearningRateScheduler reducing learning rate to 6.59706984151853 2e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6751 - accuracy: 0.5768 - precision\_2: 0.5784 - recall\_2: 0.5229 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5453 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 45/100

Epoch 00045: LearningRateScheduler reducing learning rate to 6.26721634944260 6e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6755 - accuracy: 0.5827 - precision\_2: 0.5848 - recall\_2: 0.5301 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5464 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 46/100

Epoch 00046: LearningRateScheduler reducing learning rate to 6.26721657681628 1e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6776 - accuracy: 0.5844 - precision\_2: 0.5889 - recall\_2: 0.5205 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5458 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 47/100

Epoch 00047: LearningRateScheduler reducing learning rate to 6.26721657681628 1e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6754 - accuracy: 0.5783 - precision\_2: 0.5802 - recall\_2: 0.5235 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5457 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 48/100

Epoch 00048: LearningRateScheduler reducing learning rate to 5.95385574797546 7e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6760 - accuracy: 0.5783 - precision\_2: 0.5785 - recall\_2: 0.5331 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5462 - val\_recall\_2: 0.5475 - val\_f1\_score: 0.6518  
Epoch 49/100

Epoch 00049: LearningRateScheduler reducing learning rate to 5.95385586166230 5e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6734 - accuracy: 0.5874 - precision\_2: 0.5888 - recall\_2: 0.5408 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5614 - val\_precision\_2: 0.5462 - val\_recall\_2: 0.5475 - val\_f1\_score: 0.6518  
Epoch 50/100

Epoch 00050: LearningRateScheduler reducing learning rate to 5.95385586166230 5e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6758 - accuracy: 0.5762 - precision\_2: 0.5755 - recall\_2: 0.5354 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5452 - val\_f1\_score: 0.6518

2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 51/100

Epoch 00051: LearningRateScheduler reducing learning rate to 5.65616306857918 9e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6770 - accuracy: 0.5762 - precision\_2: 0.5773 - recall\_2: 0.5247 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5457 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 52/100

Epoch 00052: LearningRateScheduler reducing learning rate to 5.65616289804893 3e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6773 - accuracy: 0.5856 - precision\_2: 0.5856 - recall\_2: 0.5462 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5457 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 53/100

Epoch 00053: LearningRateScheduler reducing learning rate to 5.65616289804893 3e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6727 - accuracy: 0.5941 - precision\_2: 0.5981 - recall\_2: 0.5390 - f1\_score: 0.6605 - val\_loss: 0.6835 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5451 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 54/100

Epoch 00054: LearningRateScheduler reducing learning rate to 5.37335475314648 7e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6748 - accuracy: 0.5850 - precision\_2: 0.5845 - recall\_2: 0.5479 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 55/100

Epoch 00055: LearningRateScheduler reducing learning rate to 5.37335495209845 2e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6785 - accuracy: 0.5756 - precision\_2: 0.5763 - recall\_2: 0.5265 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5460 - val\_recall\_2: 0.5427 - val\_f1\_score: 0.6518  
Epoch 56/100

Epoch 00056: LearningRateScheduler reducing learning rate to 5.37335495209845 2e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6771 - accuracy: 0.5897 - precision\_2: 0.5918 - recall\_2: 0.5414 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5446 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 57/100

Epoch 00057: LearningRateScheduler reducing learning rate to 5.10468720449352 9e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6774 - accuracy: 0.5750 - precision\_2: 0.5751 - recall\_2: 0.5289 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 58/100

Epoch 00058: LearningRateScheduler reducing learning rate to 5.10468737502378  
6e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6765 - accuracy: 0.5809 - precision\_2: 0.5815 - recall\_2: 0.5354 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 59/100

Epoch 00059: LearningRateScheduler reducing learning rate to 5.10468737502378  
6e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6776 - accuracy: 0.5880 - precision\_2: 0.5900 - recall\_2: 0.5390 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 60/100

Epoch 00060: LearningRateScheduler reducing learning rate to 4.84945300627259  
7e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6774 - accuracy: 0.5812 - precision\_2: 0.5820 - recall\_2: 0.5348 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 61/100

Epoch 00061: LearningRateScheduler reducing learning rate to 4.84945303469430  
7e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6741 - accuracy: 0.5906 - precision\_2: 0.5930 - recall\_2: 0.5414 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5446 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 62/100

Epoch 00062: LearningRateScheduler reducing learning rate to 4.84945303469430  
7e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6746 - accuracy: 0.5780 - precision\_2: 0.5784 - recall\_2: 0.5319 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5446 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 63/100

Epoch 00063: LearningRateScheduler reducing learning rate to 4.60698038295959  
1e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6763 - accuracy: 0.5891 - precision\_2: 0.5907 - recall\_2: 0.5432 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 64/100

Epoch 00064: LearningRateScheduler reducing learning rate to 4.60698032611617  
24e-07.

114/114 [=====] - 1s 12ms/step - loss: 0.6730 - accuracy: 0.5906 - precision\_2: 0.5922 - recall\_2: 0.5450 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5459 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518

Epoch 65/100

```
Epoch 00065: LearningRateScheduler reducing learning rate to 4.60698032611617
24e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6739 - accuracy: 0.5885 - precision_2: 0.5903 - recall_2: 0.5414 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5596 - val_precision_2: 0.5446 - val_recall_2: 0.5439 - val_f1_score: 0.6518
Epoch 66/100

Epoch 00066: LearningRateScheduler reducing learning rate to 4.37663130981036
35e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6753 - accuracy: 0.5903 - precision_2: 0.5909 - recall_2: 0.5497 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5602 - val_precision_2: 0.5453 - val_recall_2: 0.5427 - val_f1_score: 0.6518
Epoch 67/100

Epoch 00067: LearningRateScheduler reducing learning rate to 4.37663118191267
13e-07.
114/114 [=====] - 1s 12ms/step - loss: 0.6775 - accuracy: 0.5833 - precision_2: 0.5852 - recall_2: 0.5319 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5602 - val_precision_2: 0.5452 - val_recall_2: 0.5439 - val_f1_score: 0.6518
Epoch 68/100

Epoch 00068: LearningRateScheduler reducing learning rate to 4.37663118191267
13e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6749 - accuracy: 0.5774 - precision_2: 0.5778 - recall_2: 0.5307 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5608 - val_precision_2: 0.5459 - val_recall_2: 0.5439 - val_f1_score: 0.6518
Epoch 69/100

Epoch 00069: LearningRateScheduler reducing learning rate to 4.15779962281703
73e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6748 - accuracy: 0.5859 - precision_2: 0.5862 - recall_2: 0.5450 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5608 - val_precision_2: 0.5459 - val_recall_2: 0.5439 - val_f1_score: 0.6518
Epoch 70/100

Epoch 00070: LearningRateScheduler reducing learning rate to 4.15779965123874
7e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6738 - accuracy: 0.5956 - precision_2: 0.5951 - recall_2: 0.5628 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5602 - val_precision_2: 0.5451 - val_recall_2: 0.5451 - val_f1_score: 0.6518
Epoch 71/100

Epoch 00071: LearningRateScheduler reducing learning rate to 4.15779965123874
7e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6762 - accuracy: 0.5789 - precision_2: 0.5793 - recall_2: 0.5331 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5614 - val_precision_2: 0.5464 - val_recall_2: 0.5451 - val_f1_score: 0.6518
Epoch 72/100
```

```
Epoch 00072: LearningRateScheduler reducing learning rate to 3.94990966867680
94e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6763 - accuracy: 0.5715 - precision_2: 0.5727 - recall_2: 0.5164 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5602 - val_precision_2: 0.5451 - val_recall_2: 0.5451 - val_f1_score: 0.6518
Epoch 73/100

Epoch 00073: LearningRateScheduler reducing learning rate to 3.94990962604424
57e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6767 - accuracy: 0.5821 - precision_2: 0.5816 - recall_2: 0.5432 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5590 - val_precision_2: 0.5438 - val_recall_2: 0.5451 - val_f1_score: 0.6518
Epoch 74/100

Epoch 00074: LearningRateScheduler reducing learning rate to 3.94990962604424
57e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6774 - accuracy: 0.5759 - precision_2: 0.5747 - recall_2: 0.5384 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5602 - val_precision_2: 0.5449 - val_recall_2: 0.5475 - val_f1_score: 0.6518
Epoch 75/100

Epoch 00075: LearningRateScheduler reducing learning rate to 3.75241414474203
3e-07.
114/114 [=====] - 2s 13ms/step - loss: 0.6726 - accuracy: 0.5909 - precision_2: 0.5927 - recall_2: 0.5444 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5596 - val_precision_2: 0.5444 - val_recall_2: 0.5463 - val_f1_score: 0.6518
Epoch 76/100

Epoch 00076: LearningRateScheduler reducing learning rate to 3.75241427263972
6e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6756 - accuracy: 0.5765 - precision_2: 0.5739 - recall_2: 0.5479 - f1_score: 0.6605 - val_loss: 0.6834 - val_accuracy: 0.5596 - val_precision_2: 0.5443 - val_recall_2: 0.5475 - val_f1_score: 0.6518
Epoch 77/100

Epoch 00077: LearningRateScheduler reducing learning rate to 3.75241427263972
6e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6747 - accuracy: 0.5850 - precision_2: 0.5845 - recall_2: 0.5479 - f1_score: 0.6605 - val_loss: 0.6835 - val_accuracy: 0.5590 - val_precision_2: 0.5436 - val_recall_2: 0.5475 - val_f1_score: 0.6518
Epoch 78/100

Epoch 00078: LearningRateScheduler reducing learning rate to 3.56479355900773
9e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6758 - accuracy: 0.5862 - precision_2: 0.5839 - recall_2: 0.5599 - f1_score: 0.6605 - val_loss: 0.6835 - val_accuracy: 0.5596 - val_precision_2: 0.5440 - val_recall_2: 0.5499 - val_f1_score: 0.6518
Epoch 79/100

Epoch 00079: LearningRateScheduler reducing learning rate to 3.56479347374261
```

1e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6765 - accuracy: 0.5783 - precision\_2: 0.5770 - recall\_2: 0.5420 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5590 - val\_precision\_2: 0.5437 - val\_recall\_2: 0.5463 - val\_f1\_score: 0.6518  
Epoch 80/100

Epoch 00080: LearningRateScheduler reducing learning rate to 3.56479347374261 1e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6745 - accuracy: 0.5800 - precision\_2: 0.5785 - recall\_2: 0.5462 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5442 - val\_recall\_2: 0.5487 - val\_f1\_score: 0.6518  
Epoch 81/100

Epoch 00081: LearningRateScheduler reducing learning rate to 3.38655380005548 1e-07.  
114/114 [=====] - 2s 13ms/step - loss: 0.6742 - accuracy: 0.5818 - precision\_2: 0.5820 - recall\_2: 0.5390 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5596 - val\_precision\_2: 0.5442 - val\_recall\_2: 0.5487 - val\_f1\_score: 0.6518  
Epoch 82/100

Epoch 00082: LearningRateScheduler reducing learning rate to 3.38655382847719 e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6740 - accuracy: 0.5838 - precision\_2: 0.5862 - recall\_2: 0.5307 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5590 - val\_precision\_2: 0.5436 - val\_recall\_2: 0.5475 - val\_f1\_score: 0.6518  
Epoch 83/100

Epoch 00083: LearningRateScheduler reducing learning rate to 3.38655382847719 e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6751 - accuracy: 0.5885 - precision\_2: 0.5900 - recall\_2: 0.5426 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5585 - val\_precision\_2: 0.5432 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 84/100

Epoch 00084: LearningRateScheduler reducing learning rate to 3.21722613705333 07e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6766 - accuracy: 0.5847 - precision\_2: 0.5865 - recall\_2: 0.5348 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5585 - val\_precision\_2: 0.5432 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 85/100

Epoch 00085: LearningRateScheduler reducing learning rate to 3.21722609442076 65e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6750 - accuracy: 0.5877 - precision\_2: 0.5883 - recall\_2: 0.5456 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5585 - val\_precision\_2: 0.5432 - val\_recall\_2: 0.5451 - val\_f1\_score: 0.6518  
Epoch 86/100

Epoch 00086: LearningRateScheduler reducing learning rate to 3.21722609442076 65e-07.

114/114 [=====] - 1s 13ms/step - loss: 0.6754 - accuracy: 0.5768 - precision\_2: 0.5757 - recall\_2: 0.5390 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 87/100

Epoch 00087: LearningRateScheduler reducing learning rate to 3.056364789699728e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6760 - accuracy: 0.5909 - precision\_2: 0.5904 - recall\_2: 0.5563 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 88/100

Epoch 00088: LearningRateScheduler reducing learning rate to 3.056364903386566e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6760 - accuracy: 0.5730 - precision\_2: 0.5736 - recall\_2: 0.5223 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 89/100

Epoch 00089: LearningRateScheduler reducing learning rate to 3.056364903386566e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6791 - accuracy: 0.5744 - precision\_2: 0.5730 - recall\_2: 0.5378 - f1\_score: 0.6605 - val\_loss: 0.6834 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 90/100

Epoch 00090: LearningRateScheduler reducing learning rate to 2.9035466582172375e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6774 - accuracy: 0.5909 - precision\_2: 0.5924 - recall\_2: 0.5462 - f1\_score: 0.6605 - val\_loss: 0.6833 - val\_accuracy: 0.5602 - val\_precision\_2: 0.5452 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 91/100

Epoch 00091: LearningRateScheduler reducing learning rate to 2.9035467719040753e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6750 - accuracy: 0.5927 - precision\_2: 0.5958 - recall\_2: 0.5408 - f1\_score: 0.6605 - val\_loss: 0.6833 - val\_accuracy: 0.5608 - val\_precision\_2: 0.5459 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 92/100

Epoch 00092: LearningRateScheduler reducing learning rate to 2.9035467719040753e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6764 - accuracy: 0.5742 - precision\_2: 0.5745 - recall\_2: 0.5259 - f1\_score: 0.6605 - val\_loss: 0.6833 - val\_accuracy: 0.5620 - val\_precision\_2: 0.5472 - val\_recall\_2: 0.5439 - val\_f1\_score: 0.6518  
Epoch 93/100

Epoch 00093: LearningRateScheduler reducing learning rate to 2.7583694333088716e-07.  
114/114 [=====] - 1s 13ms/step - loss: 0.6768 - accuracy:

```
racy: 0.5750 - precision_2: 0.5754 - recall_2: 0.5271 - f1_score: 0.6605 - va
l_loss: 0.6833 - val_accuracy: 0.5608 - val_precision_2: 0.5459 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 94/100

Epoch 00094: LearningRateScheduler reducing learning rate to 2.75836953278485
45e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6763 - accu
racy: 0.5753 - precision_2: 0.5752 - recall_2: 0.5307 - f1_score: 0.6605 - va
l_loss: 0.6833 - val_accuracy: 0.5602 - val_precision_2: 0.5452 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 95/100

Epoch 00095: LearningRateScheduler reducing learning rate to 2.75836953278485
45e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6742 - accu
racy: 0.5915 - precision_2: 0.5923 - recall_2: 0.5503 - f1_score: 0.6605 - va
l_loss: 0.6833 - val_accuracy: 0.5602 - val_precision_2: 0.5452 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 96/100

Epoch 00096: LearningRateScheduler reducing learning rate to 2.62045105614561
2e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6731 - accu
racy: 0.5924 - precision_2: 0.5931 - recall_2: 0.5521 - f1_score: 0.6605 - va
l_loss: 0.6833 - val_accuracy: 0.5602 - val_precision_2: 0.5452 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 97/100

Epoch 00097: LearningRateScheduler reducing learning rate to 2.62045091403706
46e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6737 - accu
racy: 0.5883 - precision_2: 0.5906 - recall_2: 0.5378 - f1_score: 0.6605 - va
l_loss: 0.6833 - val_accuracy: 0.5602 - val_precision_2: 0.5452 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 98/100

Epoch 00098: LearningRateScheduler reducing learning rate to 2.62045091403706
46e-07.
114/114 [=====] - 2s 13ms/step - loss: 0.6745 - accu
racy: 0.5815 - precision_2: 0.5812 - recall_2: 0.5414 - f1_score: 0.6605 - va
l_loss: 0.6834 - val_accuracy: 0.5596 - val_precision_2: 0.5446 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 99/100

Epoch 00099: LearningRateScheduler reducing learning rate to 2.48942836833521
15e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6737 - accu
racy: 0.5894 - precision_2: 0.5898 - recall_2: 0.5497 - f1_score: 0.6605 - va
l_loss: 0.6834 - val_accuracy: 0.5590 - val_precision_2: 0.5439 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
Epoch 100/100

Epoch 00100: LearningRateScheduler reducing learning rate to 2.48942825464837
37e-07.
114/114 [=====] - 1s 13ms/step - loss: 0.6772 - accu
racy: 0.5791 - precision_2: 0.5786 - recall_2: 0.5390 - f1_score: 0.6605 - va
```

```
l_loss: 0.6834 - val_accuracy: 0.5585 - val_precision_2: 0.5433 - val_recall_
2: 0.5439 - val_f1_score: 0.6518
```

In [49]:

```
model.save('bestmodel_resnet_lstm_1.h5')
new_model = tf.keras.models.load_model('bestmodel_resnet_lstm_1.h5')
```

In [50]:

```
test_prediction=model.predict([predict_test,padded_Xtest_words,subreddit_test,
                               is_nsfw_test,time_of_day_test,
                               created_utc_test,subscribers_test])
test_prediction=((test_prediction > 0.5)+0).ravel()
print(test_prediction.shape)
y_test =tf.keras.utils.to_categorical(test_data['dank_level'].values,2)
y_test=np.argmax(y_test, axis=-1)
y_test.shape
```

(1719,)

Out[50]:

In [51]:

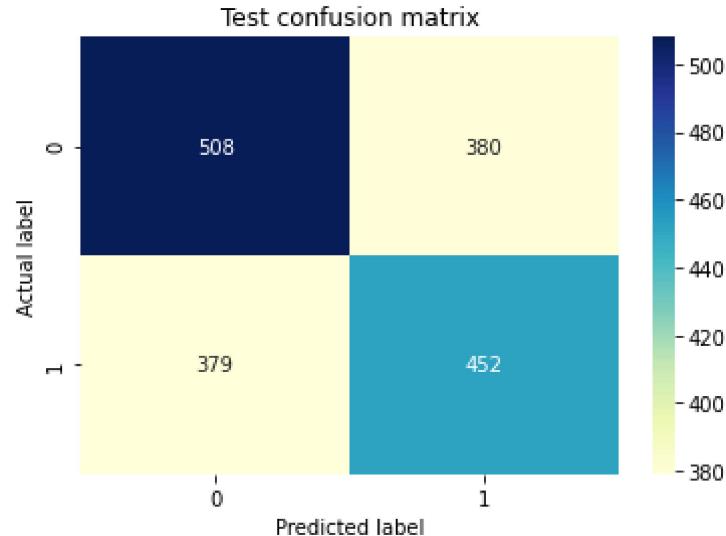
```
accuracy=accuracy_score(y_test,test_prediction)
print("Test accuracy_score",accuracy)
f1_test_score=f1_score(y_test,test_prediction)
print("Test F1_score",f1_test_score)
print("Test confusion matrix")
cnf_matrix2=confusion_matrix(y_test,test_prediction)
p = sns.heatmap(pd.DataFrame(cnf_matrix2), annot=True, cmap="YlGnBu" ,fmt='g')
plt.title('Test confusion matrix', y=1.1)
plt.ylabel('Actual label')
plt.xlabel('Predicted label')
```

Test accuracy\_score 0.5584642233856894

Test F1\_score 0.5435959110042092

Test confusion matrix

Out[51]:



```
In [38]: file = '/content/model_1.png'
tf.keras.utils.plot_model(model,to_file=file, show_shapes=True)
```

Out[38]:

