

```
In [1]: #!unzip dank_data-master.zip  
#!pip install tensorflow_addons
```

```
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 logging  
import numpy as np  
import tensorflow_addons as tfa  
from tensorflow.keras.preprocessing.text import Tokenizer  
from sklearn.preprocessing import LabelEncoder  
from sklearn.preprocessing import StandardScaler  
from tensorflow.keras.applications.vgg19 import VGG19  
from tensorflow.keras.applications.vgg19 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)
```

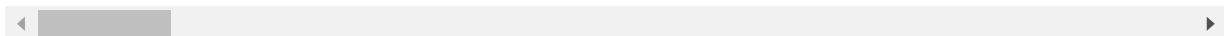
```
In [5]: final_dank=pd.read_csv('/content/dank_data-master/data/final_dank.csv')  
train_labels = [fn.split('/')[-1].split('.')[0].strip() for fn in training]  
validation_labels = [fn.split('/')[-1].split('.')[0].strip() for fn in validation]  
test_labels = [fn.split('/')[-1].split('.')[0].strip() 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]
vgg19 = VGG19(input_shape=IMAGE_SIZE + [3], weights='imagenet', include_top=False)
```

Downloading data from [https://storage.googleapis.com/tensorflow/keras-applications/vgg19/vgg19\\_weights\\_tf\\_dim\\_ordering\\_tf\\_kernels\\_notop.h5](https://storage.googleapis.com/tensorflow/keras-applications/vgg19/vgg19_weights_tf_dim_ordering_tf_kernels_notop.h5)
80142336/80134624 [=====] - 1s 0us/step

```
In [11]: for layer in vgg19.layers[:11]:
    layer.trainable = False
```

```
In [12]: #Flatten
flatten = Flatten(data_format='channels_last',name='Flatten')(vgg19.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=vgg19.input, outputs=Out)
model.summary()
```

Model: "model"

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[None, 156, 156, 3]	0
block1_conv1 (Conv2D)	(None, 156, 156, 64)	1792
block1_conv2 (Conv2D)	(None, 156, 156, 64)	36928
block1_pool (MaxPooling2D)	(None, 78, 78, 64)	0
block2_conv1 (Conv2D)	(None, 78, 78, 128)	73856
block2_conv2 (Conv2D)	(None, 78, 78, 128)	147584
block2_pool (MaxPooling2D)	(None, 39, 39, 128)	0
block3_conv1 (Conv2D)	(None, 39, 39, 256)	295168
block3_conv2 (Conv2D)	(None, 39, 39, 256)	590080
block3_conv3 (Conv2D)	(None, 39, 39, 256)	590080
block3_conv4 (Conv2D)	(None, 39, 39, 256)	590080
block3_pool (MaxPooling2D)	(None, 19, 19, 256)	0
block4_conv1 (Conv2D)	(None, 19, 19, 512)	1180160
block4_conv2 (Conv2D)	(None, 19, 19, 512)	2359808
block4_conv3 (Conv2D)	(None, 19, 19, 512)	2359808
block4_conv4 (Conv2D)	(None, 19, 19, 512)	2359808
block4_pool (MaxPooling2D)	(None, 9, 9, 512)	0
block5_conv1 (Conv2D)	(None, 9, 9, 512)	2359808
block5_conv2 (Conv2D)	(None, 9, 9, 512)	2359808
block5_conv3 (Conv2D)	(None, 9, 9, 512)	2359808
block5_conv4 (Conv2D)	(None, 9, 9, 512)	2359808
block5_pool (MaxPooling2D)	(None, 4, 4, 512)	0
Flatten (Flatten)	(None, 8192)	0
FC1 (Dense)	(None, 512)	4194816
dropout (Dropout)	(None, 512)	0
FC2 (Dense)	(None, 256)	131328
dropout_1 (Dropout)	(None, 256)	0

FC3 (Dense)	(None, 128)	32896
dropout_2 (Dropout)	(None, 128)	0
FC4 (Dense)	(None, 64)	8256
dropout_3 (Dropout)	(None, 64)	0
Output (Dense)	(None, 1)	65
<hr/>		
Total params: 24,391,745		
Trainable params: 22,066,177		
Non-trainable params: 2,325,568		

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```
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 9.99999974737875  
2e-06.

114/114 [=====] - 131s 810ms/step - loss: 2.2119 - accuracy: 0.4931 - precision: 0.4879 - recall: 0.5281 - f1\_score: 0.6626 - val\_loss: 0.6949 - val\_accuracy: 0.5073 - val\_precision: 0.4923 - val\_recall: 0.6149 - val\_f1\_score: 0.6518

Epoch 2/50

Epoch 00002: LearningRateScheduler reducing learning rate to 9.99999974737875  
2e-06.

114/114 [=====] - 94s 764ms/step - loss: 0.7076 - accuracy: 0.5027 - precision: 0.4992 - recall: 0.5333 - f1\_score: 0.6631 - val\_loss: 0.6934 - val\_accuracy: 0.5119 - val\_precision: 0.4961 - val\_recall: 0.6101 - val\_f1\_score: 0.6518

Epoch 3/50

Epoch 00003: LearningRateScheduler reducing learning rate to 9.49999976000981  
3e-06.

114/114 [=====] - 97s 786ms/step - loss: 0.6972 - accuracy: 0.4838 - precision: 0.5035 - recall: 0.4390 - f1\_score: 0.6833 - val\_loss: 0.6937 - val\_accuracy: 0.4887 - val\_precision: 0.4508 - val\_recall: 0.2647 - val\_f1\_score: 0.6518

Epoch 4/50

Epoch 00004: LearningRateScheduler reducing learning rate to 9.49999957811087  
4e-06.

114/114 [=====] - 94s 777ms/step - loss: 0.6937 - accuracy: 0.5073 - precision: 0.4768 - recall: 0.2681 - f1\_score: 0.6486 - val\_loss: 0.6932 - val\_accuracy: 0.5009 - val\_precision: 0.4746 - val\_recall: 0.3032 - val\_f1\_score: 0.6518

Epoch 5/50

Epoch 00005: LearningRateScheduler reducing learning rate to 9.49999957811087  
4e-06.

114/114 [=====] - 98s 790ms/step - loss: 0.6960 - accuracy: 0.4664 - precision: 0.4361 - recall: 0.1897 - f1\_score: 0.6695 - val\_loss: 0.6932 - val\_accuracy: 0.5096 - val\_precision: 0.4552 - val\_recall: 0.0734 - val\_f1\_score: 0.6518

Epoch 6/50

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

114/114 [=====] - 96s 768ms/step - loss: 0.6935 - accuracy: 0.5091 - precision: 0.4740 - recall: 0.0898 - f1\_score: 0.6543 - val\_loss: 0.6927 - val\_accuracy: 0.5212 - val\_precision: 0.5667 - val\_recall: 0.0409 - val\_f1\_score: 0.6518

Epoch 7/50

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

114/114 [=====] - 95s 773ms/step - loss: 0.6947 - accuracy: 0.4938 - precision: 0.3298 - recall: 0.0301 - f1\_score: 0.6583 - val\_loss: 0.6923 - val\_accuracy: 0.5172 - val\_precision: 0.5714 - val\_recall: 0.0448 - val\_f1\_score: 0.6518

Epoch 8/50

Epoch 00008: LearningRateScheduler reducing learning rate to 9.02499959920533e-06.  
114/114 [=====] - 97s 814ms/step - loss: 0.6969 - accuracy: 0.5049 - precision: 0.4537 - recall: 0.0798 - f1\_score: 0.6556 - val\_loss: 0.6930 - val\_accuracy: 0.5131 - val\_precision: 0.2000 - val\_recall: 0.024 - val\_f1\_score: 0.6518  
Epoch 9/50

Epoch 00009: LearningRateScheduler reducing learning rate to 8.573749619245064e-06.  
114/114 [=====] - 96s 768ms/step - loss: 0.6930 - accuracy: 0.5084 - precision: 0.2144 - recall: 0.0089 - f1\_score: 0.6495 - val\_loss: 0.6931 - val\_accuracy: 0.5154 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 10/50

Epoch 00010: LearningRateScheduler reducing learning rate to 8.573749255447183e-06.  
114/114 [=====] - 97s 778ms/step - loss: 0.6917 - accuracy: 0.5047 - precision: 0.6117 - recall: 0.0563 - f1\_score: 0.6702 - val\_loss: 0.6927 - val\_accuracy: 0.5166 - val\_precision: 0.5000 - val\_recall: 0.036 - val\_f1\_score: 0.6518  
Epoch 11/50

Epoch 00011: LearningRateScheduler reducing learning rate to 8.573749255447183e-06.  
114/114 [=====] - 96s 770ms/step - loss: 0.6931 - accuracy: 0.4944 - precision: 0.3938 - recall: 0.0281 - f1\_score: 0.6659 - val\_loss: 0.6924 - val\_accuracy: 0.5166 - val\_precision: 0.5000 - val\_recall: 0.012 - val\_f1\_score: 0.6518  
Epoch 12/50

Epoch 00012: LearningRateScheduler reducing learning rate to 8.145061792674824e-06.  
114/114 [=====] - 93s 766ms/step - loss: 0.6935 - accuracy: 0.4918 - precision: 0.4360 - recall: 0.0304 - f1\_score: 0.6696 - val\_loss: 0.6911 - val\_accuracy: 0.5119 - val\_precision: 0.2778 - val\_recall: 0.060 - val\_f1\_score: 0.6518  
Epoch 13/50

Epoch 00013: LearningRateScheduler reducing learning rate to 8.145061656250618e-06.  
114/114 [=====] - 93s 770ms/step - loss: 0.6958 - accuracy: 0.5072 - precision: 0.4826 - recall: 0.0813 - f1\_score: 0.6576 - val\_loss: 0.6917 - val\_accuracy: 0.5160 - val\_precision: 0.4925 - val\_recall: 0.0397 - val\_f1\_score: 0.6518  
Epoch 14/50

Epoch 00014: LearningRateScheduler reducing learning rate to 8.145061656250618e-06.  
114/114 [=====] - 97s 775ms/step - loss: 0.6980 - accuracy: 0.4935 - precision: 0.4721 - recall: 0.0691 - f1\_score: 0.6681 - val\_loss: 0.6896 - val\_accuracy: 0.5160 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 15/50

Epoch 00015: LearningRateScheduler reducing learning rate to 7.73780857343808 7e-06.  
114/114 [=====] - 93s 773ms/step - loss: 0.6924 - accuracy: 0.4967 - precision: 0.4903 - recall: 0.0471 - f1\_score: 0.6691 - val\_loss: 0.6931 - val\_accuracy: 0.5148 - val\_precision: 0.3333 - val\_recall: 0.036 - val\_f1\_score: 0.6518  
Epoch 16/50

Epoch 00016: LearningRateScheduler reducing learning rate to 7.73780811869073 7e-06.  
114/114 [=====] - 96s 772ms/step - loss: 0.6942 - accuracy: 0.4944 - precision: 0.4633 - recall: 0.0941 - f1\_score: 0.6631 - val\_loss: 0.6909 - val\_accuracy: 0.5166 - val\_precision: 0.5000 - val\_recall: 0.012 - val\_f1\_score: 0.6518  
Epoch 17/50

Epoch 00017: LearningRateScheduler reducing learning rate to 7.73780811869073 7e-06.  
114/114 [=====] - 97s 775ms/step - loss: 0.6913 - accuracy: 0.4831 - precision: 0.4728 - recall: 0.1331 - f1\_score: 0.6744 - val\_loss: 0.6915 - val\_accuracy: 0.5172 - val\_precision: 0.6667 - val\_recall: 0.024 - val\_f1\_score: 0.6518  
Epoch 18/50

Epoch 00018: LearningRateScheduler reducing learning rate to 7.3509177127562e -06.  
114/114 [=====] - 96s 761ms/step - loss: 0.6938 - accuracy: 0.4896 - precision: 0.3922 - recall: 0.0388 - f1\_score: 0.6664 - val\_loss: 0.6924 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 19/50

Epoch 00019: LearningRateScheduler reducing learning rate to 7.3509177127562e -06.  
114/114 [=====] - 95s 784ms/step - loss: 0.6937 - accuracy: 0.4979 - precision: 0.3687 - recall: 0.0246 - f1\_score: 0.6612 - val\_loss: 0.6925 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 20/50

Epoch 00020: LearningRateScheduler reducing learning rate to 7.3509177127562e -06.  
114/114 [=====] - 96s 777ms/step - loss: 0.6928 - accuracy: 0.5084 - precision: 0.4916 - recall: 0.0370 - f1\_score: 0.6585 - val\_loss: 0.6926 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 21/50

Epoch 00021: LearningRateScheduler reducing learning rate to 6.98337182711838 9e-06.  
114/114 [=====] - 93s 773ms/step - loss: 0.6916 - accuracy: 0.5121 - precision: 0.5341 - recall: 0.0563 - f1\_score: 0.6596 - val\_loss: 0.6908 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 22/50

Epoch 00022: LearningRateScheduler reducing learning rate to 6.98337180438102

2e-06.  
114/114 [=====] - 96s 770ms/step - loss: 0.6947 - accuracy: 0.4785 - precision: 0.4663 - recall: 0.0382 - f1\_score: 0.6830 - val\_loss: 0.6888 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 23/50

Epoch 00023: LearningRateScheduler reducing learning rate to 6.98337180438102 2e-06.  
114/114 [=====] - 94s 778ms/step - loss: 0.6913 - accuracy: 0.5076 - precision: 0.4302 - recall: 0.0446 - f1\_score: 0.6532 - val\_loss: 0.6905 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 24/50

Epoch 00024: LearningRateScheduler reducing learning rate to 6.63420321416197 04e-06.  
114/114 [=====] - 96s 773ms/step - loss: 0.6918 - accuracy: 0.5038 - precision: 0.3873 - recall: 0.0452 - f1\_score: 0.6547 - val\_loss: 0.6882 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 25/50

Epoch 00025: LearningRateScheduler reducing learning rate to 6.63420314594986 85e-06.  
114/114 [=====] - 93s 769ms/step - loss: 0.6908 - accuracy: 0.5056 - precision: 0.5227 - recall: 0.0745 - f1\_score: 0.6649 - val\_loss: 0.6876 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 26/50

Epoch 00026: LearningRateScheduler reducing learning rate to 6.63420314594986 85e-06.  
114/114 [=====] - 93s 767ms/step - loss: 0.6935 - accuracy: 0.5017 - precision: 0.4635 - recall: 0.0558 - f1\_score: 0.6609 - val\_loss: 0.6879 - val\_accuracy: 0.5166 - val\_precision: 0.0000e+00 - val\_recall: 0.0000e+00 - val\_f1\_score: 0.6518  
Epoch 27/50

Epoch 00027: LearningRateScheduler reducing learning rate to 6.30249298865237 4e-06.  
114/114 [=====] - 94s 782ms/step - loss: 0.6932 - accuracy: 0.4823 - precision: 0.5061 - recall: 0.1790 - f1\_score: 0.6825 - val\_loss: 0.6909 - val\_accuracy: 0.5364 - val\_precision: 0.6149 - val\_recall: 0.1095 - val\_f1\_score: 0.6518  
Epoch 28/50

Epoch 00028: LearningRateScheduler reducing learning rate to 6.30249314781394 8e-06.  
114/114 [=====] - 93s 770ms/step - loss: 0.6974 - accuracy: 0.5118 - precision: 0.5440 - recall: 0.2519 - f1\_score: 0.6710 - val\_loss: 0.6889 - val\_accuracy: 0.5433 - val\_precision: 0.5398 - val\_recall: 0.3755 - val\_f1\_score: 0.6518  
Epoch 29/50

Epoch 00029: LearningRateScheduler reducing learning rate to 6.30249314781394 8e-06.

```
114/114 [=====] - 96s 795ms/step - loss: 0.6919 - accuracy: 0.5109 - precision: 0.4981 - recall: 0.3247 - f1_score: 0.6542 - val_loss: 0.6867 - val_accuracy: 0.5422 - val_precision: 0.5840 - val_recall: 0.1841 - val_f1_score: 0.6518  
Epoch 30/50
```

Epoch 00030: LearningRateScheduler reducing learning rate to 5.98736849042325e-06.

```
114/114 [=====] - 95s 789ms/step - loss: 0.6866 - accuracy: 0.5355 - precision: 0.5411 - recall: 0.3729 - f1_score: 0.6593 - val_loss: 0.6865 - val_accuracy: 0.5212 - val_precision: 0.5588 - val_recall: 0.0457 - val_f1_score: 0.6518  
Epoch 31/50
```

Epoch 00031: LearningRateScheduler reducing learning rate to 5.987368695059558e-06.

```
114/114 [=====] - 95s 792ms/step - loss: 0.6881 - accuracy: 0.5328 - precision: 0.5300 - recall: 0.2735 - f1_score: 0.6507 - val_loss: 0.6857 - val_accuracy: 0.5492 - val_precision: 0.5733 - val_recall: 0.2635 - val_f1_score: 0.6518  
Epoch 32/50
```

Epoch 00032: LearningRateScheduler reducing learning rate to 5.987368695059558e-06.

```
114/114 [=====] - 95s 761ms/step - loss: 0.6888 - accuracy: 0.5344 - precision: 0.5235 - recall: 0.6000 - f1_score: 0.6596 - val_loss: 0.6872 - val_accuracy: 0.5364 - val_precision: 0.5423 - val_recall: 0.2623 - val_f1_score: 0.6518  
Epoch 33/50
```

Epoch 00033: LearningRateScheduler reducing learning rate to 5.68800026030658e-06.

```
114/114 [=====] - 96s 762ms/step - loss: 0.6894 - accuracy: 0.5320 - precision: 0.5338 - recall: 0.5184 - f1_score: 0.6675 - val_loss: 0.6883 - val_accuracy: 0.5358 - val_precision: 0.5604 - val_recall: 0.1841 - val_f1_score: 0.6518  
Epoch 34/50
```

Epoch 00034: LearningRateScheduler reducing learning rate to 5.688000328518683e-06.

```
114/114 [=====] - 96s 773ms/step - loss: 0.6929 - accuracy: 0.5507 - precision: 0.5472 - recall: 0.5132 - f1_score: 0.6595 - val_loss: 0.6898 - val_accuracy: 0.5416 - val_precision: 0.5417 - val_recall: 0.3357 - val_f1_score: 0.6518  
Epoch 35/50
```

Epoch 00035: LearningRateScheduler reducing learning rate to 5.688000328518683e-06.

```
114/114 [=====] - 95s 765ms/step - loss: 0.6947 - accuracy: 0.5402 - precision: 0.5336 - recall: 0.6455 - f1_score: 0.6669 - val_loss: 0.6875 - val_accuracy: 0.5404 - val_precision: 0.5655 - val_recall: 0.2130 - val_f1_score: 0.6518  
Epoch 36/50
```

Epoch 00036: LearningRateScheduler reducing learning rate to 5.403600312092749e-06.

```
114/114 [=====] - 92s 761ms/step - loss: 0.6881 - ac
```

```
curacy: 0.5491 - precision: 0.5301 - recall: 0.5505 - f1_score: 0.6487 - val_loss: 0.6871 - val_accuracy: 0.5492 - val_precision: 0.5761 - val_recall: 0.2551 - val_f1_score: 0.6518
Epoch 37/50

Epoch 00037: LearningRateScheduler reducing learning rate to 5.40360042577958e-06.
114/114 [=====] - 94s 788ms/step - loss: 0.6879 - accuracy: 0.5390 - precision: 0.5488 - recall: 0.3901 - f1_score: 0.6626 - val_loss: 0.6871 - val_accuracy: 0.5358 - val_precision: 0.5733 - val_recall: 0.1552 - val_f1_score: 0.6518
Epoch 38/50

Epoch 00038: LearningRateScheduler reducing learning rate to 5.40360042577958e-06.
114/114 [=====] - 93s 771ms/step - loss: 0.6857 - accuracy: 0.5623 - precision: 0.5795 - recall: 0.4112 - f1_score: 0.6603 - val_loss: 0.6956 - val_accuracy: 0.5241 - val_precision: 0.5496 - val_recall: 0.0866 - val_f1_score: 0.6518
Epoch 39/50

Epoch 00039: LearningRateScheduler reducing learning rate to 5.13342040449060e-06.
114/114 [=====] - 95s 769ms/step - loss: 0.6850 - accuracy: 0.5530 - precision: 0.5678 - recall: 0.4232 - f1_score: 0.6626 - val_loss: 0.6852 - val_accuracy: 0.5352 - val_precision: 0.5238 - val_recall: 0.4236 - val_f1_score: 0.6518
Epoch 40/50

Epoch 00040: LearningRateScheduler reducing learning rate to 5.13342047270271e-06.
114/114 [=====] - 92s 759ms/step - loss: 0.6839 - accuracy: 0.5485 - precision: 0.5415 - recall: 0.5635 - f1_score: 0.6629 - val_loss: 0.6890 - val_accuracy: 0.5462 - val_precision: 0.5537 - val_recall: 0.3165 - val_f1_score: 0.6518
Epoch 41/50

Epoch 00041: LearningRateScheduler reducing learning rate to 5.13342047270271e-06.
114/114 [=====] - 92s 757ms/step - loss: 0.6845 - accuracy: 0.5482 - precision: 0.5451 - recall: 0.5236 - f1_score: 0.6618 - val_loss: 0.6968 - val_accuracy: 0.5433 - val_precision: 0.5943 - val_recall: 0.1745 - val_f1_score: 0.6518
Epoch 42/50

Epoch 00042: LearningRateScheduler reducing learning rate to 4.8767494449067574e-06.
114/114 [=====] - 95s 760ms/step - loss: 0.6911 - accuracy: 0.5315 - precision: 0.5317 - recall: 0.5475 - f1_score: 0.6674 - val_loss: 0.7034 - val_accuracy: 0.5294 - val_precision: 0.6078 - val_recall: 0.0746 - val_f1_score: 0.6518
Epoch 43/50

Epoch 00043: LearningRateScheduler reducing learning rate to 4.8767492444312666e-06.
114/114 [=====] - 95s 760ms/step - loss: 0.6817 - accuracy: 0.5448 - precision: 0.5423 - recall: 0.3725 - f1_score: 0.6517 - val_
```

```
loss: 0.6906 - val_accuracy: 0.5340 - val_precision: 0.5595 - val_recall: 0.1  
697 - val_f1_score: 0.6518  
Epoch 44/50

Epoch 00044: LearningRateScheduler reducing learning rate to 4.87674924443126  
66e-06.  
114/114 [=====] - 93s 772ms/step - loss: 0.6877 - ac  
curacy: 0.5424 - precision: 0.5415 - recall: 0.5146 - f1_score: 0.6642 - val_  
loss: 0.6914 - val_accuracy: 0.5230 - val_precision: 0.5514 - val_recall: 0.0  
710 - val_f1_score: 0.6518  
Epoch 45/50

Epoch 00045: LearningRateScheduler reducing learning rate to 4.63291178220970  
3e-06.  
114/114 [=====] - 95s 758ms/step - loss: 0.6826 - ac  
curacy: 0.5487 - precision: 0.5542 - recall: 0.4150 - f1_score: 0.6590 - val_  
loss: 0.6941 - val_accuracy: 0.5451 - val_precision: 0.5884 - val_recall: 0.1  
961 - val_f1_score: 0.6518  
Epoch 46/50

Epoch 00046: LearningRateScheduler reducing learning rate to 4.63291189589654  
1e-06.  
114/114 [=====] - 92s 764ms/step - loss: 0.6826 - ac  
curacy: 0.5546 - precision: 0.5523 - recall: 0.5026 - f1_score: 0.6596 - val_  
loss: 0.7476 - val_accuracy: 0.5294 - val_precision: 0.6222 - val_recall: 0.0  
674 - val_f1_score: 0.6518  
Epoch 47/50

Epoch 00047: LearningRateScheduler reducing learning rate to 4.63291189589654  
1e-06.  
114/114 [=====] - 95s 761ms/step - loss: 0.6821 - ac  
curacy: 0.5664 - precision: 0.5688 - recall: 0.5412 - f1_score: 0.6629 - val_  
loss: 0.7162 - val_accuracy: 0.5276 - val_precision: 0.5674 - val_recall: 0.0  
963 - val_f1_score: 0.6518  
Epoch 48/50

Epoch 00048: LearningRateScheduler reducing learning rate to 4.40126630110171  
36e-06.  
114/114 [=====] - 92s 751ms/step - loss: 0.6795 - ac  
curacy: 0.5698 - precision: 0.5662 - recall: 0.5677 - f1_score: 0.6633 - val_  
loss: 0.7276 - val_accuracy: 0.5381 - val_precision: 0.6121 - val_recall: 0.1  
215 - val_f1_score: 0.6518  
Epoch 49/50

Epoch 00049: LearningRateScheduler reducing learning rate to 4.40126632383908  
15e-06.  
114/114 [=====] - 93s 773ms/step - loss: 0.6802 - ac  
curacy: 0.5577 - precision: 0.5482 - recall: 0.5491 - f1_score: 0.6568 - val_  
loss: 0.7125 - val_accuracy: 0.5480 - val_precision: 0.5931 - val_recall: 0.2  
070 - val_f1_score: 0.6518  
Epoch 50/50

Epoch 00050: LearningRateScheduler reducing learning rate to 4.40126632383908  
15e-06.  
114/114 [=====] - 92s 769ms/step - loss: 0.6865 - ac  
curacy: 0.5760 - precision: 0.5655 - recall: 0.6053 - f1_score: 0.6607 - val_
```

```
loss: 0.7327 - val_accuracy: 0.5404 - val_precision: 0.6306 - val_recall: 0.1
191 - val_f1_score: 0.6518
```

In [18]:

```
model_checkpoint = Model(inputs=vgg19.input, outputs=Out)
model_checkpoint.load_weights('/content/model_save/weights-01-0.5073.h5')
model_checkpoint.save('bestmodel_vgg19.h5')
new_model = tf.keras.models.load_model('bestmodel_vgg19.h5')
```

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

In [19]:

```
test_prediction=new_model.predict_generator(test_prediction_generator,steps=len(test_prediction_generator),workers=12)
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[19]: (1719,)

In [20]:

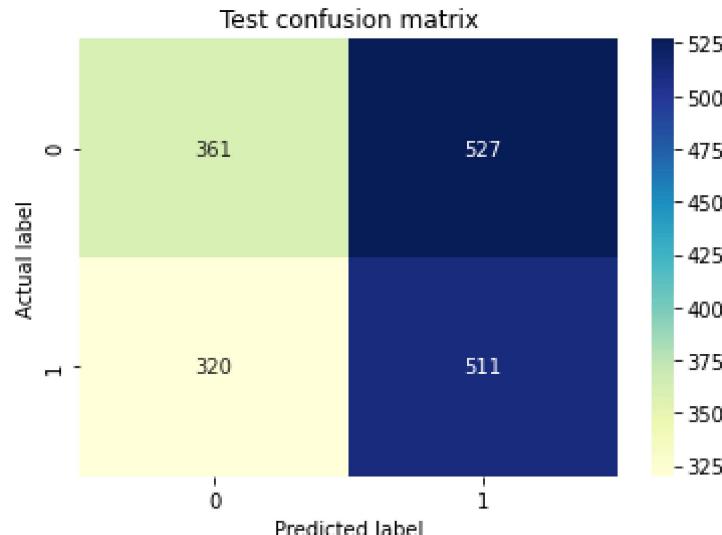
```
accuracy=accuracy_score(y_test,test_prediction)
print("Test accuracy_score",accuracy)
f1_test_score=f1_score(y_test,test_prediction)
print("Test F1_score",f1_test_score)
print("Test confusion matrix")
cnf_matrix2=confusion_matrix(y_test,test_prediction)
p = sns.heatmap(pd.DataFrame(cnf_matrix2), 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 0.5072716695753345

Test F1\_score 0.5468164794007491

Test confusion matrix

Out[20]: Text(0.5, 15.0, 'Predicted label')



```
In [21]: file = '/content/model_1.png'  
tf.keras.utils.plot_model(model,to_file=file, show_shapes=True)
```

Out[21]:

