```
Start coding or generate with AI.
```

```
!ls /content/
```

```
     sample_data  Test.zip  Train.zip
```

```
!mkdir '/content/Train'
```

```
!mv '/content/Train.zip' '/content/Train/'
```

```
!mkdir '/content/Test'
```

```
!mkdir '/content/model/'
```

```
!mv '/content/Test.zip' '/content/Test/'
```

```
!unzip '/content/Train/Train.zip'
```

```
     Archive:  /content/Train/Train.zip
       inflating: 1Hundrednote/1.jpg
       inflating: 1Hundrednote/10.jpg
       inflating: 1Hundrednote/11.jpg
       inflating: 1Hundrednote/13.jpg
       inflating: 1Hundrednote/18.jpg
       inflating: 1Hundrednote/2.jpg
       inflating: 1Hundrednote/20.jpg
       inflating: 1Hundrednote/21.jpg
       inflating: 1Hundrednote/22.jpg
       inflating: 1Hundrednote/23.jpg
       inflating: 1Hundrednote/24.jpg
       inflating: 1Hundrednote/25.jpg
       inflating: 1Hundrednote/27.jpg
       inflating: 1Hundrednote/28.jpg
       inflating: 1Hundrednote/29.jpg
       inflating: 1Hundrednote/3.jpg
       inflating: 1Hundrednote/30.jpg
       inflating: 1Hundrednote/4.jpg
       inflating: 1Hundrednote/5.jpg
       inflating: 1Hundrednote/6.jpg
       inflating: 1Hundrednote/7.jpg
       inflating: 1Hundrednote/8.jpg
       inflating: 2Hundrednote/1.jpg
       inflating: 2Hundrednote/10.jpg
       inflating: 2Hundrednote/11.jpg
       inflating: 2Hundrednote/12.jpg
       inflating: 2Hundrednote/13.jpg
       inflating: 2Hundrednote/17.jpg
       inflating: 2Hundrednote/18.jpg
       inflating: 2Hundrednote/19.jpg
       inflating: 2Hundrednote/2.jpg
       inflating: 2Hundrednote/20.jpg
       inflating: 2Hundrednote/21.jpg
       inflating: 2Hundrednote/25.jpg
       inflating: 2Hundrednote/26.jpg
       inflating: 2Hundrednote/27.jpg
       inflating: 2Hundrednote/28.jpg
       inflating: 2Hundrednote/29.jpg
       inflating: 2Hundrednote/30.jpg
       inflating: 2Hundrednote/4.jpg
       inflating: 2Hundrednote/5.jpg
       inflating: 2Hundrednote/6.jpg
       inflating: 2Hundrednote/7.jpg
       inflating: 2Hundrednote/8.jpg
       inflating: 2Thousandnote/1.jpg
       inflating: 2Thousandnote/10.jpg
       inflating: 2Thousandnote/11.jpg
```

```
  inflating: 2Thousandnote/12.jpg
  inflating: 2Thousandnote/13.jpg
  inflating: 2Thousandnote/16.jpg
  inflating: 2Thousandnote/17.jpg
  inflating: 2Thousandnote/19.jpg
  inflating: 2Thousandnote/2.jpg
  inflating: 2Thousandnote/20.jpg
  inflating: 2Thousandnote/21.jpg
  inflating: 2Thousandnote/22.jpg
  inflating: 2Thousandnote/24.jpg
```

```
!unzip '/content/Test/Test.zip'
```

```
Archive:  /content/Test/Test.zip
   creating: Test/1Hundrednote/
  inflating: Test/1Hundrednote/1.jpg
  inflating: Test/1Hundrednote/14.jpg
  inflating: Test/1Hundrednote/15.jpg
  inflating: Test/1Hundrednote/16.jpg
  inflating: Test/1Hundrednote/2.jpg
  inflating: Test/1Hundrednote/3.jpg
   creating: Test/2Hundrednote/
  inflating: Test/2Hundrednote/1.jpg
  inflating: Test/2Hundrednote/2.jpg
  inflating: Test/2Hundrednote/3.jpg
  inflating: Test/2Hundrednote/31.jpg
  inflating: Test/2Hundrednote/32.jpg
  inflating: Test/2Hundrednote/33.jpg
   creating: Test/2Thousandnote/
  inflating: Test/2Thousandnote/1.jpg
  inflating: Test/2Thousandnote/2.jpg
  inflating: Test/2Thousandnote/3.jpg
  inflating: Test/2Thousandnote/31.jpg
  inflating: Test/2Thousandnote/32.jpg
  inflating: Test/2Thousandnote/33.jpg
   creating: Test/5Hundrednote/
  inflating: Test/5Hundrednote/1.jpg
  inflating: Test/5Hundrednote/2.jpg
  inflating: Test/5Hundrednote/3.jpg
  inflating: Test/5Hundrednote/31.jpg
  inflating: Test/5Hundrednote/32.jpg
  inflating: Test/5Hundrednote/33.jpg
   creating: Test/Fiftynote/
  inflating: Test/Fiftynote/1.jpg
  inflating: Test/Fiftynote/2.jpg
  inflating: Test/Fiftynote/27.jpg
  inflating: Test/Fiftynote/28.jpg
  inflating: Test/Fiftynote/29.jpg
  inflating: Test/Fiftynote/3.jpg
   creating: Test/Tennote/
  inflating: Test/Tennote/1.jpg
  inflating: Test/Tennote/2.jpg
  inflating: Test/Tennote/3.jpg
  inflating: Test/Tennote/31.jpg
  inflating: Test/Tennote/32.jpg
  inflating: Test/Tennote/33.jpg
   creating: Test/Twentynote/
  inflating: Test/Twentynote/1.jpg
  inflating: Test/Twentynote/18.jpg
  inflating: Test/Twentynote/2.jpg
  inflating: Test/Twentynote/24.jpg
  inflating: Test/Twentynote/3.jpg
  inflating: Test/Twentynote/30.jpg
```

```
import os
import numpy as np
import matplotlib.pyplot as plt
import random
import cv2
import PIL
import glob
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.preprocessing.image import ImageDataGenerator


ROOTPATH = '/content'
DATAPATH= ROOTPATH+'/Train'
TRAINPATH = ROOTPATH+'/Train'
TESTPATH =  ROOTPATH+'/Test'
MODELPATH = ROOTPATH+'/model/'


_1Hundrednote=glob.glob(DATAPATH+'/1Hundrednote/*')# [/content/Test/1Hundrednote/1.jpg,/content/Test/1Hundrednote/2.
_2Hundrednote=glob.glob(DATAPATH+'/2Hundrednote/*')
_2Thousandnote=glob.glob(DATAPATH+'/2Thousandnote/*')
_5Hundrednote=glob.glob(DATAPATH+'/5Hundrednote/*')
_Fiftynote=glob.glob(DATAPATH+'/Fiftynote/*')
_Tennote=glob.glob(DATAPATH+'/Tennote/*')
_Twentynote=glob.glob(DATAPATH+'/Twentynote/*')


print(len(_1Hundrednote),_1Hundrednote)
print(len(_2Hundrednote),_2Hundrednote)
print(len(_2Thousandnote),_2Thousandnote)
print(len(_5Hundrednote),_5Hundrednote)
print(len(_Fiftynote),_Fiftynote)
print(len(_Tennote),_Tennote)
print(len(_Twentynote),_Twentynote)
```

```
22 ['/content/Train/1Hundrednote/20.jpg', '/content/Train/1Hundrednote/25.jpg', '/content/Train/1Hundrednote/2.jp
22 ['/content/Train/2Hundrednote/20.jpg', '/content/Train/2Hundrednote/25.jpg', '/content/Train/2Hundrednote/2.jp
21 ['/content/Train/2Thousandnote/20.jpg', '/content/Train/2Thousandnote/25.jpg', '/content/Train/2Thousandnote/2
22 ['/content/Train/5Hundrednote/20.jpg', '/content/Train/5Hundrednote/25.jpg', '/content/Train/5Hundrednote/2.jp
22 ['/content/Train/Fiftynote/20.jpg', '/content/Train/Fiftynote/25.jpg', '/content/Train/Fiftynote/2.jpg', '/con
22 ['/content/Train/Tennote/20.jpg', '/content/Train/Tennote/25.jpg', '/content/Train/Tennote/1.jpg', '/content/T
22 ['/content/Train/Twentynote/20.jpg', '/content/Train/Twentynote/2.jpg', '/content/Train/Twentynote/8.jpg', '/c
```

```
dataset_classes=[_1Hundrednote,_2Hundrednote,_2Thousandnote,_5Hundrednote,_Fiftynote,_Tennote,_Twentynote]
total_class=len(dataset_classes)
print('Total dataset class: ',total_class)
```

```
Total dataset class:  7
```

```
IMAGE_SIZE=224
BATCH_SIZE=64

#pre_processing_training
train_datagen = ImageDataGenerator(
        rescale=1./255,
        shear_range=0.2,
        zoom_range=0.2,
        horizontal_flip=True,
        fill_mode='nearest',
        validation_split=0.2)

training_set = train_datagen.flow_from_directory(
        TRAINPATH,
        shuffle=True,
        target_size=(IMAGE_SIZE,IMAGE_SIZE),
        batch_size=BATCH_SIZE,
        class_mode='categorical',
        subset='training')


validation_set = train_datagen.flow_from_directory(
        TRAINPATH,
         shuffle=True,
        target_size=(IMAGE_SIZE,IMAGE_SIZE),
        batch_size=BATCH_SIZE,
        class_mode='categorical',
        subset='validation')
```

```
Found 125 images belonging to 8 classes.
Found 28 images belonging to 8 classes.
```

```
test_datagen = ImageDataGenerator(rescale=1./255)
test_set = test_datagen.flow_from_directory(
        TESTPATH,
         shuffle=False,
        target_size=(IMAGE_SIZE,IMAGE_SIZE),
        batch_size=BATCH_SIZE,
        class_mode='categorical')
```

```
Found 42 images belonging to 8 classes.
```

```
training_set.class_indices
```

```
{'.ipynb_checkpoints': 0,
 '1Hundrednote': 1,
 '2Hundrednote': 2,
 '2Thousandnote': 3,
 '5Hundrednote': 4,
 'Fiftynote': 5,
 'Tennote': 6,
 'Twentynote': 7}
```

```
validation_set.class_indices
```

```
{'.ipynb_checkpoints': 0,
 '1Hundrednote': 1,
 '2Hundrednote': 2,
 '2Thousandnote': 3,
 '5Hundrednote': 4,
 'Fiftynote': 5,
 'Tennote': 6,
 'Twentynote': 7}
```

```
test_set.class_indices
```

```
{'.ipynb_checkpoints': 0,
 '1Hundrednote': 1,
 '2Hundrednote': 2,
 '2Thousandnote': 3,
 '5Hundrednote': 4,
 'Fiftynote': 5,
 'Tennote': 6,
 'Twentynote': 7}
```

```
total_class=len(training_set.class_indices)
print('Number of classes in dataset: ',total_class)
```

```
Number of classes in dataset:  8
```

```
x,y=training_set.next()
fig=plt.figure(figsize=(15,15))
rows=5
cols=5
for i in range(rows*cols):
    fig.add_subplot(rows,cols,i+1)
    image=x[i]
    plt.imshow(image)
    plt.title(np.argmax(y[i]))
    plt.xticks([])
    plt.yticks([])

plt.show()
```


```
x,y=validation_set.next()
fig=plt.figure(figsize=(15,15))
rows=5
cols=5
for i in range(rows*cols):
    fig.add_subplot(rows,cols,i+1)
    image=x[i]
    plt.imshow(image)
```

```
    plt.title(np.argmax(y[i]))
    plt.xticks([])
    plt.yticks([])

plt.show()
```

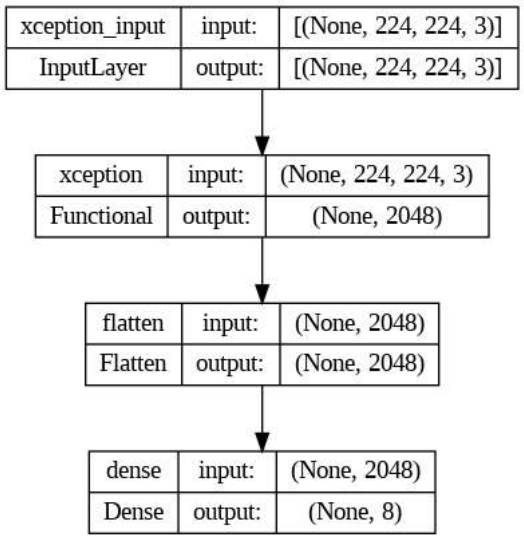
```
from tensorflow.keras.models import Sequential
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.layers import Activation, Dense, Flatten


xception_model=tf.keras.applications.xception.Xception()
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/xception/xception_weights_tf_
91884032/91884032 [==============================] - 0s 0us/step
```

```
xception_model = Sequential()
pretrained_model=tf.keras.applications.xception.Xception(
    input_shape=(224,224,3),
    include_top=False, weights='imagenet', input_tensor=None, pooling='avg',
    classes=9
)
for layer in pretrained_model.layers:
        layer.trainable=False

xception_model.add(pretrained_model)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/xception/xception_weights_tf_
83683744/83683744 [==============================] - 0s 0us/step
```

```
xception_model.add(Flatten())
xception_model.add(Dense(8, activation='softmax'))


from tensorflow.keras.utils import plot_model

# Plot the model and save it to an image file
plot_model(xception_model, to_file='xception_model.png', show_shapes=True, show_layer_names=True)
```




```
xception_model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 xception (Functional)       (None, 2048)              20861480

 flatten (Flatten)           (None, 2048)              0
```

```
 dense (Dense)               (None, 8)                 16392

=================================================================
Total params: 20877872 (79.64 MB)
Trainable params: 16392 (64.03 KB)
Non-trainable params: 20861480 (79.58 MB)
_________________________________________________________________
```

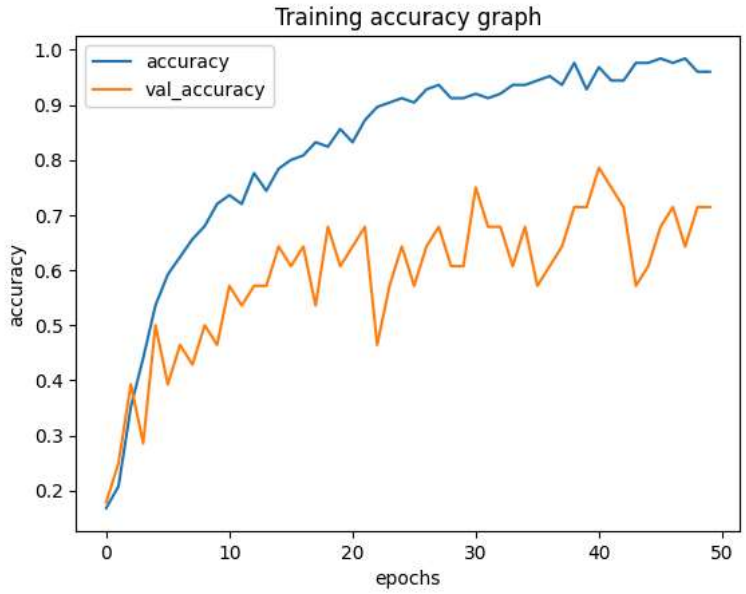
```
xception_model.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
```

```
from tensorflow.keras.callbacks import ModelCheckpoint
checkpointer = ModelCheckpoint(filepath=MODELPATH+'Xception_Pretrained.model.best.hdf5', verbose=1 ,save_best_only=Tr
```

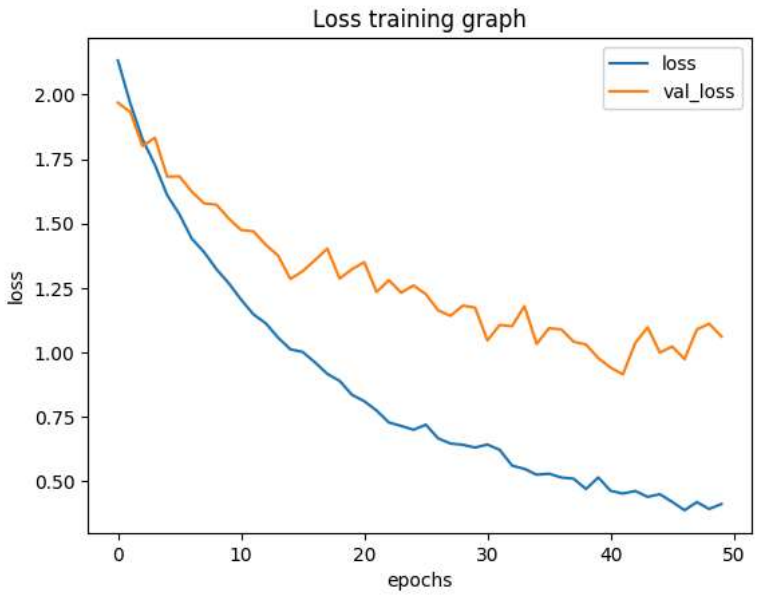
```
history=xception_model.fit(training_set,
                epochs=50,
                validation_data=validation_set,
                callbacks=[checkpointer])
```

```
Epoch 50/50
2/2 [==============================] - ETA: 0s - loss: 0.4121 - accuracy: 0.9600
Epoch 50: val_loss did not improve from 0.91532
2/2 [==============================] - 41s 24s/step - loss: 0.4121 - accuracy: 0.9600 - val_loss: 1.0621 - val
```

```
plt.xlabel('epochs')
plt.ylabel('accuracy')
plt.title('Training accuracy graph')
plt.plot(history.history['accuracy'],label='accuracy')
plt.plot(history.history['val_accuracy'],label='val_accuracy')
plt.legend()
plt.show()
```




```
plt.xlabel('epochs')
plt.ylabel('loss')
plt.title('Loss training graph')
plt.plot(history.history['loss'],label='loss')
plt.plot(history.history['val_loss'],label='val_loss')
plt.legend()
plt.show()
```




```
test_loss,test_accuracy=xception_model.evaluate(test_set)
print('Test Loss: ',test_loss)
print('Test Accuracy: ',test_accuracy)
```

```
1/1 [==============================] - 9s 9s/step - loss: 1.0806 - accuracy: 0.5476
Test Loss:  1.0805842876434326
Test Accuracy:  0.5476190447807312
```

```
print('Accuracy of the model is : ',test_accuracy*100)
```

```
Accuracy of the model is :  54.76190447807312
```

```
predicted_result=xception_model.predict(test_set)
predicted_result[:5]
```

```
1/1 [==============================] - 10s 10s/step
array([[9.5479692e-05, 8.1640399e-01, 2.1710645e-02, 3.2305419e-02,
        1.3799204e-02, 9.7097814e-02, 9.4295451e-03, 9.1579864e-03],
       [1.1670723e-03, 1.8947302e-01, 5.3290915e-02, 7.7197333e-03,
        1.8754212e-02, 2.4666326e-01, 3.4017116e-01, 1.4276072e-01],
       [4.5409714e-04, 5.9063695e-02, 7.7147163e-02, 1.2771904e-02,
        9.8159788e-03, 1.6387095e-01, 3.2107675e-01, 3.5579941e-01],
       [2.2090836e-04, 3.7565500e-01, 1.9260127e-02, 1.7577706e-02,
        1.5488674e-02, 5.5134004e-01, 1.1823633e-02, 8.6338026e-03],
       [1.7402967e-04, 8.5004056e-01, 7.9366425e-03, 7.6831937e-02,
        8.6074732e-03, 5.0202399e-02, 2.0817495e-03, 4.1253585e-03]],
      dtype=float32)
```

```
predicted_class=np.argmax(predicted_result,axis=-1)
predicted_class[:5]
```

```
array([1, 6, 7, 5, 1])
```

```
test_classes=test_set.classes
test_classes
```

```
array([1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4,
       4, 4, 5, 5, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6, 7, 7, 7, 7, 7, 7],
      dtype=int32)
```

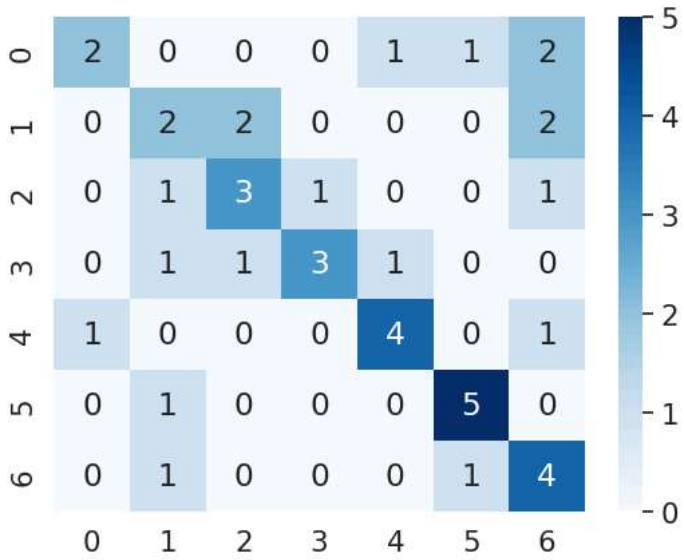
```
from sklearn.metrics import confusion matrix
```

```
cm=confusion_matrix(test_classes,predicted_class)
print(cm)
```

```
[[2 0 0 0 1 1 2]
 [0 2 2 0 0 0 2]
 [0 1 3 1 0 0 1]
 [0 1 1 3 1 0 0]
 [1 0 0 0 4 0 1]
 [0 1 0 0 0 5 0]
 [0 1 0 0 0 1 4]]
```

```
import seaborn as sns
sns.set(font_scale=1.4)
sns.heatmap(cm, annot=True,fmt='d',cmap="Blues")
```

```
<Axes: >
```




```
from sklearn.metrics import accuracy_score
print('Accuracy score: ',accuracy_score(test_classes,predicted_class))
```

```
Accuracy score:  0.5476190476190477
```

```
from sklearn.metrics import classification_report
print('Classification Report \n',classification_report(test_classes,predicted_class))
```

```
Classification Report
               precision    recall  f1-score   support

           1       0.67      0.33      0.44         6
           2       0.33      0.33      0.33         6
           3       0.50      0.50      0.50         6
           4       0.75      0.50      0.60         6
           5       0.67      0.67      0.67         6
           6       0.71      0.83      0.77         6
           7       0.40      0.67      0.50         6

    accuracy                           0.55        42
   macro avg       0.58      0.55      0.54        42
weighted avg       0.58      0.55      0.54        42
```

```
import time
t = time.time()

export_path_keras = "/content/model/Model_5_xception_Pretrained{}_model_{}.h5".format(test_accuracy,int(t))
print(export_path_keras)
xception_model.save(export_path_keras)
```

```
/content/model/Model_5_xception_Pretrained0.5476190447807312_model_1713538918.h5
/usr/local/lib/python3.10/dist-packages/keras/src/engine/training.py:3103: UserWarning: You are saving your model
  saving_api.save_model(
```

```
from tensorflow.keras.models import load_model


model_path=export_path_keras
reload_model=load_model(model_path)
reload_model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 xception (Functional)       (None, 2048)              20861480

 flatten (Flatten)           (None, 2048)              0

 dense (Dense)               (None, 8)                 16392

=================================================================
Total params: 20877872 (79.64 MB)
Trainable params: 16392 (64.03 KB)
Non-trainable params: 20861480 (79.58 MB)
_________________________________________________________________
```

```
print(len(reload_model.weights))
print(reload_model.output_shape)
```

```
236
(None, 8)
```

```
reload_model.layers
```

```
[<keras.src.engine.functional.Functional at 0x7a928880b940>,
 <keras.src.layers.reshaping.flatten.Flatten at 0x7a92886c71f0>,
 <keras.src.layers.core.dense.Dense at 0x7a9288685600>]
```

```
t = time.time()

export_path_sm = "/content/model/Model_5_xception_Pretrained {} Model {}".format(test_accuracy,int(t))
print(export_path_sm)

tf.saved_model.save(xception_model, export_path_sm)
```

```
/content/model/Model_5_xception_Pretrained 0.5476190447807312 Model 1713538949
```

```
reload_tf_saved_model=tf.saved_model.load(export_path_sm)


reload_tf_saved_model.signatures['serving_default']
```

```
<ConcreteFunction (*, xception_input: TensorSpec(shape=(None, 224, 224, 3), dtype=tf.float32,
name='xception_input')) -> Dict[['dense', TensorSpec(shape=(None, 8), dtype=tf.float32, name='dense')]] at
0x7A9287DBEDA0>
```

```
reload_tf_saved_model
```

```
<tensorflow.python.saved_model.load.Loader._recreate_base_user_object.<locals>._UserObject at 0x7a92865eb9d0>
```

```
model=reload_model
```

```
!pip install pyttsx3
!pip install playsound
!pip install pyttsx3
!sudo apt-get install espeak
!ldconfig -p | grep libespeak.so.1
```

```
Collecting pyttsx3
  Downloading pyttsx3-2.90-py3-none-any.whl (39 kB)
Installing collected packages: pyttsx3
Successfully installed pyttsx3-2.90
Collecting playsound
  Downloading playsound-1.3.0.tar.gz (7.7 kB)
  Preparing metadata (setup.py) ... done
Building wheels for collected packages: playsound
  Building wheel for playsound (setup.py) ... done
  Created wheel for playsound: filename=playsound-1.3.0-py3-none-any.whl size=7020 sha256=e2bad352ba259c667057
  Stored in directory: /root/.cache/pip/wheels/90/89/ed/2d643f4226fc8c7c9156fc28abd8051e2d2c0de37ae51ac45c
Successfully built playsound
Installing collected packages: playsound
Successfully installed playsound-1.3.0
Requirement already satisfied: pyttsx3 in /usr/local/lib/python3.10/dist-packages (2.90)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  espeak-data libespeak1 libportaudio2 libsonic0
The following NEW packages will be installed:
  espeak espeak-data libespeak1 libportaudio2 libsonic0
0 upgraded, 5 newly installed, 0 to remove and 45 not upgraded.
Need to get 1,382 kB of archives.
After this operation, 3,178 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libportaudio2 amd64 19.6.0-1.1 [65.3 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 libsonic0 amd64 0.2.0-11build1 [10.3 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/universe amd64 espeak-data amd64 1.48.15+dfsg-3 [1,085 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libespeak1 amd64 1.48.15+dfsg-3 [156 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/universe amd64 espeak amd64 1.48.15+dfsg-3 [64.2 kB]
Fetched 1,382 kB in 6s (233 kB/s)
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based frontend cannot be used. at /usr/sha
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (This frontend requires a controlling tty.)
debconf: falling back to frontend: Teletype
dpkg-preconfigure: unable to re-open stdin:
Selecting previously unselected package libportaudio2:amd64.
(Reading database ... 121752 files and directories currently installed.)
Preparing to unpack .../libportaudio2_19.6.0-1.1_amd64.deb ...
Unpacking libportaudio2:amd64 (19.6.0-1.1) ...
Selecting previously unselected package libsonic0:amd64.
Preparing to unpack .../libsonic0_0.2.0-11build1_amd64.deb ...
Unpacking libsonic0:amd64 (0.2.0-11build1) ...
Selecting previously unselected package espeak-data:amd64.
Preparing to unpack .../espeak-data_1.48.15+dfsg-3_amd64.deb ...
Unpacking espeak-data:amd64 (1.48.15+dfsg-3) ...
Selecting previously unselected package libespeak1:amd64.
Preparing to unpack .../libespeak1_1.48.15+dfsg-3_amd64.deb ...
Unpacking libespeak1:amd64 (1.48.15+dfsg-3) ...
Selecting previously unselected package espeak.
Preparing to unpack .../espeak_1.48.15+dfsg-3_amd64.deb ...
Unpacking espeak (1.48.15+dfsg-3) ...
Setting up libportaudio2:amd64 (19.6.0-1.1) ...
Setting up libsonic0:amd64 (0.2.0-11build1) ...
Setting up espeak-data:amd64 (1.48.15+dfsg-3) ...
```

```
import os
import pyttsx3
import numpy as np
import matplotlib.pyplot as plt
import random
import cv2
import PIL
import glob
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.preprocessing.image import ImageDataGenerator


from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image


checkpointer = ModelCheckpoint(filepath=MODELPATH+'5.Model_Xception_Pretrained.h5', verbose=1, save_best_only=True)



export_path_keras = "/content/model/5.Model_Xception_Pretrained.h5"


print(export_path_keras)
tf.saved_model.save(xception_model, export_path_keras)
```

```
/content/model/5.Model_Xception_Pretrained.h5
```

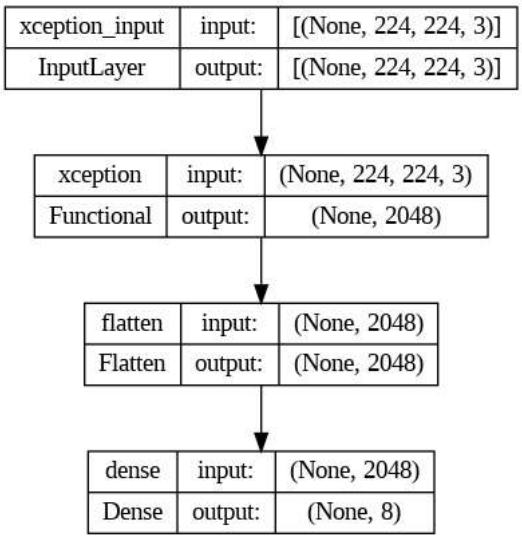
```
export_path_keras = "/content/model/5.Model_Xception_Pretrained_updated.h5"
print(export_path_keras)

xception_model.save(export_path_keras)
```

```
/content/model/5.Model_Xception_Pretrained_updated.h5
```

```
MODELPATH = export_path_keras
reload_model = tf.keras.models.load_model(MODELPATH)

# Print the model summary
reload_model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 xception (Functional)       (None, 2048)              20861480

 flatten (Flatten)           (None, 2048)              0

 dense (Dense)               (None, 8)                 16392

=================================================================
Total params: 20877872 (79.64 MB)
Trainable params: 16392 (64.03 KB)
Non-trainable params: 20861480 (79.58 MB)
_________________________________________________________________
```

```
from tensorflow.keras.utils import plot_model

# Plot the model and save it to an image file
plot_model(xception_model, to_file='cnn_model_Xception.png', show_shapes=True, show_layer_names=True)
```


xception_input
input:
[(None, 224, 224, 3)]
InputLayer
output:
[(None, 224, 224, 3)]
xception
input:
(None, 224, 224, 3)
Functional
output:
(None, 2048)
flatten
input:
(None, 2048)
Flatten
output:
(None, 2048)
dense
input:
(None, 2048)
Dense
output:
(None, 8)