

```
In [2]: import tensorflow as tf
import numpy as np
import pandas as pd
from sklearn.metrics import classification_report, confusion_matrix
import matplotlib.pyplot as plt
import seaborn as sns
import os

INFO:tensorflow:Enabling eager execution
INFO:tensorflow:Enabling v2 tensorshape
INFO:tensorflow:Enabling resource variables
INFO:tensorflow:Enabling tensor equality
INFO:tensorflow:Enabling control flow v2

In [3]: epochs = 10 # quantidade de vezes a ser executado o algoritmo, uma epoch é quanto todo
base_model = 32 # número de amostras que será carregado a cada execução

In [4]: #carrega o modelo da InceptionResNetV2 com os pesos aprendidos no treino da Inception
base_model = tf.keras.applications.InceptionResNetV2(weights='imagenet', include_top=False)

In [5]: # o restante do modelo e suas camadas são discutidos a seguir
# x recebe o final da InceptionResNetV2
x=base_model.output

In [6]: #Nova configuração para o modelo
#adiciona após x uma camada GlobalMaxPooling2D e atribui este no a x novamente (logo
x=tf.keras.layers.GlobalMaxPooling2D()(x)
#adiciona após x uma camada densa com 128 neurônios com funcao de ativacao relu. Atrib
x=tf.keras.layers.Dense(128,activation='relu')(x)
#adiciona após x uma camada densa com 64 neurônios com funcao de ativacao relu. Atrib
x=tf.keras.layers.Dense(64,activation='relu')(x)
#adiciona após x uma camada densa com 32 neurônios com funcao de ativacao relu. Atrib
x=tf.keras.layers.Dense(32,activation='relu')(x)
#adiciona após x os neurônios que devem ser utilizados, nesse caso foram desligados 2
x=tf.keras.layers.Dropout(0.5)(x)
#adiciona após x uma camada densa com 7 neurônios (sete classes) com funcao de ativac
#preds=tf.keras.layers.Dense(3,activation='softmax')(x)
preds=tf.keras.layers.Dense(3,activation='sigmoid')(x)
#definindo modelo final
model=tf.keras.models.Model(inputs=base_model.input,outputs=preds)
#mostrando modelo final e sua estrutura
model.summary()

Model: "model"

Layer (type) Output Shape Param # Connected to
=====
input_1 (InputLayer) (None, None, None, 0)
-----
conv2d (Conv2D) (None, None, None, 3 864) input_1[0][0]
-----
batch_normalization (BatchNorm (None, None, None, 3 96) conv2d[0][0]
-----
activation (Activation) (None, None, None, 3 0) batch_normalization
[0][0]
-----
conv2d_1 (Conv2D) (None, None, None, 3 9216) activation[0][0]
-----
batch_normalization_1 (BatchNorm (None, None, None, 3 96) conv2d_1[0][0]
-----
activation_1 (Activation) (None, None, None, 3 0) batch_normalization_1
[0][0]
-----
conv2d_2 (Conv2D) (None, None, None, 6 18432) activation_1[0][0]
-----
batch_normalization_2 (BatchNorm (None, None, None, 6 192) conv2d_2[0][0]
-----
activation_2 (Activation) (None, None, None, 6 0) batch_normalization_2
[0][0]
-----
max_pooling2d (MaxPooling2D) (None, None, None, 6 0) activation_2[0][0]
-----
conv2d_3 (Conv2D) (None, None, None, 8 5120) max_pooling2d[0][0]
-----
batch_normalization_3 (BatchNorm (None, None, None, 8 240) conv2d_3[0][0]
-----
activation_3 (Activation) (None, None, None, 8 0) batch_normalization_3
[0][0]
-----
conv2d_4 (Conv2D) (None, None, None, 1 138240) activation_3[0][0]
-----
batch_normalization_4 (BatchNorm (None, None, None, 1 576) conv2d_4[0][0]
-----
activation_4 (Activation) (None, None, None, 1 0) batch_normalization_4
[0][0]
-----
max_pooling2d_1 (MaxPooling2D) (None, None, None, 1 0) activation_4[0][0]
-----
conv2d_5 (Conv2D) (None, None, None, 6 12288) max_pooling2d_1[0][0]
-----
batch_normalization_5 (BatchNorm (None, None, None, 6 192) conv2d_5[0][0]
-----
activation_5 (Activation) (None, None, None, 6 0) batch_normalization_5
[0][0]
-----
conv2d_6 (Conv2D) (None, None, None, 4 9216) max_pooling2d_1[0][0]
-----
conv2d_7 (Conv2D) (None, None, None, 9 55296) activation_5[0][0]
-----
batch_normalization_6 (BatchNorm (None, None, None, 4 144) conv2d_6[0][0]
-----
batch_normalization_7 (BatchNorm (None, None, None, 9 288) conv2d_7[0][0]
-----
activation_6 (Activation) (None, None, None, 4 0) batch_normalization_7
[0][0]
-----
activation_7 (Activation) (None, None, None, 9 0) batch_normalization_7
[0][0]
-----
average_pooling2d (AveragePooli (None, None, None, 1 0) max_pooling2d_1[0][0]
-----
conv2d_8 (Conv2D) (None, None, None, 9 18432) max_pooling2d_1[0][0]
-----
conv2d_9 (Conv2D) (None, None, None, 6 76800) activation_6[0][0]
-----
conv2d_10 (Conv2D) (None, None, None, 9 82944) activation_7[0][0]
-----
conv2d_11 (Conv2D) (None, None, None, 6 12288) average_pooling2d[0]
[0]
-----
batch_normalization_8 (BatchNorm (None, None, None, 9 288) conv2d_11[0][0]
-----
batch_normalization_9 (BatchNorm (None, None, None, 6 192) conv2d_10[0][0]
-----
batch_normalization_10 (BatchNo (None, None, None, 9 288) conv2d_11[0][0]
-----
batch_normalization_11 (BatchNo (None, None, None, 6 192) conv2d_11[0][0]
-----
activation_8 (Activation) (None, None, None, 9 0) batch_normalization_11
[0][0]
-----
activation_9 (Activation) (None, None, None, 6 0) batch_normalization_11
[0][0]
-----
activation_10 (Activation) (None, None, None, 9 0) batch_normalization_11
[0][0]
-----
activation_11 (Activation) (None, None, None, 6 0) batch_normalization_11
[0][0]
-----
mixed_5b (Concatenate) (None, None, None, 3 0) activation_5[0][0]
activation_7[0][0]
activation_10[0][0]
activation_11[0][0]
-----
conv2d_15 (Conv2D) (None, None, None, 3 10240) mixed_5b[0][0]
-----
batch_normalization_15 (BatchNo (None, None, None, 3 96) conv2d_15[0][0]
-----
activation_15 (Activation) (None, None, None, 3 0) batch_normalization_15
[0][0]
-----
conv2d_13 (Conv2D) (None, None, None, 3 10240) mixed_5b[0][0]
-----
conv2d_16 (Conv2D) (None, None, None, 4 13824) activation_15[0][0]
-----
batch_normalization_13 (BatchNo (None, None, None, 3 96) conv2d_13[0][0]
-----
batch_normalization_16 (BatchNo (None, None, None, 4 144) conv2d_16[0][0]
-----
activation_13 (Activation) (None, None, None, 3 0) batch_normalization_16
[0][0]
-----
activation_16 (Activation) (None, None, None, 4 0) batch_normalization_16
[0][0]
-----
conv2d_12 (Conv2D) (None, None, None, 3 10240) mixed_5b[0][0]
-----
conv2d_14 (Conv2D) (None, None, None, 3 9216) activation_13[0][0]
-----
conv2d_17 (Conv2D) (None, None, None, 6 27648) activation_16[0][0]
-----
batch_normalization_12 (BatchNo (None, None, None, 3 96) conv2d_12[0][0]
-----
batch_normalization_14 (BatchNo (None, None, None, 3 96) conv2d_14[0][0]
-----
batch_normalization_17 (BatchNo (None, None, None, 6 192) conv2d_17[0][0]
-----
activation_12 (Activation) (None, None, None, 3 0) batch_normalization_17
[0][0]
-----
activation_14 (Activation) (None, None, None, 3 0) batch_normalization_17
[0][0]
-----
activation_17 (Activation) (None, None, None, 6 0) batch_normalization_17
[0][0]
-----
block35_1_mixed (Concatenate) (None, None, None, 1 0) activation_12[0][0]
activation_14[0][0]
activation_17[0][0]
-----
block35_1_conv (Conv2D) (None, None, None, 3 41280) block35_1_mixed[0][0]
-----
block35_1 (Lambda) (None, None, None, 3 0) mixed_5b[0][0]
block35_1_conv[0][0]
-----
block35_1_ac (Activation) (None, None, None, 3 0) block35_1[0][0]
-----
conv2d_21 (Conv2D) (None, None, None, 3 10240) block35_1_ac[0][0]
-----
batch_normalization_21 (BatchNo (None, None, None, 3 96) conv2d_21[0][0]
-----
activation_21 (Activation) (None, None, None, 3 0) batch_normalization_21
[0][0]
-----
conv2d_19 (Conv2D) (None, None, None, 3 10240) block35_1_ac[0][0]
-----
conv2d_22 (Conv2D) (None, None, None, 4 13824) activation_21[0][0]
-----
batch_normalization_19 (BatchNo (None, None, None, 3 96) conv2d_19[0][0]
-----
batch_normalization_22 (BatchNo (None, None, None, 4 144) conv2d_22[0][0]
-----
activation_19 (Activation) (None, None, None, 3 0) batch_normalization_22
[0][0]
-----
activation_22 (Activation) (None, None, None, 4 0) batch_normalization_22
[0][0]
-----
conv2d_18 (Conv2D) (None, None, None, 3 10240) block35_1_ac[0][0]
-----
conv2d_20 (Conv2D) (None, None, None, 3 9216) activation_19[0][0]
-----
conv2d_23 (Conv2D) (None, None, None, 6 27648) activation_22[0][0]
-----
batch_normalization_18 (BatchNo (None, None, None, 3 96) conv2d_18[0][0]
-----
batch_normalization_20 (BatchNo (None, None, None, 3 96) conv2d_20[0][0]
-----
batch_normalization_23 (BatchNo (None, None, None, 6 192) conv2d_23[0][0]
-----
activation_18 (Activation) (None, None, None, 3 0) batch_normalization_23
[0][0]
-----
activation_20 (Activation) (None, None, None, 3 0) batch_normalization_23
[0][0]
-----
activation_23 (Activation) (None, None, None, 6 0) batch_normalization_23
[0][0]
-----
block35_2_mixed (Concatenate) (None, None, None, 1 0) activation_18[0][0]
activation_20[0][0]
activation_23[0][0]
-----
block35_2_conv (Conv2D) (None, None, None, 3 41280) block35_2_mixed[0][0]
-----
block35_2 (Lambda) (None, None, None, 3 0) block35_2_conv[0][0]
block35_2_mixed[0][0]
-----
block35_2_ac (Activation) (None, None, None, 3 0) block35_2[0][0]
-----
conv2d_27 (Conv2D) (None, None, None, 3 10240) block35_2_ac[0][0]
-----
batch_normalization_27 (BatchNo (None, None, None, 3 96) conv2d_27[0][0]
-----
activation_27 (Activation) (None, None, None, 3 0) batch_normalization_27
[0][0]
-----
conv2d_25 (Conv2D) (None, None, None, 3 10240) block35_2_ac[0][0]
-----
conv2d_28 (Conv2D) (None, None, None, 4 13824) activation_27[0][0]
-----
batch_normalization_25 (BatchNo (None, None, None, 3 96) conv2d_25[0][0]
-----
batch_normalization_28 (BatchNo (None, None, None, 4 144) conv2d_28[0][0]
-----
activation_25 (Activation) (None, None, None, 3 0) batch_normalization_28
[0][0]
-----
activation_28 (Activation) (None, None, None, 4 0) batch_normalization_28
[0][0]
-----
conv2d_24 (Conv2D) (None, None, None, 3 10240) block35_2_ac[0][0]
-----
conv2d_26 (Conv2D) (None, None, None, 3 9216) activation_25[0][0]
-----
conv2d_29 (Conv2D) (None, None, None, 6 27648) activation_28[0][0]
-----
batch_normalization_24 (BatchNo (None, None, None, 3 96) conv2d_24[0][0]
-----
batch_normalization_26 (BatchNo (None, None, None, 3 96) conv2d_26[0][0]
-----
batch_normalization_29 (BatchNo (None, None, None, 6 192) conv2d_29[0][0]
-----
activation_24 (Activation) (None, None, None, 3 0) batch_normalization_29
[0][0]
-----
activation_26 (Activation) (None, None, None, 3 0) batch_normalization_29
[0][0]
-----
activation_29 (Activation) (None, None, None, 6 0) batch_normalization_29
[0][0]
-----
block35_3_mixed (Concatenate) (None, None, None, 1 0) activation_24[0][0]
activation_26[0][0]
activation_29[0][0]
-----
block35_3_conv (Conv2D) (None, None, None, 3 41280) block35_3_mixed[0][0]
-----
block35_3 (Lambda) (None, None, None, 3 0) block35_3_conv[0][0]
block35_3_mixed[0][0]
-----
block35_3_ac (Activation) (None, None, None, 3 0) block35_3[0][0]
-----
conv2d_33 (Conv2D) (None, None, None, 3 10240) block35_3_ac[0][0]
-----
batch_normalization_33 (BatchNo (None, None, None, 3 96) conv2d_33[0][0]
-----
activation_33 (Activation) (None, None, None, 3 0) batch_normalization_33
[0][0]
-----
conv2d_31 (Conv2D) (None, None, None, 3 10240) block35_3_ac[0][0]
-----
conv2d_34 (Conv2D) (None, None, None, 4 13824) activation_33[0][0]
-----
batch_normalization_31 (BatchNo (None, None, None, 3 96) conv2d_31[0][0]
-----
batch_normalization_34 (BatchNo (None, None, None, 4 144) conv2d_34[0][0]
-----
activation_31 (Activation) (None, None, None, 3 0) batch_normalization_34
[0][0]
-----
activation_34 (Activation) (None, None, None, 4 0) batch_normalization_34
[0][0]
-----
conv2d_30 (Conv2D) (None, None, None, 3 10240) block35_3_ac[0][0]
-----
conv2d_32 (Conv2D) (None, None, None, 3 9216) activation_31[0][0]
-----
conv2d_35 (Conv2D) (None, None, None, 6 27648) activation_34[0][0]
-----
batch_normalization_30 (BatchNo (None, None, None, 3 96) conv2d_30[0][0]
-----
batch_normalization_32 (BatchNo (None, None, None, 3 96) conv2d_32[0][0]
-----
batch_normalization_35 (BatchNo (None, None, None, 6 192) conv2d_35[0][0]
-----
activation_30 (Activation) (None, None, None, 3 0) batch_normalization_35
[0][0]
-----
activation_32 (Activation) (None, None, None, 3 0) batch_normalization_35
[0][0]
-----
activation_35 (Activation) (None, None, None, 6 0) batch_normalization_35
[0][0]
-----
block35_4_mixed (Concatenate) (None, None, None, 1 0) activation_30[0][0]
activation_32[0][0]
activation_35[0][0]
-----
block35_4_conv (Conv2D) (None, None, None, 3 41280) block35_4_mixed[0][0]
-----
block35_4 (Lambda) (None, None, None, 3 0) block35_4_conv[0][0]
block35_4_mixed[0][0]
-----
block35_4_ac (Activation) (None, None, None, 3 0) block35_4[0][0]
block35_4_conv[0][0]
-----
conv2d_39 (Conv2D) (None, None, None, 3 10240) block35_4_ac[0][0]
-----
batch_normalization_39 (BatchNo (None, None, None, 3 96) conv2d_39[0][0]
-----
activation_39 (Activation) (None, None, None, 3 0) batch_normalization_39
[0][0]
-----
conv2d_37 (Conv2D) (None, None, None, 3 10240) block35_4_ac[0][0]
-----
conv2d_40 (Conv2D) (None, None, None, 4 13824) activation_39[0][0]
-----
batch_normalization_37 (BatchNo (None, None, None, 3 96) conv2d_37[0][0]
-----
batch_normalization_40 (BatchNo (None, None, None, 4 144) conv2d_40[0][0]
-----
activation_37 (Activation) (None, None, None, 3 0) batch_normalization_40
[0][0]
-----
activation_40 (Activation) (None, None, None, 4 0) batch_normalization_40
[0][0]
-----
conv2d_36 (Conv2D) (None, None, None, 3 10240) block35_4_ac[0][0]
-----
conv2d_38 (Conv2D) (None, None, None, 3 9216) activation_37[0][0]
-----
conv2d_41 (Conv2D) (None, None, None, 6 27648) activation_40[0][0]
-----
batch_normalization_36 (BatchNo (None, None, None, 3 96) conv2d_36[0][0]
-----
batch_normalization_38 (BatchNo (None, None, None, 3 96) conv2d_38[0][0]
-----
batch_normalization_41 (BatchNo (None, None, None, 6 192) conv2d_41[0][0]
-----
activation_36 (Activation) (None, None, None, 3 0) batch_normalization_41
[0][0]
-----
activation_38 (Activation) (None, None, None, 3 0) batch_normalization_41
[0][0]
-----
activation_41 (Activation) (None, None, None, 6 0) batch_normalization_41
[0][0]
-----
block35_5_mixed (Concatenate) (None, None, None, 1 0) activation_36[0][0]
activation_38[0][0]
activation_41[0][0]
-----
block35_5_conv (Conv2D) (None, None, None, 3 41280) block35_5_mixed[0][0]
-----
block35_5 (Lambda) (None, None, None, 3 0) block35_5_conv[0][0]
block35_5_mixed[0][0]
-----
block35_5_ac (Activation) (None, None, None, 3 0) block35_5[0][0]
block35_5_conv[0][0]
-----
conv2d_45 (Conv2D) (None, None, None, 3 10240) block35_5_ac[0][0]
-----
batch_normalization_45 (BatchNo (None, None, None, 3 96) conv2d_45[0][0]
-----
activation_45 (Activation) (None, None, None, 3 0) batch_normalization_45
[0][0]
-----
conv2d_43 (Conv2D) (None, None, None, 3 10240) block35_5_ac[0][0]
-----
conv2d_46 (Conv2D) (None, None, None, 4 13824) activation_45[0][0]
-----
batch_normalization_43 (BatchNo (None, None, None, 3 96) conv2d_43[0][0]
-----
batch_normalization_46 (BatchNo (None, None, None, 4 144) conv2d_46[0][0]
-----
activation_43 (Activation) (None, None, None, 3 0) batch_normalization_46
[0][0]
-----
activation_46 (Activation) (None, None, None, 4 0) batch_normalization_46
[0][0]
-----
conv2d_42 (Conv2D) (None, None, None, 3 10240) block35_5_ac[0][0]
-----
conv2d_44 (Conv2D) (None, None, None, 3 9216) activation_43[0][0]
-----
conv2d_47 (Conv2D) (None, None, None, 6 27648) activation_46[0][0]
-----
batch_normalization_42 (BatchNo (None, None, None, 3 96) conv2d_42[0][0]
-----
batch_normalization_44 (BatchNo (None, None, None, 3 96) conv2d_44[0][0]
-----
batch_normalization_47 (BatchNo (None, None, None, 6 192) conv2d_47[0][0]
-----
activation_42 (Activation) (None, None, None, 3 0) batch_normalization_47
[0][0]
-----
activation_44 (Activation) (None, None, None, 3 0) batch_normalization_47
[0][0]
-----
activation_47 (Activation) (None, None, None, 6 0) batch_normalization_47
[0][0]
-----
block35_6_mixed (Concatenate) (None, None, None, 1 0) activation_42[0][0]
activation_44[0][0]
activation_47[0][0]
-----
block35_6_conv (Conv2D) (None, None, None, 3 41280) block35_6_mixed[0][0]
-----
block35_6 (Lambda) (None, None, None, 3 0) block35_6_conv[0][0]
block35_6_mixed[0][0]
-----
block35_6_ac (Activation) (None, None, None, 3 0) block35_6[0][0]
block35_6_conv[0][0]
-----
conv2d_51 (Conv2D) (None, None, None, 3 10240) block35_6_ac[0][0]
-----
batch_normalization_51 (BatchNo (None, None, None, 3 96) conv2d_51[0][0]
-----
activation_51 (Activation) (None, None, None, 3 0) batch_normalization_51
[0][0]
-----
conv2d_49 (Conv2D) (None, None, None, 3 10240) block35_6_ac[0][0]
-----
conv2d_52 (Conv2D) (None, None, None, 4 13824) activation_51[0][0]
-----
batch_normalization_49 (BatchNo (None, None, None, 3 96) conv2d_49[0][0]
-----
batch_normalization_52 (BatchNo (None, None, None, 4 144) conv2d_52[0][0]
-----
activation_49 (Activation) (None, None, None, 3 0) batch_normalization_52
[0][0]
-----
activation_52 (Activation) (None, None, None, 4 0) batch_normalization_52
[0][0]
-----
conv2d_48 (Conv2D) (None, None, None, 3 10240) block35_6_ac[0][0]
-----
conv2d_50 (Conv2D) (None, None, None, 3 9216) activation_49[0][0]
-----
conv2d_53 (Conv2D) (None, None, None, 6 27648) activation_52[0][0]
-----
batch_normalization_48 (BatchNo (None, None, None, 3 96) conv2d_48[0][0]
-----
batch_normalization_50 (BatchNo (None, None, None, 3 96) conv2d_50[0][0]
-----
batch_normalization_53 (BatchNo (None, None, None, 6 192) conv2d_53[0][0]
-----
activation_48 (Activation) (None, None, None, 3 0) batch_normalization_53
[0][0]
-----
activation_50 (Activation) (None, None, None, 3 0) batch_normalization_53
[0][0]
-----
activation_53 (Activation) (None, None, None, 6 0) batch_normalization_53
[0][0]
-----
block35_7_mixed (Concatenate) (None, None, None, 1 0) activation_48[0][0]
activation_50[0][0]
activation_53[0][0]
-----
block35_7_conv (Conv2D) (None, None, None, 3 41280) block35_7_mixed[0][0]
-----
block35_7 (Lambda) (None, None, None, 3 0) block35_7_conv[0][0]
block35_7_mixed[0][0]
-----
block35_7_ac (Activation) (None, None, None, 3 0) block35_7[0][0]
block35_7_conv[0][0]
-----
conv2d_57 (Conv2D) (None, None, None, 3 10240) block35_7_ac[0][0]
-----
batch_normalization_57 (BatchNo (None, None, None, 3 96) conv2d_57[0][0]
-----
activation_57 (Activation) (None, None, None, 3 0) batch_normalization_57
[0][0]
-----
conv2d_55 (Conv2D) (None, None, None, 3 10240) block35_7_ac[0][0]
-----
conv2d_58 (Conv2D) (None, None, None, 4 13824) activation_57[0][0]
-----
batch_normalization_55 (BatchNo (None, None, None, 3 96) conv2d_55[0][0]
-----
batch_normalization_58 (BatchNo (None, None, None, 4 144) conv2d_58[0][0]
-----
activation_55 (Activation) (None, None, None, 3 0) batch_normalization_58
[0][0]
-----
activation_58 (Activation) (None, None, None, 4 0) batch_normalization_58
[0][0]
-----
conv2d_54 (Conv2D) (None, None, None, 3 10240) block35_7_ac[0][0]
-----
conv2d_56 (Conv2D) (None, None, None, 3 9216) activation_55[0][0]
-----
conv2d_59 (Conv2D) (None, None, None, 6 27648) activation_58[0][0]
-----
batch_normalization_54 (BatchNo (None, None, None, 3 96) conv2d_54[0][0]
-----
batch_normalization_59 (BatchNo (None, None, None, 6 192) conv2d_59[0][0]
-----
activation_54 (Activation) (None, None, None, 3 0) batch_normalization_59
[0][0]
```


activation_56 (Activation) 6[0][0]	(None, None, None, 3 0	batch_normalization_56[0][0]
activation_59 (Activation) 9[0][0]	(None, None, None, 6 0	batch_normalization_59[0][0]
block35_8_mixed (Concatenate)	(None, None, None, 1 0	activation_54[0][0] activation_56[0][0] activation_59[0][0]
block35_8_conv (Conv2D)	(None, None, None, 3 41280	block35_8_mixed[0][0]
block35_8 (Lambda)	(None, None, None, 3 0	block35_7_ac[0][0] block35_8_conv[0][0]
block35_8_ac (Activation)	(None, None, None, 3 0	block35_8[0][0]
conv2d_63 (Conv2D)	(None, None, None, 3 10240	block35_8_ac[0][0]
batch_normalization_63 (BatchNo	(None, None, None, 3 96	conv2d_63[0][0]
activation_63 (Activation) 3[0][0]	(None, None, None, 3 0	batch_normalization_63[0][0]
conv2d_61 (Conv2D)	(None, None, None, 3 10240	block35_8_ac[0][0]
conv2d_64 (Conv2D)	(None, None, None, 4 13824	activation_63[0][0]
batch_normalization_61 (BatchNo	(None, None, None, 3 96	conv2d_61[0][0]
batch_normalization_64 (BatchNo	(None, None, None, 4 144	conv2d_64[0][0]
activation_61 (Activation) 1[0][0]	(None, None, None, 3 0	batch_normalization_61[0][0]
activation_64 (Activation) 4[0][0]	(None, None, None, 4 0	batch_normalization_64[0][0]
conv2d_60 (Conv2D)	(None, None, None, 3 10240	block35_8_ac[0][0]
conv2d_62 (Conv2D)	(None, None, None, 3 9216	activation_61[0][0]
conv2d_65 (Conv2D)	(None, None, None, 6 27648	activation_64[0][0]
batch_normalization_60 (BatchNo	(None, None, None, 3 96	conv2d_60[0][0]
batch_normalization_62 (BatchNo	(None, None, None, 3 96	conv2d_62[0][0]
batch_normalization_65 (BatchNo	(None, None, None, 6 192	conv2d_65[0][0]
activation_60 (Activation) 0[0][0]	(None, None, None, 3 0	batch_normalization_60[0][0]
activation_62 (Activation) 2[0][0]	(None, None, None, 3 0	batch_normalization_62[0][0]
activation_65 (Activation) 5[0][0]	(None, None, None, 6 0	batch_normalization_65[0][0]
block35_9_mixed (Concatenate)	(None, None, None, 1 0	activation_60[0][0] activation_62[0][0] activation_65[0][0]
block35_9_conv (Conv2D)	(None, None, None, 3 41280	block35_9_mixed[0][0]
block35_9 (Lambda)	(None, None, None, 3 0	block35_8_ac[0][0] block35_9_conv[0][0]
block35_9_ac (Activation)	(None, None, None, 3 0	block35_9[0][0]
conv2d_69 (Conv2D)	(None, None, None, 3 10240	block35_9_ac[0][0]
batch_normalization_69 (BatchNo	(None, None, None, 3 96	conv2d_69[0][0]
activation_69 (Activation) 9[0][0]	(None, None, None, 3 0	batch_normalization_69[0][0]
conv2d_67 (Conv2D)	(None, None, None, 3 10240	block35_9_ac[0][0]
conv2d_70 (Conv2D)	(None, None, None, 4 13824	activation_69[0][0]
batch_normalization_67 (BatchNo	(None, None, None, 3 96	conv2d_67[0][0]
batch_normalization_70 (BatchNo	(None, None, None, 4 144	conv2d_70[0][0]
activation_67 (Activation) 7[0][0]	(None, None, None, 3 0	batch_normalization_67[0][0]
activation_70 (Activation) 0[0][0]	(None, None, None, 4 0	batch_normalization_70[0][0]
conv2d_66 (Conv2D)	(None, None, None, 3 10240	block35_9_ac[0][0]
conv2d_68 (Conv2D)	(None, None, None, 3 9216	activation_67[0][0]
conv2d_71 (Conv2D)	(None, None, None, 6 27648	activation_70[0][0]
batch_normalization_66 (BatchNo	(None, None, None, 3 96	conv2d_66[0][0]
batch_normalization_68 (BatchNo	(None, None, None, 3 96	conv2d_68[0][0]
batch_normalization_71 (BatchNo	(None, None, None, 6 192	conv2d_71[0][0]
activation_66 (Activation) 6[0][0]	(None, None, None, 3 0	batch_normalization_66[0][0]
activation_68 (Activation) 8[0][0]	(None, None, None, 3 0	batch_normalization_68[0][0]
activation_71 (Activation) 1[0][0]	(None, None, None, 6 0	batch_normalization_71[0][0]
block35_10_mixed (Concatenate)	(None, None, None, 1 0	activation_66[0][0] activation_68[0][0] activation_71[0][0]
block35_10_conv (Conv2D)	(None, None, None, 3 41280	block35_10_mixed[0][0]
block35_10 (Lambda)	(None, None, None, 3 0	block35_9_ac[0][0] block35_10_conv[0][0]
block35_10_ac (Activation)	(None, None, None, 3 0	block35_10[0][0]
conv2d_73 (Conv2D)	(None, None, None, 2 81920	block35_10_ac[0][0]
batch_normalization_73 (BatchNo	(None, None, None, 2 768	conv2d_73[0][0]
activation_73 (Activation) 3[0][0]	(None, None, None, 2 0	batch_normalization_73[0][0]
conv2d_74 (Conv2D)	(None, None, None, 2 589824	activation_73[0][0]
batch_normalization_74 (BatchNo	(None, None, None, 2 768	conv2d_74[0][0]
activation_74 (Activation) 4[0][0]	(None, None, None, 2 0	batch_normalization_74[0][0]
conv2d_72 (Conv2D)	(None, None, None, 3 1105920	block35_10_ac[0][0]
conv2d_75 (Conv2D)	(None, None, None, 3 884736	activation_74[0][0]
batch_normalization_72 (BatchNo	(None, None, None, 3 1152	conv2d_72[0][0]
batch_normalization_75 (BatchNo	(None, None, None, 3 1152	conv2d_75[0][0]
activation_72 (Activation) 2[0][0]	(None, None, None, 3 0	batch_normalization_72[0][0]
activation_75 (Activation) 5[0][0]	(None, None, None, 3 0	batch_normalization_75[0][0]
max_pooling2d_2 (MaxPooling2D)	(None, None, None, 3 0	block35_10_ac[0][0]
mixed_6a (Concatenate)	(None, None, None, 1 0	activation_72[0][0] activation_75[0][0] max_pooling2d_2[0][0]
conv2d_77 (Conv2D)	(None, None, None, 1 139264	mixed_6a[0][0]
batch_normalization_77 (BatchNo	(None, None, None, 1 384	conv2d_77[0][0]
activation_77 (Activation) 7[0][0]	(None, None, None, 1 0	batch_normalization_77[0][0]
conv2d_78 (Conv2D)	(None, None, None, 1 143360	activation_77[0][0]
batch_normalization_78 (BatchNo	(None, None, None, 1 480	conv2d_78[0][0]
activation_78 (Activation) 8[0][0]	(None, None, None, 1 0	batch_normalization_78[0][0]
conv2d_76 (Conv2D)	(None, None, None, 1 208896	mixed_6a[0][0]
conv2d_79 (Conv2D)	(None, None, None, 1 215040	activation_78[0][0]
batch_normalization_76 (BatchNo	(None, None, None, 1 576	conv2d_76[0][0]
batch_normalization_79 (BatchNo	(None, None, None, 1 576	conv2d_79[0][0]
activation_76 (Activation) 6[0][0]	(None, None, None, 1 0	batch_normalization_76[0][0]
activation_79 (Activation) 9[0][0]	(None, None, None, 1 0	batch_normalization_79[0][0]
block17_1_mixed (Concatenate)	(None, None, None, 3 0	activation_76[0][0] activation_79[0][0]
block17_1_conv (Conv2D)	(None, None, None, 1 418880	block17_1_mixed[0][0]
block17_1 (Lambda)	(None, None, None, 1 0	mixed_6a[0][0] block17_1_conv[0][0]
block17_1_ac (Activation)	(None, None, None, 1 0	block17_1[0][0]
conv2d_81 (Conv2D)	(None, None, None, 1 139264	block17_1_ac[0][0]
batch_normalization_81 (BatchNo	(None, None, None, 1 384	conv2d_81[0][0]
activation_81 (Activation) 1[0][0]	(None, None, None, 1 0	batch_normalization_81[0][0]
conv2d_82 (Conv2D)	(None, None, None, 1 143360	activation_81[0][0]
batch_normalization_82 (BatchNo	(None, None, None, 1 480	conv2d_82[0][0]
activation_82 (Activation) 2[0][0]	(None, None, None, 1 0	batch_normalization_82[0][0]
conv2d_80 (Conv2D)	(None, None, None, 1 208896	block17_1_ac[0][0]
conv2d_83 (Conv2D)	(None, None, None, 1 215040	activation_82[0][0]
batch_normalization_80 (BatchNo	(None, None, None, 1 576	conv2d_80[0][0]
batch_normalization_83 (BatchNo	(None, None, None, 1 576	conv2d_83[0][0]
activation_80 (Activation) 0[0][0]	(None, None, None, 1 0	batch_normalization_80[0][0]
activation_83 (Activation) 3[0][0]	(None, None, None, 1 0	batch_normalization_83[0][0]
block17_2_mixed (Concatenate)	(None, None, None, 3 0	activation_80[0][0] activation_83[0][0]
block17_2_conv (Conv2D)	(None, None, None, 1 418880	block17_2_mixed[0][0]
block17_2 (Lambda)	(None, None, None, 1 0	block17_1_ac[0][0] block17_2_conv[0][0]
block17_2_ac (Activation)	(None, None, None, 1 0	block17_2[0][0]
conv2d_85 (Conv2D)	(None, None, None, 1 139264	block17_2_ac[0][0]
batch_normalization_85 (BatchNo	(None, None, None, 1 384	conv2d_85[0][0]
activation_85 (Activation) 5[0][0]	(None, None, None, 1 0	batch_normalization_85[0][0]
conv2d_86 (Conv2D)	(None, None, None, 1 143360	activation_85[0][0]
batch_normalization_86 (BatchNo	(None, None, None, 1 480	conv2d_86[0][0]
activation_86 (Activation) 6[0][0]	(None, None, None, 1 0	batch_normalization_86[0][0]
conv2d_84 (Conv2D)	(None, None, None, 1 208896	block17_2_ac[0][0]
conv2d_87 (Conv2D)	(None, None, None, 1 215040	activation_86[0][0]
batch_normalization_84 (BatchNo	(None, None, None, 1 576	conv2d_84[0][0]
batch_normalization_87 (BatchNo	(None, None, None, 1 576	conv2d_87[0][0]
activation_84 (Activation) 4[0][0]	(None, None, None, 1 0	batch_normalization_84[0][0]
activation_87 (Activation) 7[0][0]	(None, None, None, 1 0	batch_normalization_87[0][0]
block17_3_mixed (Concatenate)	(None, None, None, 3 0	activation_84[0][0] activation_87[0][0]
block17_3_conv (Conv2D)	(None, None, None, 1 418880	block17_3_mixed[0][0]
block17_3 (Lambda)	(None, None, None, 1 0	block17_2_ac[0][0] block17_3_conv[0][0]
block17_3_ac (Activation)	(None, None, None, 1 0	block17_3[0][0]
conv2d_89 (Conv2D)	(None, None, None, 1 139264	block17_3_ac[0][0]
batch_normalization_89 (BatchNo	(None, None, None, 1 384	conv2d_89[0][0]
activation_89 (Activation) 9[0][0]	(None, None, None, 1 0	batch_normalization_89[0][0]
conv2d_90 (Conv2D)	(None, None, None, 1 143360	activation_89[0][0]
batch_normalization_90 (BatchNo	(None, None, None, 1 480	conv2d_90[0][0]
activation_90 (Activation) 0[0][0]	(None, None, None, 1 0	batch_normalization_90[0][0]
conv2d_88 (Conv2D)	(None, None, None, 1 208896	block17_3_ac[0][0]
conv2d_91 (Conv2D)	(None, None, None, 1 215040	activation_90[0][0]
batch_normalization_88 (BatchNo	(None, None, None, 1 576	conv2d_88[0][0]
batch_normalization_91 (BatchNo	(None, None, None, 1 576	conv2d_91[0][0]
activation_88 (Activation) 8[0][0]	(None, None, None, 1 0	batch_normalization_88[0][0]
activation_91 (Activation) 1[0][0]	(None, None, None, 1 0	batch_normalization_91[0][0]
block17_4_mixed (Concatenate)	(None, None, None, 3 0	activation_88[0][0] activation_91[0][0]
block17_4_conv (Conv2D)	(None, None, None, 1 418880	block17_4_mixed[0][0]
block17_4 (Lambda)	(None, None, None, 1 0	block17_3_ac[0][0] block17_4_conv[0][0]
block17_4_ac (Activation)	(None, None, None, 1 0	block17_4[0][0]
conv2d_93 (Conv2D)	(None, None, None, 1 139264	block17_4_ac[0][0]
batch_normalization_93 (BatchNo	(None, None, None, 1 384	conv2d_93[0][0]
activation_93 (Activation) 3[0][0]	(None, None, None, 1 0	batch_normalization_93[0][0]
conv2d_94 (Conv2D)	(None, None, None, 1 143360	activation_93[0][0]
batch_normalization_94 (BatchNo	(None, None, None, 1 480	conv2d_94[0][0]
activation_94 (Activation) 4[0][0]	(None, None, None, 1 0	batch_normalization_94[0][0]
conv2d_92 (Conv2D)	(None, None, None, 1 208896	block17_4_ac[0][0]
conv2d_95 (Conv2D)	(None, None, None, 1 215040	activation_94[0][0]
batch_normalization_92 (BatchNo	(None, None, None, 1 576	conv2d_92[0][0]
batch_normalization_95 (BatchNo	(None, None, None, 1 576	conv2d_95[0][0]
activation_92 (Activation) 2[0][0]	(None, None, None, 1 0	batch_normalization_92[0][0]
activation_95 (Activation) 5[0][0]	(None, None, None, 1 0	batch_normalization_95[0][0]
block17_5_mixed (Concatenate)	(None, None, None, 3 0	activation_92[0][0] activation_95[0][0]
block17_5_conv (Conv2D)	(None, None, None, 1 418880	block17_5_mixed[0][0]
block17_5 (Lambda)	(None, None, None, 1 0	block17_4_ac[0][0] block17_5_conv[0][0]
block17_5_ac (Activation)	(None, None, None, 1 0	block17_5[0][0]
conv2d_97 (Conv2D)	(None, None, None, 1 139264	block17_5_ac[0][0]
batch_normalization_97 (BatchNo	(None, None, None, 1 384	conv2d_97[0][0]
activation_97 (Activation) 7[0][0]	(None, None, None, 1 0	batch_normalization_97[0][0]
conv2d_98 (Conv2D)	(None, None, None, 1 143360	activation_97[0][0]
batch_normalization_98 (BatchNo	(None, None, None, 1 480	conv2d_98[0][0]
activation_98 (Activation) 8[0][0]	(None, None, None, 1 0	batch_normalization_98[0][0]
conv2d_96 (Conv2D)	(None, None, None, 1 208896	block17_5_ac[0][0]
conv2d_99 (Conv2D)	(None, None, None, 1 215040	activation_98[0][0]
batch_normalization_96 (BatchNo	(None, None, None, 1 576	conv2d_96[0][0]
batch_normalization_99 (BatchNo	(None, None, None, 1 576	conv2d_99[0][0]
activation_96 (Activation) 6[0][0]	(None, None, None, 1 0	batch_normalization_96[0][0]
activation_99 (Activation) 9[0][0]	(None, None, None, 1 0	batch_normalization_99[0][0]
block17_6_mixed (Concatenate)	(None, None, None, 3 0	activation_96[0][0] activation_99[0][0]
block17_6_conv (Conv2D)	(None, None, None, 1 418880	block17_6_mixed[0][0]
block17_6 (Lambda)	(None, None, None, 1 0	block17_5_ac[0][0] block17_6_conv[0][0]
block17_6_ac (Activation)	(None, None, None, 1 0	block17_6[0][0]
conv2d_101 (Conv2D)	(None, None, None, 1 139264	block17_6_ac[0][0]
batch_normalization_101 (BatchN	(None, None, None, 1 384	conv2d_101[0][0]
activation_101 (Activation) 01[0][0]	(None, None, None, 1 0	batch_normalization_101[0][0]
conv2d_102 (Conv2D)	(None, None, None, 1 143360	activation_101[0][0]
batch_normalization_102 (BatchN	(None, None, None, 1 480	conv2d_102[0][0]
activation_102 (Activation) 02[0][0]	(None, None, None, 1 0	batch_normalization_102[0][0]
conv2d_100 (Conv2D)	(None, None, None, 1 208896	block17_6_ac[0][0]
conv2d_103 (Conv2D)	(None, None, None, 1 215040	activation_102[0][0]
batch_normalization_100 (BatchN	(None, None, None, 1 576	conv2d_100[0][0]
batch_normalization_103 (BatchN	(None, None, None, 1 576	conv2d_103[0][0]
activation_100 (Activation) 00[0][0]	(None, None, None, 1 0	batch_normalization_100[0][0]
activation_103 (Activation) 03[0][0]	(None, None, None, 1 0	batch_normalization_103[0][0]
block17_7_mixed (Concatenate)	(None, None, None, 3 0	activation_100[0][0] activation_103[0][0]
block17_7_conv (Conv2D)	(None, None, None, 1 418880	block17_7_mixed[0][0]
block17_7 (Lambda)	(None, None, None, 1 0	block17_6_ac[0][0] block17_7_conv[0][0]
block17_7_ac (Activation)	(None, None, None, 1 0	block17_7[0][0]
conv2d_105 (Conv2D)	(None, None, None, 1 139264	block17_7_ac[0][0]
batch_normalization_105 (BatchN	(None, None, None, 1 384	conv2d_105[0][0]
activation_105 (Activation) 05[0][0]	(None, None, None, 1 0	batch_normalization_105[0][0]
conv2d_106 (Conv2D)	(None, None, None, 1 143360	activation_105[0][0]
batch_normalization_106 (BatchN	(None, None, None, 1 480	conv2d_106[0][0]
activation_106 (Activation) 06[0][0]	(None, None, None, 1 0	batch_normalization_106[0][0]
conv2d_104 (Conv2D)	(None, None, None, 1 208896	block17_7_ac[0][0]
conv2d_107 (Conv2D)	(None, None, None, 1 215040	activation_106[0][0]
batch_normalization_104 (BatchN	(None, None, None, 1 576	conv2d_104[0][0]
batch_normalization_107 (BatchN	(None, None, None, 1 576	conv2d_107[0][0]
activation_104 (Activation) 04[0][0]	(None, None, None, 1 0	batch_normalization_104[0][0]
activation_107 (Activation) 07[0][0]	(None, None, None, 1 0	batch_normalization_107[0][0]
block17_8_mixed (Concatenate)	(None, None, None, 3 0	activation_104[0][0] activation_107[0][0]
block17_8_conv (Conv2D)	(None, None, None, 1 418880	block17_8_mixed[0][0]
block17_8 (Lambda)	(None, None, None, 1 0	block17_7_ac[0][0] block17_8_conv[0][0]
block17_8_ac (Activation)	(None, None, None, 1 0	block17_8[0][0]
conv2d_109 (Conv2D)	(None, None, None, 1 139264	block17_8_ac[0][0]
batch_normalization_109 (BatchN	(None, None, None, 1 384	conv2d_109[0][0]
activation_109 (Activation) 09[0][0]	(None, None, None, 1 0	batch_normalization_109[0][0]
conv2d_110 (Conv2D)	(None, None, None, 1 143360	activation_109[0][0]
batch_normalization_110 (BatchN	(None, None, None, 1 480	conv2d_110[0][0]
activation_110 (Activation) 10[0][0]	(None, None, None, 1 0	batch_normalization_110[0][0]
conv2d_108 (Conv2D)	(None, None, None, 1 208896	block17_8_ac[0][0]
conv2d_111 (Conv2D)	(None, None, None, 1 215040	activation_110[0][0]
batch_normalization_108 (BatchN	(None, None, None, 1 576	conv2d_108[0][0]
batch_normalization_111 (BatchN	(None, None, None, 1 576	conv2d_111[0][0]
activation_108 (Activation) 08[0][0]	(None, None, None, 1 0	batch_normalization_108[0][0]
activation_111 (Activation) 11[0][0]	(None, None, None, 1 0	batch_normalization_111[0][0]
block17_9_mixed (Concatenate)	(None, None, None, 3 0	activation_108[0][0] activation_111[0][0]
block17_9_conv (Conv2D)	(None, None, None, 1 418880	block17_9_mixed[0][0]
block17_9 (Lambda)	(None, None, None, 1 0	block17_8_ac[0][0] block17_9_conv[0][0]
block17_9_ac (Activation)	(None, None, None, 1 0	block17_9[0][0]
conv2d_113 (Conv2D)	(None, None, None, 1 139264	block17_9_ac[0][0]
batch_normalization_113 (BatchN	(None, None, None, 1 384	conv2d_113[0][0]
activation_113 (Activation) 13[0][0]	(None, None, None, 1 0	batch_normalization_113[0][0]
conv2d_114 (Conv2D)	(None, None, None, 1 143360	activation_113[0][0]
batch_normalization_114 (BatchN	(None, None, None, 1 480	conv2d_114[0][0]
activation_114 (Activation) 14[0][0]	(None, None, None, 1 0	batch_normalization_114[0][0]
conv2d_112 (Conv2D)	(None, None, None, 1 208896	block17_9_ac[0][0]
conv2d_115 (Conv2D)	(None, None, None, 1 215040	activation_114[0][0]
batch_normalization_112 (BatchN	(None, None, None, 1 576	conv2d_112[0][0]
batch_normalization_115 (BatchN	(None, None, None, 1 576	conv2d_115[0][0]
activation_112 (Activation) 12[0][0]	(None, None, None, 1 0	batch_normalization_112[0][0]
activation_115 (Activation) 15[0][0]	(None, None, None, 1 0	batch_normalization_115[0][0]
block17_10_mixed (Concatenate)	(None, None, None, 3 0	activation_112[0][0] activation_115[0][0]
block17_10_conv (Conv2D)	(None, None, None, 1 418880	block17_10_mixed[0][0]
block17_10 (Lambda)	(None, None, None, 1 0	block17_9_ac[0][0] block17_10_conv[0][0]
block17_10_ac (Activation)	(None, None, None, 1 0	block17_10[0][0]

[illegible]

block8_3_mixed (Concatenate)	(None, None, None, 4 0	activation_171[0][0]
block8_3_conv (Conv2D)	(None, None, None, 2 933920	activation_174[0][0]
block8_3 (Lambda)	(None, None, None, 2 0	block8_2_ac[0][0]
block8_3_ac (Activation)	(None, None, None, 2 0	block8_3_conv[0][0]
conv2d_176 (Conv2D)	(None, None, None, 1 399360	block8_3_ac[0][0]
batch_normalization_176 (BatchN	(None, None, None, 1 576	conv2d_176[0][0]
activation_176 (Activation)	(None, None, None, 1 0	batch_normalization_1
conv2d_177 (Conv2D)	(None, None, None, 2 129024	activation_176[0][0]
batch_normalization_177 (BatchN	(None, None, None, 2 672	conv2d_177[0][0]
activation_177 (Activation)	(None, None, None, 2 0	batch_normalization_1
conv2d_175 (Conv2D)	(None, None, None, 1 399360	block8_3_ac[0][0]
conv2d_178 (Conv2D)	(None, None, None, 2 172032	activation_177[0][0]
batch_normalization_175 (BatchN	(None, None, None, 1 576	conv2d_175[0][0]
batch_normalization_178 (BatchN	(None, None, None, 2 768	conv2d_178[0][0]
activation_175 (Activation)	(None, None, None, 1 0	batch_normalization_1
activation_178 (Activation)	(None, None, None, 2 0	batch_normalization_1
block8_4_mixed (Concatenate)	(None, None, None, 4 0	activation_175[0][0]
block8_4_conv (Conv2D)	(None, None, None, 2 933920	activation_178[0][0]
block8_4 (Lambda)	(None, None, None, 2 0	block8_3_ac[0][0]
block8_4_ac (Activation)	(None, None, None, 2 0	block8_4_conv[0][0]
conv2d_180 (Conv2D)	(None, None, None, 1 399360	block8_4_ac[0][0]
batch_normalization_180 (BatchN	(None, None, None, 1 576	conv2d_180[0][0]
activation_180 (Activation)	(None, None, None, 1 0	batch_normalization_1
conv2d_181 (Conv2D)	(None, None, None, 2 129024	activation_180[0][0]
batch_normalization_181 (BatchN	(None, None, None, 2 672	conv2d_181[0][0]
activation_181 (Activation)	(None, None, None, 2 0	batch_normalization_1
conv2d_179 (Conv2D)	(None, None, None, 1 399360	block8_4_ac[0][0]
conv2d_182 (Conv2D)	(None, None, None, 2 172032	activation_181[0][0]
batch_normalization_179 (BatchN	(None, None, None, 1 576	conv2d_179[0][0]
batch_normalization_182 (BatchN	(None, None, None, 2 768	conv2d_182[0][0]
activation_179 (Activation)	(None, None, None, 1 0	batch_normalization_1
activation_182 (Activation)	(None, None, None, 2 0	batch_normalization_1
block8_5_mixed (Concatenate)	(None, None, None, 4 0	activation_179[0][0]
block8_5_conv (Conv2D)	(None, None, None, 2 933920	activation_182[0][0]
block8_5 (Lambda)	(None, None, None, 2 0	block8_4_ac[0][0]
block8_5_ac (Activation)	(None, None, None, 2 0	block8_5_conv[0][0]
conv2d_184 (Conv2D)	(None, None, None, 1 399360	block8_5_ac[0][0]
batch_normalization_184 (BatchN	(None, None, None, 1 576	conv2d_184[0][0]
activation_184 (Activation)	(None, None, None, 1 0	batch_normalization_1
conv2d_185 (Conv2D)	(None, None, None, 2 129024	activation_184[0][0]
batch_normalization_185 (BatchN	(None, None, None, 2 672	conv2d_185[0][0]
activation_185 (Activation)	(None, None, None, 2 0	batch_normalization_1
conv2d_183 (Conv2D)	(None, None, None, 1 399360	block8_5_ac[0][0]
conv2d_186 (Conv2D)	(None, None, None, 2 172032	activation_185[0][0]
batch_normalization_183 (BatchN	(None, None, None, 1 576	conv2d_183[0][0]
batch_normalization_186 (BatchN	(None, None, None, 2 768	conv2d_186[0][0]
activation_183 (Activation)	(None, None, None, 1 0	batch_normalization_1
activation_186 (Activation)	(None, None, None, 2 0	batch_normalization_1
block8_6_mixed (Concatenate)	(None, None, None, 4 0	activation_183[0][0]
block8_6_conv (Conv2D)	(None, None, None, 2 933920	activation_186[0][0]
block8_6 (Lambda)	(None, None, None, 2 0	block8_5_ac[0][0]
block8_6_ac (Activation)	(None, None, None, 2 0	block8_6_conv[0][0]
conv2d_188 (Conv2D)	(None, None, None, 1 399360	block8_6_ac[0][0]
batch_normalization_188 (BatchN	(None, None, None, 1 576	conv2d_188[0][0]
activation_188 (Activation)	(None, None, None, 1 0	batch_normalization_1
conv2d_189 (Conv2D)	(None, None, None, 2 129024	activation_188[0][0]
batch_normalization_189 (BatchN	(None, None, None, 2 672	conv2d_189[0][0]
activation_189 (Activation)	(None, None, None, 2 0	batch_normalization_1
conv2d_187 (Conv2D)	(None, None, None, 1 399360	block8_6_ac[0][0]
conv2d_190 (Conv2D)	(None, None, None, 2 172032	activation_189[0][0]
batch_normalization_187 (BatchN	(None, None, None, 1 576	conv2d_187[0][0]
batch_normalization_190 (BatchN	(None, None, None, 2 768	conv2d_190[0][0]
activation_187 (Activation)	(None, None, None, 1 0	batch_normalization_1
activation_190 (Activation)	(None, None, None, 2 0	batch_normalization_1
block8_7_mixed (Concatenate)	(None, None, None, 4 0	activation_187[0][0]
block8_7_conv (Conv2D)	(None, None, None, 2 933920	activation_190[0][0]
block8_7 (Lambda)	(None, None, None, 2 0	block8_6_ac[0][0]
block8_7_ac (Activation)	(None, None, None, 2 0	block8_7_conv[0][0]
conv2d_192 (Conv2D)	(None, None, None, 1 399360	block8_7_ac[0][0]
batch_normalization_192 (BatchN	(None, None, None, 1 576	conv2d_192[0][0]
activation_192 (Activation)	(None, None, None, 1 0	batch_normalization_1
conv2d_193 (Conv2D)	(None, None, None, 2 129024	activation_192[0][0]
batch_normalization_193 (BatchN	(None, None, None, 2 672	conv2d_193[0][0]
activation_193 (Activation)	(None, None, None, 2 0	batch_normalization_1
conv2d_191 (Conv2D)	(None, None, None, 1 399360	block8_7_ac[0][0]
conv2d_194 (Conv2D)	(None, None, None, 2 172032	activation_193[0][0]
batch_normalization_191 (BatchN	(None, None, None, 1 576	conv2d_191[0][0]
batch_normalization_194 (BatchN	(None, None, None, 2 768	conv2d_194[0][0]
activation_191 (Activation)	(None, None, None, 1 0	batch_normalization_1
activation_194 (Activation)	(None, None, None, 2 0	batch_normalization_1
block8_8_mixed (Concatenate)	(None, None, None, 4 0	activation_191[0][0]
block8_8_conv (Conv2D)	(None, None, None, 2 933920	activation_194[0][0]
block8_8 (Lambda)	(None, None, None, 2 0	block8_7_ac[0][0]
block8_8_ac (Activation)	(None, None, None, 2 0	block8_8_conv[0][0]
conv2d_196 (Conv2D)	(None, None, None, 1 399360	block8_8_ac[0][0]
batch_normalization_196 (BatchN	(None, None, None, 1 576	conv2d_196[0][0]
activation_196 (Activation)	(None, None, None, 1 0	batch_normalization_1
conv2d_197 (Conv2D)	(None, None, None, 2 129024	activation_196[0][0]
batch_normalization_197 (BatchN	(None, None, None, 2 672	conv2d_197[0][0]
activation_197 (Activation)	(None, None, None, 2 0	batch_normalization_1
conv2d_195 (Conv2D)	(None, None, None, 1 399360	block8_8_ac[0][0]
conv2d_198 (Conv2D)	(None, None, None, 2 172032	activation_197[0][0]
batch_normalization_195 (BatchN	(None, None, None, 1 576	conv2d_195[0][0]
batch_normalization_198 (BatchN	(None, None, None, 2 768	conv2d_198[0][0]
activation_195 (Activation)	(None, None, None, 1 0	batch_normalization_1
activation_198 (Activation)	(None, None, None, 2 0	batch_normalization_1
block8_9_mixed (Concatenate)	(None, None, None, 4 0	activation_195[0][0]
block8_9_conv (Conv2D)	(None, None, None, 2 933920	activation_198[0][0]
block8_9 (Lambda)	(None, None, None, 2 0	block8_8_ac[0][0]
block8_9_ac (Activation)	(None, None, None, 2 0	block8_9_conv[0][0]
conv2d_200 (Conv2D)	(None, None, None, 1 399360	block8_9_ac[0][0]
batch_normalization_200 (BatchN	(None, None, None, 1 576	conv2d_200[0][0]
activation_200 (Activation)	(None, None, None, 1 0	batch_normalization_2
conv2d_201 (Conv2D)	(None, None, None, 2 129024	activation_200[0][0]
batch_normalization_201 (BatchN	(None, None, None, 2 672	conv2d_201[0][0]
activation_201 (Activation)	(None, None, None, 2 0	batch_normalization_2
conv2d_199 (Conv2D)	(None, None, None, 1 399360	block8_9_ac[0][0]
conv2d_202 (Conv2D)	(None, None, None, 2 172032	activation_201[0][0]
batch_normalization_199 (BatchN	(None, None, None, 1 576	conv2d_199[0][0]
batch_normalization_202 (BatchN	(None, None, None, 2 768	conv2d_202[0][0]
activation_199 (Activation)	(None, None, None, 1 0	batch_normalization_2
activation_202 (Activation)	(None, None, None, 2 0	batch_normalization_2
block8_10_mixed (Concatenate)	(None, None, None, 4 0	activation_199[0][0]
block8_10_conv (Conv2D)	(None, None, None, 2 933920	activation_202[0][0]
block8_10 (Lambda)	(None, None, None, 2 0	block8_9_ac[0][0]
conv_7b (Conv2D)	(None, None, None, 1 3194880	block8_10_conv[0][0]
conv_7b_bn (BatchNormalization)	(None, None, None, 1 4608	conv_7b[0][0]
conv_7b_ac (Activation)	(None, None, None, 1 0	conv_7b_bn[0][0]
global_max_pooling2d (GlobalMax	(None, 1536)	0
dense (Dense)	(None, 128)	196736
dense_1 (Dense)	(None, 64)	8256
dense_2 (Dense)	(None, 32)	2080
dropout (Dropout)	(None, 32)	0
dense_3 (Dense)	(None, 3)	99

=====

Total params:	54,543,907
Trainable params:	54,483,363
Non-trainable params:	60,544

In [6]:

```
#congelando os neurônios já treinados na ImageNet, queremos retrainar somente a última
for l in model.layers:
    if l.name.split('.')[-1] != 'dense':
        l.trainable=False
    else:
        l.trainable=True
```

In [7]:

```
#iniciando objeto que apanhara todas as imagens de treino, processando as imagens com
train_data_gen = tf.keras.preprocessing.image.ImageDataGenerator(preprocessing_functio

#iniciando objeto que apanhara todas as imagens de teste, processando as imagens com
test_data_gen = tf.keras.preprocessing.image.ImageDataGenerator(preprocessing_functio
```

In [8]:

```
#CARREGANDO PRÓPRIO DATASET PARA USO

#definindo gerador de imagens de treino
train_generator = train_data_gen.flow_from_directory('shapes_split/train',
                                                    target_size=(224, 224), # tamanho da
                                                    batch_size=batch,
                                                    class_mode='categorical',
                                                    shuffle=True)

#definindo gerador de imagens de teste
test_generator = test_data_gen.flow_from_directory('shapes_split/test',
                                                    target_size=(224, 224), # tamanho da
                                                    batch_size=batch,
                                                    class_mode='categorical',
                                                    shuffle=True)
```

Found 240 images belonging to 3 classes.
Found 60 images belonging to 3 classes.

In [9]:

```
lr = tf.keras.optimizers.Adam(learning_rate=0.001) #estabelecendo taxa de otimização

model.compile(optimizer=lr, loss='categorical_crossentropy', metrics=['accuracy'])
```

In [10]:

```
#definição dos steps
step_size_train = train_generator.n//train_generator.batch_size
step_size_test = test_generator.n//test_generator.batch_size
```

In [11]:

```
#treinando e testando o modelo
history = model.fit_generator(generator=train_generator,
                             steps_per_epoch=step_size_train,
                             epochs=epochs,
                             validation_data=test_generator,
                             validation_steps=step_size_test)

c:\users\vinicius\appdata\local\programs\python\python39\lib\site-packages\tensorflow
\python\keras\engine\training.py:1940: UserWarning: Model.fit_generator() is deprecate
d and will be removed in a future version. Please use Model.evaluate, which supp
ports generators.
  warnings.warn('Model.fit_generator() is deprecated and '
Preds Created
Epoch 1/10
7/7 [=====] - 49s 5s/step - loss: 2.4135 - accuracy: 0.4056 -
val_loss: 0.4403 - val_accuracy: 0.8125
Epoch 2/10
7/7 [=====] - 32s 5s/step - loss: 0.7256 - accuracy: 0.6998 -
val_loss: 0.2326 - val_accuracy: 1.0000
Epoch 3/10
7/7 [=====] - 34s 5s/step - loss: 0.3562 - accuracy: 0.8580 -
val_loss: 0.0875 - val_accuracy: 1.0000
Epoch 4/10
7/7 [=====] - 32s 5s/step - loss: 0.1808 - accuracy: 0.9199 -
val_loss: 0.0382 - val_accuracy: 1.0000
Epoch 5/10
7/7 [=====] - 34s 5s/step - loss: 0.1336 - accuracy: 0.9550 -
val_loss: 0.0180 - val_accuracy: 1.0000
Epoch 6/10
7/7 [=====] - 31s 4s/step - loss: 0.1211 - accuracy: 0.9491 -
val_loss: 0.0112 - val_accuracy: 1.0000
Epoch 7/10
7/7 [=====] - 32s 5s/step - loss: 0.0822 - accuracy: 0.9728 -
val_loss: 0.0157 - val_accuracy: 1.0000
Epoch 8/10
7/7 [=====] - 30s 4s/step - loss: 0.0946 - accuracy: 0.9711 -
val_loss: 0.0065 - val_accuracy: 1.0000
Epoch 9/10
7/7 [=====] - 29s 4s/step - loss: 0.0835 - accuracy: 0.9803 -
val_loss: 0.0042 - val_accuracy: 1.0000
Epoch 10/10
7/7 [=====] - 29s 5s/step - loss: 0.0532 - accuracy: 0.9900 -
val_loss: 0.0110 - val_accuracy: 1.0000
```

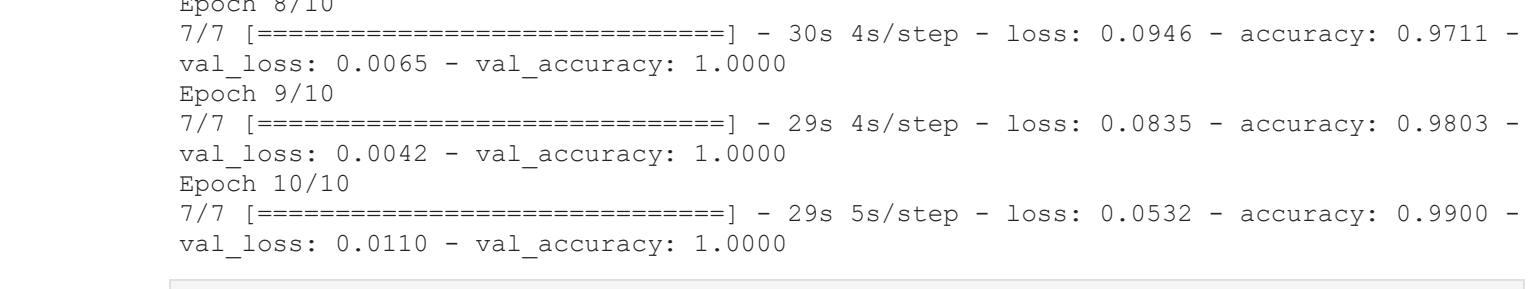
In [12]:

```
#Avaliando o modelo
loss_train, train_acc = model.evaluate_generator(train_generator, steps=step_size_train)
loss_test, test_acc = model.evaluate_generator(test_generator, steps=step_size_test)
print('Train: %.3f, Test: %.3f' % (train_acc, test_acc))

c:\users\vinicius\appdata\local\programs\python\python39\lib\site-packages\tensorflow
\python\keras\engine\training.py:1973: UserWarning: Model.evaluate_generator() is depre
cated and will be removed in a future version. Please use Model.evaluate, which suppo
rts generators.
  warnings.warn('Model.evaluate_generator() is deprecated and '
Preds Created
Train: 1.000, Test: 1.000
```

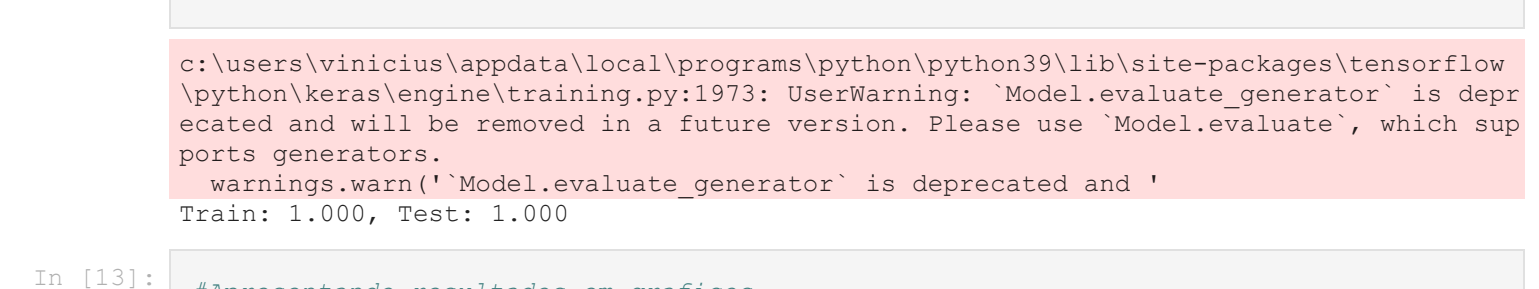
In [13]:

```
#Apresentando resultados em graficos
plt.title('Loss')
plt.plot(history.history['loss'], label='train')
plt.plot(history.history['val_loss'], label='test')
plt.legend()
plt.show()
```



In [14]:

```
# Criando graficos para visualização dos resultados
plt.title('Accuracy')
plt.plot(history.history['accuracy'], label='train')
plt.plot(history.history['val_accuracy'], label='test')
plt.legend()
plt.show()
```



In [15]:

```
print('Criando classificações..')
labels = os.listdir('shapes_split/test')
print('Rotulos', labels)

#criando estruturas para métricas de avaliação, processo um pouco mais demorado
Y_pred = model.predict_generator(test_generator)
print('Preds Created')
y_pred = np.argmax(Y_pred, axis=1)
print('Preds ID created')
```

Criando classificações..

```
Rotulos ['circles', 'squares', 'triangles']
c:\users\vinicius\appdata\local\programs\python\python39\lib\site-packages\tensorflow
\python\keras\engine\training.py:1940: UserWarning: Model.predict_generator() is depre
cated and will be removed in a future version. Please use Model.predict, which suppo
rts generators.
  warnings.warn('Model.predict_generator() is deprecated and '
Preds Created
Preds ID created
```

In [16]:

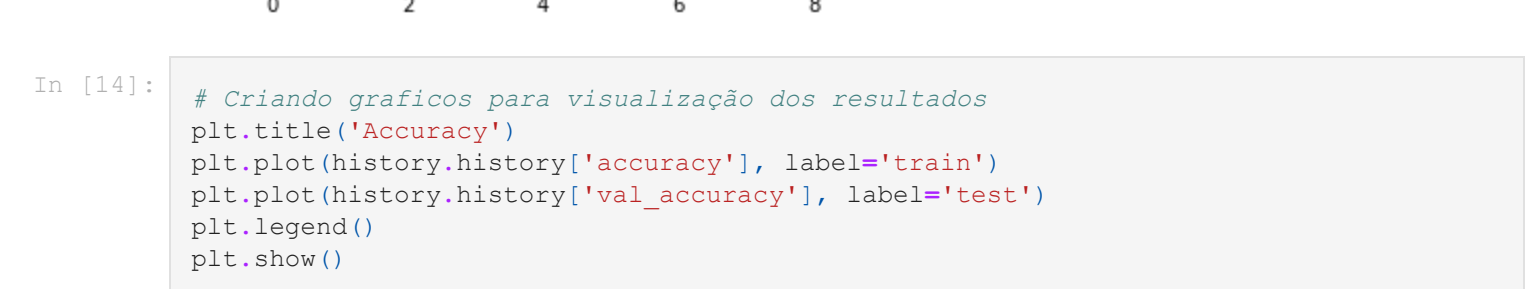
```
classification = classification_report(test_generator.classes, y_pred, target_names=labels)
print('-----CLASSIFICATION-----')
print(classification)
matrix = confusion_matrix(test_generator.classes, y_pred)
df_cm = pd.DataFrame(matrix, index = [i for i in range(3)],
                      columns = [i for i in range(3)])
plt.figure(figsize = (10,7))
print('-----MATRIX-----')
sns.heatmap(df_cm, annot=True, linewidths=2.5)
```

-----CLASSIFICATION-----

	precision	recall	f1-score	support
circles	0.40	0.40	0.40	20
squares	0.30	0.30	0.30	20
triangles	0.45	0.45	0.45	20
accuracy	0.38	0.38	0.38	60
macro avg	0.38	0.38	0.38	60
weighted avg	0.38	0.38	0.38	60

-----MATRIX-----

```
<AxesSubplot>
```



In []: