

project-source-code

September 4, 2020

1 Project Description

- This project will train a Deep Convolutional Neural Network (DCNN) to correctly classify different types of food.
- Since the training a power DCNN model requires huge computational power and time, we benefit from transfer learning.
- Transfer learning allows to obtain already trained weight and bias parameters using a larger dataset. The only thing is to adjust the last layers of the trained model based on the task of our project.
- In this project, we will use a dataset containing 16,643 color images of food, which have size of 96x96.
- There are 11 classes in the dataset: Bread, Diary Product, Dessert, Egg, Fried food, Meat, Noodles-Pasta, Rice, Seafood, Soup, Vegetable-Fruit.

```
[1]: import numpy as np
import pandas as pd
import tensorflow as tf
import matplotlib.pyplot as plt
import seaborn as sns
import os, PIL, random
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.applications.resnet50 import ResNet50
from tensorflow.keras.applications.inception_resnet_v2 import InceptionResNetV2
from tensorflow.keras.layers import *
from tensorflow.keras.models import Model, load_model
from tensorflow.keras.utils import plot_model
from IPython.display import display
from tensorflow.keras.callbacks import ReduceLROnPlateau, EarlyStopping,
    ModelCheckpoint, LearningRateScheduler
from tensorflow.keras.optimizers import SGD, Adam
```

2 Data import, exploration, and visualization

```
[2]: # list the categories in the dataset  
os.listdir("./food11/training/")
```

```
[2]: ['Bread',  
      'Dairy product',  
      'Dessert',  
      'Egg',  
      'Fried food',  
      'Meat',  
      'Noodles-Pasta',  
      'Rice',  
      'Seafood',  
      'Soup',  
      'Vegetable-Fruit']
```

As it was mentioned earlier, there are 11 classes in the dataset. So, we import the data and place it into train, validation, and test datasets.

```
[3]: train, validation, test = [], [], []  
  
for image in os.listdir("./food11/training/"):  
    train.extend(os.listdir(os.path.join("./food11/training", image)))  
    validation.extend(os.listdir(os.path.join("./food11/validation", image)))  
    test.extend(os.listdir(os.path.join("./food11/evaluation", image)))  
  
print(f"There are {len(train)} images for training\nThere are {len(validation)} images for validation\nThere are {len(test)} images for testing")
```

There are 9866 images for training
There are 3430 images for validation
There are 3347 images for testing

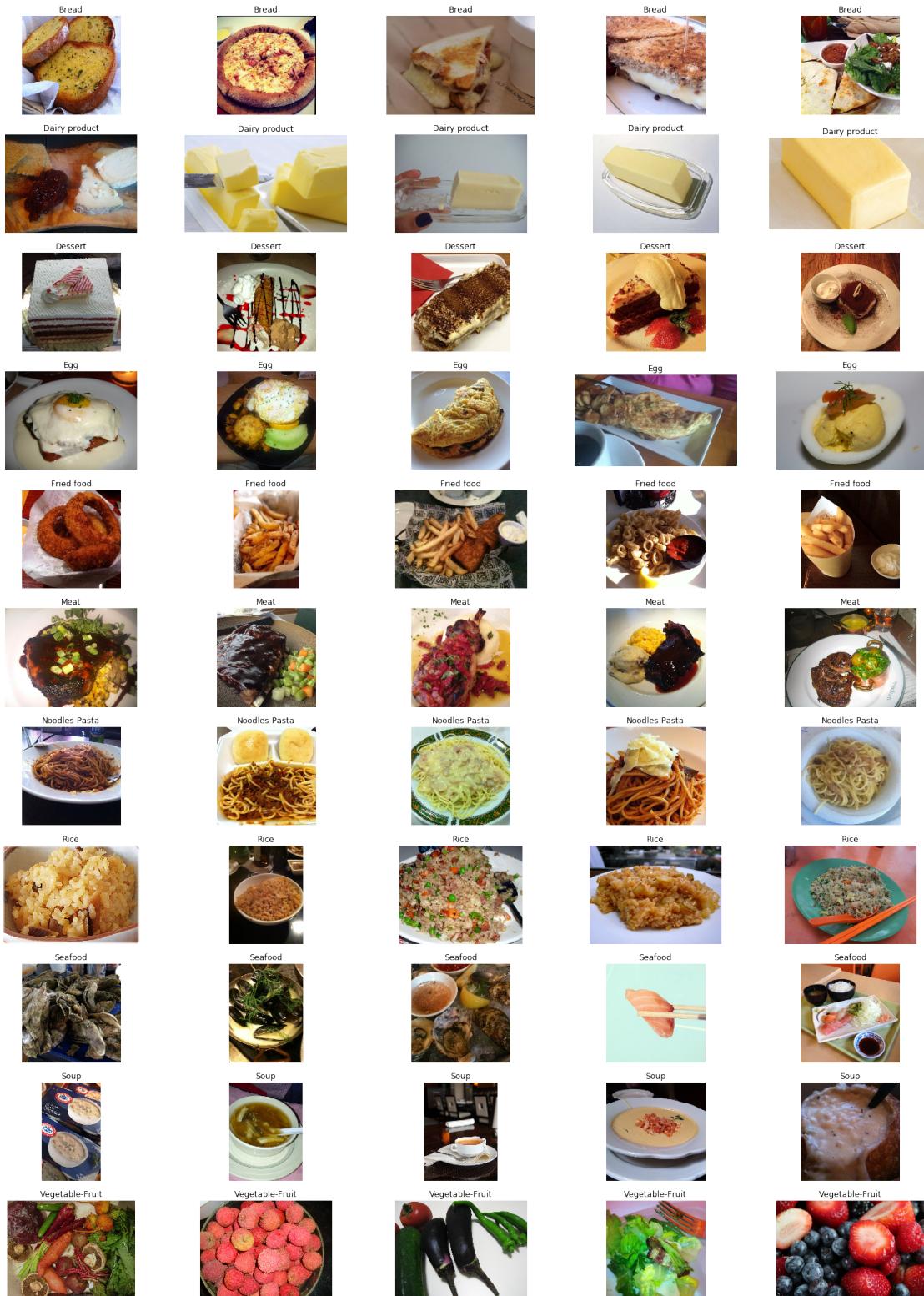
We have more than 16k food images available for this dataset. We may be interested in visualizing and observing these images.

```
[4]: meat_images = os.listdir(os.path.join("./food11/training", "Meat"))  
print(f"There are {len(meat_images)} meat images for training.")
```

There are 1325 meat images for training.

```
[5]: n_rows, n_cols = 11, 5  
  
fig, axes = plt.subplots(n_rows, n_cols, figsize=(25, 35))  
row_count = 0  
  
for category in os.listdir("./food11/training"):  
    category_name = os.listdir(os.path.join("./food11/training", category))
```

```
for column in range(n_cols):
    img = os.path.join("./food11/training", category, category_name[column])
    axes[row_count][column].imshow(PIL.Image.open(img))
    axes[row_count][column].title.set_text(category)
    axes[row_count][column].axis("off")
row_count += 1
```



We also might be interested in whether the given dataset is balanced or not.

```
[6]: class_distributions, class_names = [], []

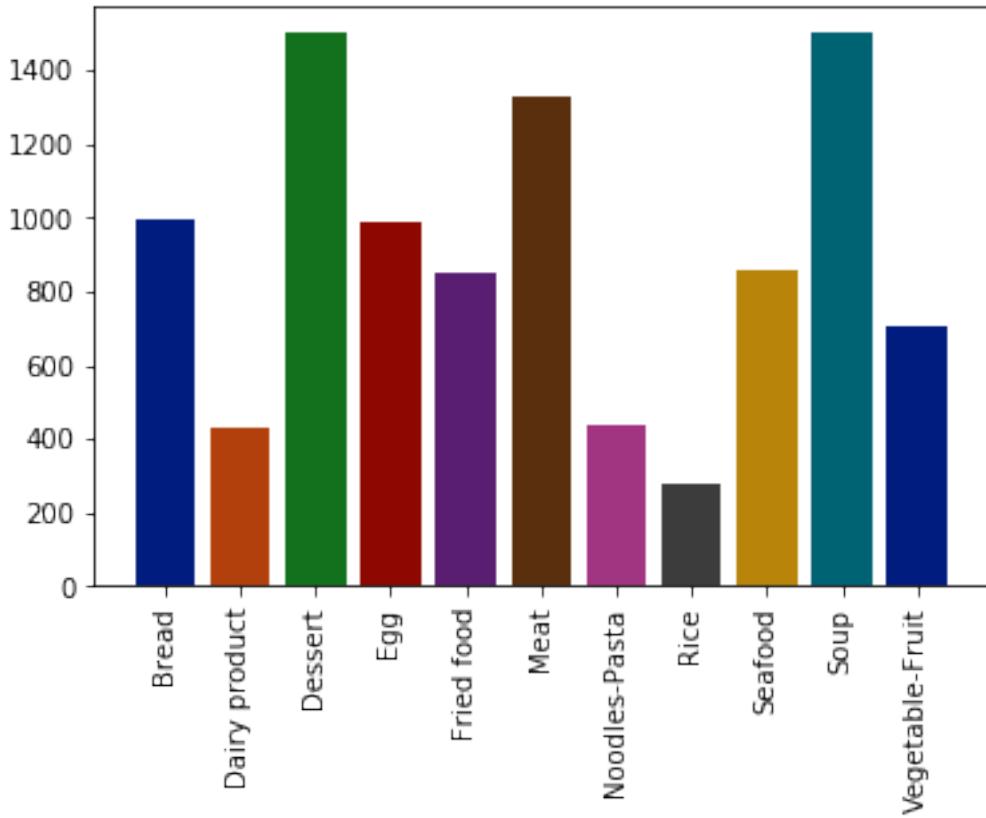
for category in os.listdir("food11/training/"):
    class_names.append(category)
    category_images = os.listdir(os.path.join("food11/training", category))
    class_distributions.append(len(category_images))

for class_name, num_images in zip(class_names, class_distributions):
    print(f"There are {num_images} images in the category of {class_name}")
```

There are 994 images in the category of Bread
There are 429 images in the category of Dairy product
There are 1500 images in the category of Dessert
There are 986 images in the category of Egg
There are 848 images in the category of Fried food
There are 1325 images in the category of Meat
There are 440 images in the category of Noodles-Pasta
There are 280 images in the category of Rice
There are 855 images in the category of Seafood
There are 1500 images in the category of Soup
There are 709 images in the category of Vegetable-Fruit

```
[7]: plt.bar(class_names, class_distributions, color=sns.color_palette("dark", len(class_names)))
plt.xticks(rotation=90)
```

```
[7]: ([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10], <a list of 11 Text xticklabel objects>)
```



```
[8]: class_distributions_val, class_names_val = [], []

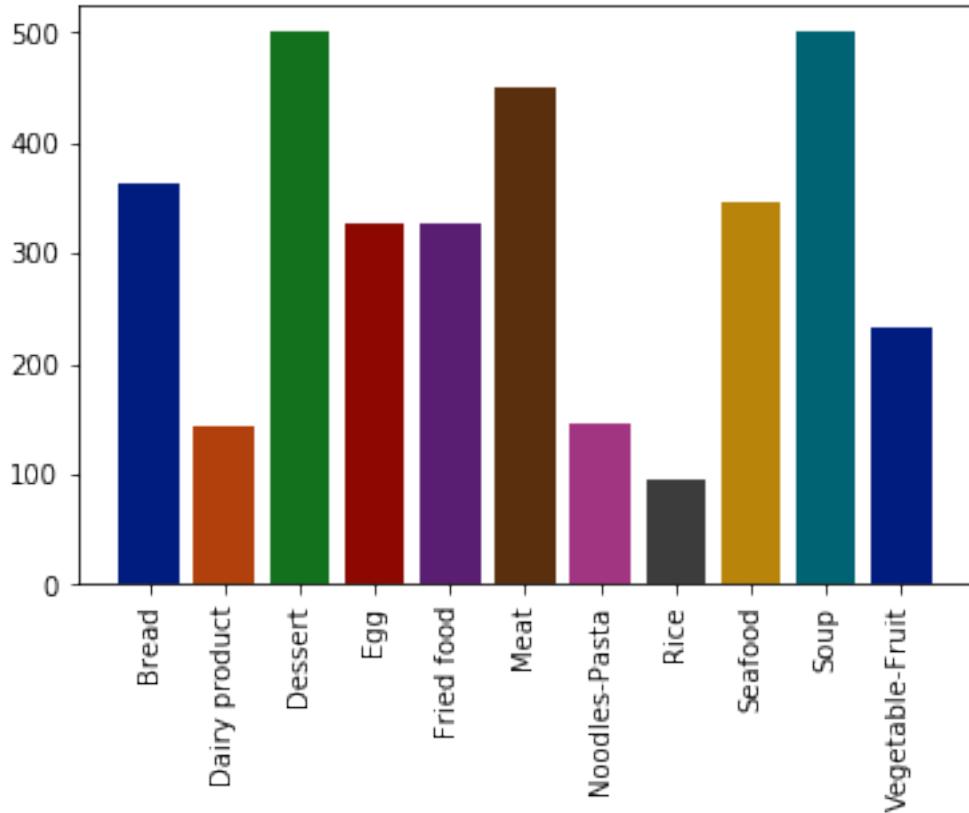
for category in os.listdir("food11/validation"):
    class_names_val.append(category)
    category_images = os.listdir(os.path.join("food11/validation", category))
    class_distributions_val.append(len(category_images))

for class_name, num_images in zip(class_names_val, class_distributions_val):
    print(f"There are {num_images} images in the category of {class_name}")
```

There are 362 images in the category of Bread
 There are 144 images in the category of Dairy product
 There are 500 images in the category of Dessert
 There are 327 images in the category of Egg
 There are 326 images in the category of Fried food
 There are 449 images in the category of Meat
 There are 147 images in the category of Noodles-Pasta
 There are 96 images in the category of Rice
 There are 347 images in the category of Seafood
 There are 500 images in the category of Soup
 There are 232 images in the category of Vegetable-Fruit

```
[9]: plt.bar(class_names_val, class_distributions_val, color=sns.  
          color_palette('dark', len(class_names_val)))  
plt.xticks(rotation=90)
```

```
[9]: ([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10], <a list of 11 Text xticklabel objects>)
```



As it can be seen from the bar plots, the distribution of the images in each category of the training and validation data is not the same. For example, Vegetable-Fruit class has the largest proportion in validation data, while in the training data it has quite moderate number of images in contrast to the other classes.

```
[10]: class_names_test, class_distributions_test = [], []  
  
for category in os.listdir("food11/evaluation"):  
    class_names_test.append(category)  
    category_images = os.listdir(os.path.join("food11/evaluation", category))  
    class_distributions_test.append(len(category_images))  
  
for name, distribution in zip(class_names_test, class_distributions_test):  
    print(f"There are {distribution} images in the category of {name}")
```

There are 368 images in the category of Bread

There are 148 images in the category of Dairy product

```
There are 500 images in the category of Dessert
There are 335 images in the category of Egg
There are 287 images in the category of Fried food
There are 432 images in the category of Meat
There are 147 images in the category of Noodles-Pasta
There are 96 images in the category of Rice
There are 303 images in the category of Seafood
There are 500 images in the category of Soup
There are 231 images in the category of Vegetable-Fruit
```

3 Data preprocessing

We will use data augmentation to create more training images, which are augmented in several ways. This will help a model to observe more images of food and assist to increase the generalizability of the model. Note that data augmentation is applied only for training data. However, in order to keep the distribution of the trained and evaluating data the same, one must apply rescaling to validation and test data as well.

```
[11]: train_datagen = ImageDataGenerator(rescale=1./255, zoom_range=0.2,
                                         horizontal_flip=True,
                                         rotation_range=0.2, width_shift_range=0.2,
                                         height_shift_range=0.2)
train_gen = train_datagen.flow_from_directory("food11/training",
                                              target_size=(256, 256),
                                              batch_size=64,
                                              class_mode='categorical')
```

Found 9866 images belonging to 11 classes.

```
[12]: valid_datagen = ImageDataGenerator(rescale=1./255)
valid_gen = valid_datagen.flow_from_directory("food11/validation",
                                              target_size=(256,256),
                                              batch_size=64,
                                              class_mode='categorical')
```

Found 3430 images belonging to 11 classes.

```
[13]: test_datagen = ImageDataGenerator(rescale=1./255)
test_gen = test_datagen.flow_from_directory("food11/evaluation",
                                              target_size=(256,256),
                                              batch_size=64,
                                              class_mode='categorical')
```

Found 3347 images belonging to 11 classes.

4 Model formulation

In this project, we benefit from transfer learning, meaning that we will not formulate a DCNN model from scratch. Instead, we will fine-tune existing DCNN model that already achieved the state-of-the-art performance using significantly larger dataset.

```
[14]: # We use the parameters of the InceptionResNet trained on ImageNet;
# include_top=False means that we do not want to take the last output layer of the model
model = InceptionResNetV2(weights='imagenet', include_top=False,
                           input_tensor=Input(shape=(256,256,3)))

[15]: model.summary()
```

Model: "inception_resnet_v2"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, 256, 256, 3) 0]		
conv2d (Conv2D)	(None, 127, 127, 32) 864		input_1[0] [0]
batch_normalization (BatchNorma	(None, 127, 127, 32) 96		conv2d[0] [0]
activation (Activation)	(None, 127, 127, 32) 0		
batch_normalization[0] [0]			
conv2d_1 (Conv2D)	(None, 125, 125, 32) 9216		
activation[0] [0]			
batch_normalization_1 (BatchNor	(None, 125, 125, 32) 96		conv2d_1[0] [0]
activation_1 (Activation)	(None, 125, 125, 32) 0		
batch_normalization_1[0] [0]			
conv2d_2 (Conv2D)	(None, 125, 125, 64) 18432		
activation_1[0] [0]			
batch_normalization_2 (BatchNor	(None, 125, 125, 64) 192		conv2d_2[0] [0]

```
-----  
activation_2 (Activation)      (None, 125, 125, 64) 0  
batch_normalization_2[0] [0]  
  
-----  
max_pooling2d (MaxPooling2D)   (None, 62, 62, 64) 0  
activation_2[0] [0]  
  
-----  
conv2d_3 (Conv2D)             (None, 62, 62, 80) 5120  
max_pooling2d[0] [0]  
  
-----  
batch_normalization_3 (BatchNor (None, 62, 62, 80) 240           conv2d_3[0] [0]  
  
-----  
activation_3 (Activation)      (None, 62, 62, 80) 0  
batch_normalization_3[0] [0]  
  
-----  
conv2d_4 (Conv2D)             (None, 60, 60, 192) 138240  
activation_3[0] [0]  
  
-----  
batch_normalization_4 (BatchNor (None, 60, 60, 192) 576           conv2d_4[0] [0]  
  
-----  
activation_4 (Activation)      (None, 60, 60, 192) 0  
batch_normalization_4[0] [0]  
  
-----  
max_pooling2d_1 (MaxPooling2D) (None, 29, 29, 192) 0  
activation_4[0] [0]  
  
-----  
conv2d_8 (Conv2D)             (None, 29, 29, 64) 12288  
max_pooling2d_1[0] [0]  
  
-----  
batch_normalization_8 (BatchNor (None, 29, 29, 64) 192           conv2d_8[0] [0]  
  
-----  
activation_8 (Activation)      (None, 29, 29, 64) 0  
batch_normalization_8[0] [0]  
  
-----  
conv2d_6 (Conv2D)             (None, 29, 29, 48) 9216
```

```
max_pooling2d_1[0] [0]
-----
conv2d_9 (Conv2D)           (None, 29, 29, 96)  55296
activation_8[0] [0]
-----
batch_normalization_6 (BatchNor (None, 29, 29, 48) 144      conv2d_6[0] [0]
-----
batch_normalization_9 (BatchNor (None, 29, 29, 96) 288      conv2d_9[0] [0]
-----
activation_6 (Activation)   (None, 29, 29, 48)  0
batch_normalization_6[0] [0]
-----
activation_9 (Activation)   (None, 29, 29, 96)  0
batch_normalization_9[0] [0]
-----
average_pooling2d (AveragePooli (None, 29, 29, 192) 0
max_pooling2d_1[0] [0]
-----
conv2d_5 (Conv2D)           (None, 29, 29, 96)  18432
max_pooling2d_1[0] [0]
-----
conv2d_7 (Conv2D)           (None, 29, 29, 64)  76800
activation_6[0] [0]
-----
conv2d_10 (Conv2D)          (None, 29, 29, 96)  82944
activation_9[0] [0]
-----
conv2d_11 (Conv2D)          (None, 29, 29, 64)  12288
average_pooling2d[0] [0]
-----
batch_normalization_5 (BatchNor (None, 29, 29, 96) 288      conv2d_5[0] [0]
-----
batch_normalization_7 (BatchNor (None, 29, 29, 64) 192      conv2d_7[0] [0]
-----
batch_normalization_10 (BatchNo (None, 29, 29, 96) 288      conv2d_10[0] [0]
```

```
-----  
batch_normalization_11 (BatchNo (None, 29, 29, 64) 192 conv2d_11[0] [0]  
-----  
activation_5 (Activation) (None, 29, 29, 96) 0  
batch_normalization_5[0] [0]  
-----  
activation_7 (Activation) (None, 29, 29, 64) 0  
batch_normalization_7[0] [0]  
-----  
activation_10 (Activation) (None, 29, 29, 96) 0  
batch_normalization_10[0] [0]  
-----  
activation_11 (Activation) (None, 29, 29, 64) 0  
batch_normalization_11[0] [0]  
-----  
mixed_5b (Concatenate) (None, 29, 29, 320) 0  
activation_5[0] [0]  
activation_7[0] [0]  
activation_10[0] [0]  
activation_11[0] [0]  
-----  
conv2d_15 (Conv2D) (None, 29, 29, 32) 10240 mixed_5b[0] [0]  
-----  
batch_normalization_15 (BatchNo (None, 29, 29, 32) 96 conv2d_15[0] [0]  
-----  
activation_15 (Activation) (None, 29, 29, 32) 0  
batch_normalization_15[0] [0]  
-----  
conv2d_13 (Conv2D) (None, 29, 29, 32) 10240 mixed_5b[0] [0]  
-----  
conv2d_16 (Conv2D) (None, 29, 29, 48) 13824  
activation_15[0] [0]  
-----  
batch_normalization_13 (BatchNo (None, 29, 29, 32) 96 conv2d_13[0] [0]  
-----
```

```
batch_normalization_16 (BatchNo (None, 29, 29, 48) 144           conv2d_16[0] [0]
-----
activation_13 (Activation)      (None, 29, 29, 32) 0
batch_normalization_13[0] [0]
-----
activation_16 (Activation)      (None, 29, 29, 48) 0
batch_normalization_16[0] [0]
-----
conv2d_12 (Conv2D)             (None, 29, 29, 32) 10240        mixed_5b[0] [0]
-----
conv2d_14 (Conv2D)             (None, 29, 29, 32) 9216
activation_13[0] [0]
-----
conv2d_17 (Conv2D)             (None, 29, 29, 64) 27648
activation_16[0] [0]
-----
batch_normalization_12 (BatchNo (None, 29, 29, 32) 96           conv2d_12[0] [0]
-----
batch_normalization_14 (BatchNo (None, 29, 29, 32) 96           conv2d_14[0] [0]
-----
batch_normalization_17 (BatchNo (None, 29, 29, 64) 192          conv2d_17[0] [0]
-----
activation_12 (Activation)     (None, 29, 29, 32) 0
batch_normalization_12[0] [0]
-----
activation_14 (Activation)     (None, 29, 29, 32) 0
batch_normalization_14[0] [0]
-----
activation_17 (Activation)     (None, 29, 29, 64) 0
batch_normalization_17[0] [0]
-----
block35_1_mixed (Concatenate) (None, 29, 29, 128) 0
activation_12[0] [0]
activation_14[0] [0]
activation_17[0] [0]
```

```
--  
block35_1_conv (Conv2D)           (None, 29, 29, 320)  41280  
block35_1_mixed[0] [0]  
  
--  
block35_1 (Lambda)              (None, 29, 29, 320)  0          mixed_5b[0] [0]  
block35_1_conv[0] [0]  
  
--  
block35_1_ac (Activation)       (None, 29, 29, 320)  0          block35_1[0] [0]  
  
--  
conv2d_21 (Conv2D)             (None, 29, 29, 32)   10240  
block35_1_ac[0] [0]  
  
--  
batch_normalization_21 (BatchNo (None, 29, 29, 32)  96          conv2d_21[0] [0]  
  
--  
activation_21 (Activation)      (None, 29, 29, 32)   0  
batch_normalization_21[0] [0]  
  
--  
conv2d_19 (Conv2D)             (None, 29, 29, 32)   10240  
block35_1_ac[0] [0]  
  
--  
conv2d_22 (Conv2D)             (None, 29, 29, 48)   13824  
activation_21[0] [0]  
  
--  
batch_normalization_19 (BatchNo (None, 29, 29, 32)  96          conv2d_19[0] [0]  
  
--  
batch_normalization_22 (BatchNo (None, 29, 29, 48)  144          conv2d_22[0] [0]  
  
--  
activation_19 (Activation)      (None, 29, 29, 32)   0  
batch_normalization_19[0] [0]  
  
--  
activation_22 (Activation)      (None, 29, 29, 48)   0  
batch_normalization_22[0] [0]  
  
--  
conv2d_18 (Conv2D)             (None, 29, 29, 32)   10240  
block35_1_ac[0] [0]
```

```
-----  
conv2d_20 (Conv2D)           (None, 29, 29, 32)  9216  
activation_19[0] [0]  
-----  
conv2d_23 (Conv2D)           (None, 29, 29, 64)  27648  
activation_22[0] [0]  
-----  
batch_normalization_18 (BatchNo (None, 29, 29, 32)  96          conv2d_18[0] [0]  
-----  
batch_normalization_20 (BatchNo (None, 29, 29, 32)  96          conv2d_20[0] [0]  
-----  
batch_normalization_23 (BatchNo (None, 29, 29, 64)  192         conv2d_23[0] [0]  
-----  
activation_18 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_18[0] [0]  
-----  
activation_20 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_20[0] [0]  
-----  
activation_23 (Activation)    (None, 29, 29, 64)  0  
batch_normalization_23[0] [0]  
-----  
block35_2_mixed (Concatenate) (None, 29, 29, 128)  0  
activation_18[0] [0]  
activation_20[0] [0]  
activation_23[0] [0]  
-----  
block35_2_conv (Conv2D)       (None, 29, 29, 320) 41280  
block35_2_mixed[0] [0]  
-----  
block35_2 (Lambda)           (None, 29, 29, 320)  0  
block35_1_ac[0] [0]  
block35_2_conv[0] [0]  
-----  
block35_2_ac (Activation)    (None, 29, 29, 320)  0          block35_2[0] [0]  
-----
```

conv2d_27 (Conv2D)	(None, 29, 29, 32)	10240
block35_2_ac[0] [0]		

batch_normalization_27 (BatchNo	(None, 29, 29, 32)	96
batch_normalization_27[0] [0]		conv2d_27[0] [0]

activation_27 (Activation)	(None, 29, 29, 32)	0
batch_normalization_27[0] [0]		

conv2d_25 (Conv2D)	(None, 29, 29, 32)	10240
block35_2_ac[0] [0]		

conv2d_28 (Conv2D)	(None, 29, 29, 48)	13824
activation_27[0] [0]		

batch_normalization_25 (BatchNo	(None, 29, 29, 32)	96
batch_normalization_25[0] [0]		conv2d_25[0] [0]

batch_normalization_28 (BatchNo	(None, 29, 29, 48)	144
batch_normalization_28[0] [0]		conv2d_28[0] [0]

activation_25 (Activation)	(None, 29, 29, 32)	0
batch_normalization_25[0] [0]		

activation_28 (Activation)	(None, 29, 29, 48)	0
batch_normalization_28[0] [0]		

conv2d_24 (Conv2D)	(None, 29, 29, 32)	10240
block35_2_ac[0] [0]		

conv2d_26 (Conv2D)	(None, 29, 29, 32)	9216
activation_25[0] [0]		

conv2d_29 (Conv2D)	(None, 29, 29, 64)	27648
activation_28[0] [0]		

batch_normalization_24 (BatchNo	(None, 29, 29, 32)	96
batch_normalization_24[0] [0]		conv2d_24[0] [0]

```
batch_normalization_26 (BatchNo (None, 29, 29, 32) 96           conv2d_26[0] [0]
-----
batch_normalization_29 (BatchNo (None, 29, 29, 64) 192          conv2d_29[0] [0]
-----
activation_24 (Activation)      (None, 29, 29, 32) 0
batch_normalization_24[0] [0]
-----
activation_26 (Activation)      (None, 29, 29, 32) 0
batch_normalization_26[0] [0]
-----
activation_29 (Activation)      (None, 29, 29, 64) 0
batch_normalization_29[0] [0]
-----
block35_3_mixed (Concatenate)  (None, 29, 29, 128) 0
activation_24[0] [0]
activation_26[0] [0]
activation_29[0] [0]
-----
block35_3_conv (Conv2D)        (None, 29, 29, 320) 41280
block35_3_mixed[0] [0]
-----
block35_3 (Lambda)            (None, 29, 29, 320) 0
block35_2_ac[0] [0]
block35_3_conv[0] [0]
-----
block35_3_ac (Activation)     (None, 29, 29, 320) 0           block35_3[0] [0]
-----
conv2d_33 (Conv2D)            (None, 29, 29, 32) 10240
block35_3_ac[0] [0]
-----
batch_normalization_33 (BatchNo (None, 29, 29, 32) 96           conv2d_33[0] [0]
-----
activation_33 (Activation)     (None, 29, 29, 32) 0
batch_normalization_33[0] [0]
-----
conv2d_31 (Conv2D)            (None, 29, 29, 32) 10240
```

```
block35_3_ac[0] [0]
-----
conv2d_34 (Conv2D)           (None, 29, 29, 48)  13824
activation_33[0] [0]
-----
batch_normalization_31 (BatchNo (None, 29, 29, 32)  96          conv2d_31[0] [0]
-----
batch_normalization_34 (BatchNo (None, 29, 29, 48)  144          conv2d_34[0] [0]
-----
activation_31 (Activation)   (None, 29, 29, 32)  0
batch_normalization_31[0] [0]
-----
activation_34 (Activation)   (None, 29, 29, 48)  0
batch_normalization_34[0] [0]
-----
conv2d_30 (Conv2D)           (None, 29, 29, 32)  10240
block35_3_ac[0] [0]
-----
conv2d_32 (Conv2D)           (None, 29, 29, 32)  9216
activation_31[0] [0]
-----
conv2d_35 (Conv2D)           (None, 29, 29, 64)  27648
activation_34[0] [0]
-----
batch_normalization_30 (BatchNo (None, 29, 29, 32)  96          conv2d_30[0] [0]
-----
batch_normalization_32 (BatchNo (None, 29, 29, 32)  96          conv2d_32[0] [0]
-----
batch_normalization_35 (BatchNo (None, 29, 29, 64)  192          conv2d_35[0] [0]
-----
activation_30 (Activation)   (None, 29, 29, 32)  0
batch_normalization_30[0] [0]
-----
activation_32 (Activation)   (None, 29, 29, 32)  0
batch_normalization_32[0] [0]
```

```
-----  
activation_35 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_35[0] [0]  
  
-----  
block35_4_mixed (Concatenate)  (None, 29, 29, 128)  0  
activation_30[0] [0]  
activation_32[0] [0]  
activation_35[0] [0]  
  
-----  
block35_4_conv (Conv2D)        (None, 29, 29, 320)  41280  
block35_4_mixed[0] [0]  
  
-----  
block35_4 (Lambda)            (None, 29, 29, 320)  0  
block35_3_ac[0] [0]  
block35_4_conv[0] [0]  
  
-----  
block35_4_ac (Activation)     (None, 29, 29, 320)  0          block35_4[0] [0]  
  
-----  
conv2d_39 (Conv2D)           (None, 29, 29, 32)   10240  
block35_4_ac[0] [0]  
  
-----  
batch_normalization_39 (BatchNo (None, 29, 29, 32)  96          conv2d_39[0] [0]  
  
-----  
activation_39 (Activation)    (None, 29, 29, 32)   0  
batch_normalization_39[0] [0]  
  
-----  
conv2d_37 (Conv2D)           (None, 29, 29, 32)   10240  
block35_4_ac[0] [0]  
  
-----  
conv2d_40 (Conv2D)           (None, 29, 29, 48)   13824  
activation_39[0] [0]  
  
-----  
batch_normalization_37 (BatchNo (None, 29, 29, 32)  96          conv2d_37[0] [0]  
  
-----  
batch_normalization_40 (BatchNo (None, 29, 29, 48)  144          conv2d_40[0] [0]
```

```
-----  
activation_37 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_37[0] [0]  
-----  
activation_40 (Activation)      (None, 29, 29, 48)  0  
batch_normalization_40[0] [0]  
-----  
conv2d_36 (Conv2D)            (None, 29, 29, 32)  10240  
block35_4_ac[0] [0]  
-----  
conv2d_38 (Conv2D)            (None, 29, 29, 32)  9216  
activation_37[0] [0]  
-----  
conv2d_41 (Conv2D)            (None, 29, 29, 64)  27648  
activation_40[0] [0]  
-----  
batch_normalization_36 (BatchNo (None, 29, 29, 32)  96           conv2d_36[0] [0]  
-----  
batch_normalization_38 (BatchNo (None, 29, 29, 32)  96           conv2d_38[0] [0]  
-----  
batch_normalization_41 (BatchNo (None, 29, 29, 64)  192          conv2d_41[0] [0]  
-----  
activation_36 (Activation)     (None, 29, 29, 32)  0  
batch_normalization_36[0] [0]  
-----  
activation_38 (Activation)     (None, 29, 29, 32)  0  
batch_normalization_38[0] [0]  
-----  
activation_41 (Activation)     (None, 29, 29, 64)  0  
batch_normalization_41[0] [0]  
-----  
block35_5_mixed (Concatenate) (None, 29, 29, 128)  0  
activation_36[0] [0]  
activation_38[0] [0]  
activation_41[0] [0]  
-----
```

```
block35_5_conv (Conv2D)           (None, 29, 29, 320)  41280
block35_5_mixed[0] [0]

-----
block35_5 (Lambda)              (None, 29, 29, 320)  0
block35_4_ac[0] [0]
block35_5_conv[0] [0]

-----
block35_5_ac (Activation)       (None, 29, 29, 320)  0          block35_5[0] [0]

-----
conv2d_45 (Conv2D)              (None, 29, 29, 32)   10240
block35_5_ac[0] [0]

-----
batch_normalization_45 (BatchNo (None, 29, 29, 32)   96          conv2d_45[0] [0]

-----
activation_45 (Activation)      (None, 29, 29, 32)   0
batch_normalization_45[0] [0]

-----
conv2d_43 (Conv2D)              (None, 29, 29, 32)   10240
block35_5_ac[0] [0]

-----
conv2d_46 (Conv2D)              (None, 29, 29, 48)   13824
activation_45[0] [0]

-----
batch_normalization_43 (BatchNo (None, 29, 29, 32)   96          conv2d_43[0] [0]

-----
batch_normalization_46 (BatchNo (None, 29, 29, 48)   144          conv2d_46[0] [0]

-----
activation_43 (Activation)      (None, 29, 29, 32)   0
batch_normalization_43[0] [0]

-----
activation_46 (Activation)      (None, 29, 29, 48)   0
batch_normalization_46[0] [0]

-----
conv2d_42 (Conv2D)              (None, 29, 29, 32)   10240
block35_5_ac[0] [0]
```

```
-----  
conv2d_44 (Conv2D)           (None, 29, 29, 32)  9216  
activation_43[0] [0]  
-----  
conv2d_47 (Conv2D)           (None, 29, 29, 64)  27648  
activation_46[0] [0]  
-----  
batch_normalization_42 (BatchNo (None, 29, 29, 32)  96          conv2d_42[0] [0]  
-----  
batch_normalization_44 (BatchNo (None, 29, 29, 32)  96          conv2d_44[0] [0]  
-----  
batch_normalization_47 (BatchNo (None, 29, 29, 64)  192         conv2d_47[0] [0]  
-----  
activation_42 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_42[0] [0]  
-----  
activation_44 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_44[0] [0]  
-----  
activation_47 (Activation)    (None, 29, 29, 64)  0  
batch_normalization_47[0] [0]  
-----  
block35_6_mixed (Concatenate) (None, 29, 29, 128)  0  
activation_42[0] [0]  
activation_44[0] [0]  
activation_47[0] [0]  
-----  
block35_6_conv (Conv2D)       (None, 29, 29, 320) 41280  
block35_6_mixed[0] [0]  
-----  
block35_6 (Lambda)           (None, 29, 29, 320)  0  
block35_5_ac[0] [0]  
block35_6_conv[0] [0]  
-----  
block35_6_ac (Activation)    (None, 29, 29, 320)  0          block35_6[0] [0]  
-----
```

conv2d_51 (Conv2D)	(None, 29, 29, 32)	10240	
block35_6_ac[0] [0]			
<hr/>			
batch_normalization_51 (BatchNo	(None, 29, 29, 32)	96	conv2d_51[0] [0]
<hr/>			
activation_51 (Activation)	(None, 29, 29, 32)	0	
batch_normalization_51[0] [0]			
<hr/>			
conv2d_49 (Conv2D)	(None, 29, 29, 32)	10240	
block35_6_ac[0] [0]			
<hr/>			
conv2d_52 (Conv2D)	(None, 29, 29, 48)	13824	
activation_51[0] [0]			
<hr/>			
batch_normalization_49 (BatchNo	(None, 29, 29, 32)	96	conv2d_49[0] [0]
<hr/>			
batch_normalization_52 (BatchNo	(None, 29, 29, 48)	144	conv2d_52[0] [0]
<hr/>			
activation_49 (Activation)	(None, 29, 29, 32)	0	
batch_normalization_49[0] [0]			
<hr/>			
activation_52 (Activation)	(None, 29, 29, 48)	0	
batch_normalization_52[0] [0]			
<hr/>			
conv2d_48 (Conv2D)	(None, 29, 29, 32)	10240	
block35_6_ac[0] [0]			
<hr/>			
conv2d_50 (Conv2D)	(None, 29, 29, 32)	9216	
activation_49[0] [0]			
<hr/>			
conv2d_53 (Conv2D)	(None, 29, 29, 64)	27648	
activation_52[0] [0]			
<hr/>			
batch_normalization_48 (BatchNo	(None, 29, 29, 32)	96	conv2d_48[0] [0]
<hr/>			
<hr/>			

```
batch_normalization_50 (BatchNo (None, 29, 29, 32) 96           conv2d_50[0] [0]
-----
batch_normalization_53 (BatchNo (None, 29, 29, 64) 192          conv2d_53[0] [0]
-----
activation_48 (Activation)      (None, 29, 29, 32) 0
batch_normalization_48[0] [0]
-----
activation_50 (Activation)      (None, 29, 29, 32) 0
batch_normalization_50[0] [0]
-----
activation_53 (Activation)      (None, 29, 29, 64) 0
batch_normalization_53[0] [0]
-----
block35_7_mixed (Concatenate)   (None, 29, 29, 128) 0
activation_48[0] [0]
activation_50[0] [0]
activation_53[0] [0]
-----
block35_7_conv (Conv2D)         (None, 29, 29, 320) 41280
block35_7_mixed[0] [0]
-----
block35_7 (Lambda)              (None, 29, 29, 320) 0
block35_6_ac[0] [0]
block35_7_conv[0] [0]
-----
block35_7_ac (Activation)       (None, 29, 29, 320) 0           block35_7[0] [0]
-----
conv2d_57 (Conv2D)              (None, 29, 29, 32) 10240
block35_7_ac[0] [0]
-----
batch_normalization_57 (BatchNo (None, 29, 29, 32) 96           conv2d_57[0] [0]
-----
activation_57 (Activation)       (None, 29, 29, 32) 0
batch_normalization_57[0] [0]
-----
conv2d_55 (Conv2D)              (None, 29, 29, 32) 10240
```

```
block35_7_ac[0] [0]
-----
conv2d_58 (Conv2D)           (None, 29, 29, 48)  13824
activation_57[0] [0]
-----
batch_normalization_55 (BatchNo (None, 29, 29, 32)  96          conv2d_55[0] [0]
-----
batch_normalization_58 (BatchNo (None, 29, 29, 48)  144          conv2d_58[0] [0]
-----
activation_55 (Activation)   (None, 29, 29, 32)  0
batch_normalization_55[0] [0]
-----
activation_58 (Activation)   (None, 29, 29, 48)  0
batch_normalization_58[0] [0]
-----
conv2d_54 (Conv2D)           (None, 29, 29, 32)  10240
block35_7_ac[0] [0]
-----
conv2d_56 (Conv2D)           (None, 29, 29, 32)  9216
activation_55[0] [0]
-----
conv2d_59 (Conv2D)           (None, 29, 29, 64)  27648
activation_58[0] [0]
-----
batch_normalization_54 (BatchNo (None, 29, 29, 32)  96          conv2d_54[0] [0]
-----
batch_normalization_56 (BatchNo (None, 29, 29, 32)  96          conv2d_56[0] [0]
-----
batch_normalization_59 (BatchNo (None, 29, 29, 64)  192          conv2d_59[0] [0]
-----
activation_54 (Activation)   (None, 29, 29, 32)  0
batch_normalization_54[0] [0]
-----
activation_56 (Activation)   (None, 29, 29, 32)  0
batch_normalization_56[0] [0]
```

```
-----  
activation_59 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_59[0] [0]  
  
-----  
block35_8_mixed (Concatenate)  (None, 29, 29, 128)  0  
activation_54[0] [0]  
activation_56[0] [0]  
activation_59[0] [0]  
  
-----  
block35_8_conv (Conv2D)        (None, 29, 29, 320) 41280  
block35_8_mixed[0] [0]  
  
-----  
block35_8 (Lambda)            (None, 29, 29, 320)  0  
block35_7_ac[0] [0]  
block35_8_conv[0] [0]  
  
-----  
block35_8_ac (Activation)    (None, 29, 29, 320)  0          block35_8[0] [0]  
  
-----  
conv2d_63 (Conv2D)           (None, 29, 29, 32)   10240  
block35_8_ac[0] [0]  
  
-----  
batch_normalization_63 (BatchNo (None, 29, 29, 32)  96          conv2d_63[0] [0]  
  
-----  
activation_63 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_63[0] [0]  
  
-----  
conv2d_61 (Conv2D)           (None, 29, 29, 32)   10240  
block35_8_ac[0] [0]  
  
-----  
conv2d_64 (Conv2D)           (None, 29, 29, 48)   13824  
activation_63[0] [0]  
  
-----  
batch_normalization_61 (BatchNo (None, 29, 29, 32)  96          conv2d_61[0] [0]  
  
-----  
batch_normalization_64 (BatchNo (None, 29, 29, 48)  144          conv2d_64[0] [0]
```

```
-----  
activation_61 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_61[0] [0]  
-----  
activation_64 (Activation)      (None, 29, 29, 48)  0  
batch_normalization_64[0] [0]  
-----  
conv2d_60 (Conv2D)            (None, 29, 29, 32)  10240  
block35_8_ac[0] [0]  
-----  
conv2d_62 (Conv2D)            (None, 29, 29, 32)  9216  
activation_61[0] [0]  
-----  
conv2d_65 (Conv2D)            (None, 29, 29, 64)  27648  
activation_64[0] [0]  
-----  
batch_normalization_60 (BatchNo (None, 29, 29, 32)  96           conv2d_60[0] [0]  
-----  
batch_normalization_62 (BatchNo (None, 29, 29, 32)  96           conv2d_62[0] [0]  
-----  
batch_normalization_65 (BatchNo (None, 29, 29, 64)  192          conv2d_65[0] [0]  
-----  
activation_60 (Activation)     (None, 29, 29, 32)  0  
batch_normalization_60[0] [0]  
-----  
activation_62 (Activation)     (None, 29, 29, 32)  0  
batch_normalization_62[0] [0]  
-----  
activation_65 (Activation)     (None, 29, 29, 64)  0  
batch_normalization_65[0] [0]  
-----  
block35_9_mixed (Concatenate) (None, 29, 29, 128)  0  
activation_60[0] [0]  
activation_62[0] [0]  
activation_65[0] [0]  
-----
```

```
block35_9_conv (Conv2D)           (None, 29, 29, 320)  41280
block35_9_mixed[0] [0]

-----
block35_9 (Lambda)              (None, 29, 29, 320)  0
block35_8_ac[0] [0]
block35_9_conv[0] [0]

-----
block35_9_ac (Activation)       (None, 29, 29, 320)  0          block35_9[0] [0]

-----
conv2d_69 (Conv2D)              (None, 29, 29, 32)   10240
block35_9_ac[0] [0]

-----
batch_normalization_69 (BatchNo (None, 29, 29, 32)   96          conv2d_69[0] [0]

-----
activation_69 (Activation)      (None, 29, 29, 32)   0
batch_normalization_69[0] [0]

-----
conv2d_67 (Conv2D)              (None, 29, 29, 32)   10240
block35_9_ac[0] [0]

-----
conv2d_70 (Conv2D)              (None, 29, 29, 48)   13824
activation_69[0] [0]

-----
batch_normalization_67 (BatchNo (None, 29, 29, 32)   96          conv2d_67[0] [0]

-----
batch_normalization_70 (BatchNo (None, 29, 29, 48)   144          conv2d_70[0] [0]

-----
activation_67 (Activation)      (None, 29, 29, 32)   0
batch_normalization_67[0] [0]

-----
activation_70 (Activation)      (None, 29, 29, 48)   0
batch_normalization_70[0] [0]

-----
conv2d_66 (Conv2D)              (None, 29, 29, 32)   10240
block35_9_ac[0] [0]
```

```
-----  
conv2d_68 (Conv2D)           (None, 29, 29, 32)  9216  
activation_67[0] [0]  
-----  
conv2d_71 (Conv2D)           (None, 29, 29, 64)  27648  
activation_70[0] [0]  
-----  
batch_normalization_66 (BatchNo (None, 29, 29, 32)  96          conv2d_66[0] [0]  
-----  
batch_normalization_68 (BatchNo (None, 29, 29, 32)  96          conv2d_68[0] [0]  
-----  
batch_normalization_71 (BatchNo (None, 29, 29, 64)  192         conv2d_71[0] [0]  
-----  
activation_66 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_66[0] [0]  
-----  
activation_68 (Activation)    (None, 29, 29, 32)  0  
batch_normalization_68[0] [0]  
-----  
activation_71 (Activation)    (None, 29, 29, 64)  0  
batch_normalization_71[0] [0]  
-----  
block35_10_mixed (Concatenate) (None, 29, 29, 128)  0  
activation_66[0] [0]  
activation_68[0] [0]  
activation_71[0] [0]  
-----  
block35_10_conv (Conv2D)      (None, 29, 29, 320) 41280  
block35_10_mixed[0] [0]  
-----  
block35_10 (Lambda)          (None, 29, 29, 320)  0  
block35_9_ac[0] [0]  
block35_10_conv[0] [0]  
-----  
block35_10_ac (Activation)   (None, 29, 29, 320)  0  
block35_10[0] [0]
```

```
-----  
conv2d_73 (Conv2D)           (None, 29, 29, 256)  81920  
block35_10_ac[0] [0]  
-----  
batch_normalization_73 (BatchNo (None, 29, 29, 256)  768      conv2d_73[0] [0]  
-----  
activation_73 (Activation)    (None, 29, 29, 256)  0  
batch_normalization_73[0] [0]  
-----  
conv2d_74 (Conv2D)           (None, 29, 29, 256)  589824  
activation_73[0] [0]  
-----  
batch_normalization_74 (BatchNo (None, 29, 29, 256)  768      conv2d_74[0] [0]  
-----  
activation_74 (Activation)    (None, 29, 29, 256)  0  
batch_normalization_74[0] [0]  
-----  
conv2d_72 (Conv2D)           (None, 14, 14, 384)  1105920  
block35_10_ac[0] [0]  
-----  
conv2d_75 (Conv2D)           (None, 14, 14, 384)  884736  
activation_74[0] [0]  
-----  
batch_normalization_72 (BatchNo (None, 14, 14, 384)  1152      conv2d_72[0] [0]  
-----  
batch_normalization_75 (BatchNo (None, 14, 14, 384)  1152      conv2d_75[0] [0]  
-----  
activation_72 (Activation)    (None, 14, 14, 384)  0  
batch_normalization_72[0] [0]  
-----  
activation_75 (Activation)    (None, 14, 14, 384)  0  
batch_normalization_75[0] [0]  
-----  
max_pooling2d_2 (MaxPooling2D) (None, 14, 14, 320)  0  
block35_10_ac[0] [0]
```

```
--> mixed_6a (Concatenate)           (None, 14, 14, 1088) 0
activation_72[0] [0]
activation_75[0] [0]
max_pooling2d_2[0] [0]

-----
conv2d_77 (Conv2D)                 (None, 14, 14, 128) 139264      mixed_6a[0] [0]

-----
batch_normalization_77 (BatchNo (None, 14, 14, 128) 384      conv2d_77[0] [0]

-----
activation_77 (Activation)         (None, 14, 14, 128) 0
batch_normalization_77[0] [0]

-----
conv2d_78 (Conv2D)                 (None, 14, 14, 160) 143360
activation_77[0] [0]

-----
batch_normalization_78 (BatchNo (None, 14, 14, 160) 480      conv2d_78[0] [0]

-----
activation_78 (Activation)         (None, 14, 14, 160) 0
batch_normalization_78[0] [0]

-----
conv2d_76 (Conv2D)                 (None, 14, 14, 192) 208896      mixed_6a[0] [0]

-----
conv2d_79 (Conv2D)                 (None, 14, 14, 192) 215040
activation_78[0] [0]

-----
batch_normalization_76 (BatchNo (None, 14, 14, 192) 576      conv2d_76[0] [0]

-----
batch_normalization_79 (BatchNo (None, 14, 14, 192) 576      conv2d_79[0] [0]

-----
activation_76 (Activation)         (None, 14, 14, 192) 0
batch_normalization_76[0] [0]

-----
activation_79 (Activation)         (None, 14, 14, 192) 0
batch_normalization_79[0] [0]
```

```
--  
block17_1_mixed (Concatenate)    (None, 14, 14, 384)  0  
activation_76[0] [0]  
activation_79[0] [0]  
  
--  
block17_1_conv (Conv2D)          (None, 14, 14, 1088) 418880  
block17_1_mixed[0] [0]  
  
--  
block17_1 (Lambda)              (None, 14, 14, 1088) 0           mixed_6a[0] [0]  
block17_1_conv[0] [0]  
  
--  
block17_1_ac (Activation)      (None, 14, 14, 1088) 0           block17_1[0] [0]  
  
--  
conv2d_81 (Conv2D)             (None, 14, 14, 128)   139264  
block17_1_ac[0] [0]  
  
--  
batch_normalization_81 (BatchNo (None, 14, 14, 128) 384           conv2d_81[0] [0]  
  
--  
activation_81 (Activation)     (None, 14, 14, 128)  0  
batch_normalization_81[0] [0]  
  
--  
conv2d_82 (Conv2D)             (None, 14, 14, 160)  143360  
activation_81[0] [0]  
  
--  
batch_normalization_82 (BatchNo (None, 14, 14, 160) 480           conv2d_82[0] [0]  
  
--  
activation_82 (Activation)     (None, 14, 14, 160)  0  
batch_normalization_82[0] [0]  
  
--  
conv2d_80 (Conv2D)             (None, 14, 14, 192) 208896  
block17_1_ac[0] [0]  
  
--  
conv2d_83 (Conv2D)             (None, 14, 14, 192) 215040  
activation_82[0] [0]  
  
--  
batch_normalization_80 (BatchNo (None, 14, 14, 192) 576           conv2d_80[0] [0]
```

```
-----  
batch_normalization_83 (BatchNo (None, 14, 14, 192) 576           conv2d_83[0] [0]  
-----  
activation_80 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_80[0] [0]  
-----  
activation_83 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_83[0] [0]  
-----  
block17_2_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_80[0] [0]  
activation_83[0] [0]  
-----  
block17_2_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_2_mixed[0] [0]  
-----  
block17_2 (Lambda)            (None, 14, 14, 1088) 0  
block17_1_ac[0] [0]  
block17_2_conv[0] [0]  
-----  
block17_2_ac (Activation)     (None, 14, 14, 1088) 0           block17_2[0] [0]  
-----  
conv2d_85 (Conv2D)           (None, 14, 14, 128)  139264  
block17_2_ac[0] [0]  
-----  
batch_normalization_85 (BatchNo (None, 14, 14, 128) 384           conv2d_85[0] [0]  
-----  
activation_85 (Activation)     (None, 14, 14, 128)  0  
batch_normalization_85[0] [0]  
-----  
conv2d_86 (Conv2D)           (None, 14, 14, 160)  143360  
activation_85[0] [0]  
-----  
batch_normalization_86 (BatchNo (None, 14, 14, 160) 480           conv2d_86[0] [0]  
-----
```

```
activation_86 (Activation)      (None, 14, 14, 160)  0
batch_normalization_86[0] [0]
-----
conv2d_84 (Conv2D)            (None, 14, 14, 192)  208896
block17_2_ac[0] [0]
-----
conv2d_87 (Conv2D)            (None, 14, 14, 192)  215040
activation_86[0] [0]
-----
batch_normalization_84 (BatchNo (None, 14, 14, 192)  576           conv2d_84[0] [0]
-----
batch_normalization_87 (BatchNo (None, 14, 14, 192)  576           conv2d_87[0] [0]
-----
activation_84 (Activation)    (None, 14, 14, 192)  0
batch_normalization_84[0] [0]
-----
activation_87 (Activation)    (None, 14, 14, 192)  0
batch_normalization_87[0] [0]
-----
block17_3_mixed (Concatenate) (None, 14, 14, 384)  0
activation_84[0] [0]
activation_87[0] [0]
-----
block17_3_conv (Conv2D)       (None, 14, 14, 1088) 418880
block17_3_mixed[0] [0]
-----
block17_3 (Lambda)           (None, 14, 14, 1088) 0
block17_2_ac[0] [0]
block17_3_conv[0] [0]
-----
block17_3_ac (Activation)    (None, 14, 14, 1088) 0           block17_3[0] [0]
-----
conv2d_89 (Conv2D)           (None, 14, 14, 128)   139264
block17_3_ac[0] [0]
-----
batch_normalization_89 (BatchNo (None, 14, 14, 128)  384           conv2d_89[0] [0]
```

```
-----  
activation_89 (Activation)      (None, 14, 14, 128)  0  
batch_normalization_89[0] [0]  
  
-----  
conv2d_90 (Conv2D)            (None, 14, 14, 160)  143360  
activation_89[0] [0]  
  
-----  
batch_normalization_90 (BatchNo (None, 14, 14, 160)  480           conv2d_90[0] [0]  
  
-----  
activation_90 (Activation)      (None, 14, 14, 160)  0  
batch_normalization_90[0] [0]  
  
-----  
conv2d_88 (Conv2D)            (None, 14, 14, 192)  208896  
block17_3_ac[0] [0]  
  
-----  
conv2d_91 (Conv2D)            (None, 14, 14, 192)  215040  
activation_90[0] [0]  
  
-----  
batch_normalization_88 (BatchNo (None, 14, 14, 192)  576           conv2d_88[0] [0]  
  
-----  
batch_normalization_91 (BatchNo (None, 14, 14, 192)  576           conv2d_91[0] [0]  
  
-----  
activation_88 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_88[0] [0]  
  
-----  
activation_91 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_91[0] [0]  
  
-----  
block17_4_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_88[0] [0]  
activation_91[0] [0]  
  
-----  
block17_4_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_4_mixed[0] [0]  
  
-----
```

```
block17_4 (Lambda)           (None, 14, 14, 1088) 0
block17_3_ac[0] [0]
block17_4_conv[0] [0]

-----
-----  
block17_4_ac (Activation)      (None, 14, 14, 1088) 0          block17_4[0] [0]

-----
-----  
conv2d_93 (Conv2D)           (None, 14, 14, 128) 139264
block17_4_ac[0] [0]

-----
-----  
batch_normalization_93 (BatchNo (None, 14, 14, 128) 384        conv2d_93[0] [0]

-----
-----  
activation_93 (Activation)     (None, 14, 14, 128) 0
batch_normalization_93[0] [0]

-----
-----  
conv2d_94 (Conv2D)           (None, 14, 14, 160) 143360
activation_93[0] [0]

-----
-----  
batch_normalization_94 (BatchNo (None, 14, 14, 160) 480        conv2d_94[0] [0]

-----
-----  
activation_94 (Activation)     (None, 14, 14, 160) 0
batch_normalization_94[0] [0]

-----
-----  
conv2d_92 (Conv2D)           (None, 14, 14, 192) 208896
block17_4_ac[0] [0]

-----
-----  
conv2d_95 (Conv2D)           (None, 14, 14, 192) 215040
activation_94[0] [0]

-----
-----  
batch_normalization_92 (BatchNo (None, 14, 14, 192) 576        conv2d_92[0] [0]

-----
-----  
batch_normalization_95 (BatchNo (None, 14, 14, 192) 576        conv2d_95[0] [0]

-----
-----  
activation_92 (Activation)     (None, 14, 14, 192) 0
batch_normalization_92[0] [0]
```

```
activation_95 (Activation)      (None, 14, 14, 192)  0
batch_normalization_95[0] [0]
-----
-----  
block17_5_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_92[0] [0]
activation_95[0] [0]
-----
-----  
block17_5_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_5_mixed[0] [0]
-----
-----  
block17_5 (Lambda)            (None, 14, 14, 1088) 0
block17_4_ac[0] [0]
block17_5_conv[0] [0]
-----
-----  
block17_5_ac (Activation)    (None, 14, 14, 1088) 0          block17_5[0] [0]
-----
-----  
conv2d_97 (Conv2D)           (None, 14, 14, 128)   139264
block17_5_ac[0] [0]
-----
-----  
batch_normalization_97 (BatchNo (None, 14, 14, 128) 384          conv2d_97[0] [0]
-----
-----  
activation_97 (Activation)    (None, 14, 14, 128)  0
batch_normalization_97[0] [0]
-----
-----  
conv2d_98 (Conv2D)           (None, 14, 14, 160)  143360
activation_97[0] [0]
-----
-----  
batch_normalization_98 (BatchNo (None, 14, 14, 160) 480          conv2d_98[0] [0]
-----
-----  
activation_98 (Activation)    (None, 14, 14, 160)  0
batch_normalization_98[0] [0]
-----
-----  
conv2d_96 (Conv2D)           (None, 14, 14, 192) 208896
block17_5_ac[0] [0]
-----
-----  
conv2d_99 (Conv2D)           (None, 14, 14, 192) 215040
```

```
activation_98[0] [0]
-----
batch_normalization_96 (BatchNo (None, 14, 14, 192) 576           conv2d_96[0] [0]
-----
batch_normalization_99 (BatchNo (None, 14, 14, 192) 576           conv2d_99[0] [0]
-----
activation_96 (Activation)      (None, 14, 14, 192)  0
batch_normalization_96[0] [0]
-----
activation_99 (Activation)      (None, 14, 14, 192)  0
batch_normalization_99[0] [0]
-----
block17_6_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_96[0] [0]
activation_99[0] [0]
-----
block17_6_conv (Conv2D)         (None, 14, 14, 1088) 418880
block17_6_mixed[0] [0]
-----
block17_6 (Lambda)             (None, 14, 14, 1088)  0
block17_5_ac[0] [0]
block17_6_conv[0] [0]
-----
block17_6_ac (Activation)     (None, 14, 14, 1088)  0           block17_6[0] [0]
-----
conv2d_101 (Conv2D)            (None, 14, 14, 128)  139264
block17_6_ac[0] [0]
-----
batch_normalization_101 (BatchN (None, 14, 14, 128) 384
conv2d_101[0] [0]
-----
activation_101 (Activation)    (None, 14, 14, 128)  0
batch_normalization_101[0] [0]
-----
conv2d_102 (Conv2D)            (None, 14, 14, 160)  143360
activation_101[0] [0]
```

```
-----  
batch_normalization_102 (BatchN (None, 14, 14, 160) 480  
conv2d_102[0] [0]  
  
-----  
activation_102 (Activation)      (None, 14, 14, 160)  0  
batch_normalization_102[0] [0]  
  
-----  
conv2d_100 (Conv2D)           (None, 14, 14, 192) 208896  
block17_6_ac[0] [0]  
  
-----  
conv2d_103 (Conv2D)           (None, 14, 14, 192) 215040  
activation_102[0] [0]  
  
-----  
batch_normalization_100 (BatchN (None, 14, 14, 192) 576  
conv2d_100[0] [0]  
  
-----  
batch_normalization_103 (BatchN (None, 14, 14, 192) 576  
conv2d_103[0] [0]  
  
-----  
activation_100 (Activation)     (None, 14, 14, 192)  0  
batch_normalization_100[0] [0]  
  
-----  
activation_103 (Activation)     (None, 14, 14, 192)  0  
batch_normalization_103[0] [0]  
  
-----  
block17_7_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_100[0] [0]  
activation_103[0] [0]  
  
-----  
block17_7_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_7_mixed[0] [0]  
  
-----  
block17_7 (Lambda)             (None, 14, 14, 1088) 0  
block17_6_ac[0] [0]  
block17_7_conv[0] [0]  
-----
```

```
block17_7_ac (Activation)      (None, 14, 14, 1088) 0          block17_7[0] [0]
-----
conv2d_105 (Conv2D)           (None, 14, 14, 128) 139264
block17_7_ac[0] [0]
-----
batch_normalization_105 (BatchN (None, 14, 14, 128) 384
conv2d_105[0] [0]
-----
activation_105 (Activation)   (None, 14, 14, 128) 0
batch_normalization_105[0] [0]
-----
conv2d_106 (Conv2D)           (None, 14, 14, 160) 143360
activation_105[0] [0]
-----
batch_normalization_106 (BatchN (None, 14, 14, 160) 480
conv2d_106[0] [0]
-----
activation_106 (Activation)   (None, 14, 14, 160) 0
batch_normalization_106[0] [0]
-----
conv2d_104 (Conv2D)           (None, 14, 14, 192) 208896
block17_7_ac[0] [0]
-----
conv2d_107 (Conv2D)           (None, 14, 14, 192) 215040
activation_106[0] [0]
-----
batch_normalization_104 (BatchN (None, 14, 14, 192) 576
conv2d_104[0] [0]
-----
batch_normalization_107 (BatchN (None, 14, 14, 192) 576
conv2d_107[0] [0]
-----
activation_104 (Activation)   (None, 14, 14, 192) 0
batch_normalization_104[0] [0]
-----
activation_107 (Activation)   (None, 14, 14, 192) 0
```

```
batch_normalization_107[0] [0]
-----
block17_8_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_104[0] [0]
activation_107[0] [0]
-----
block17_8_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_8_mixed[0] [0]
-----
block17_8 (Lambda)            (None, 14, 14, 1088) 0
block17_7_ac[0] [0]
block17_8_conv[0] [0]
-----
block17_8_ac (Activation)    (None, 14, 14, 1088) 0           block17_8[0] [0]
-----
conv2d_109 (Conv2D)          (None, 14, 14, 128) 139264
block17_8_ac[0] [0]
-----
batch_normalization_109 (BatchN (None, 14, 14, 128) 384
conv2d_109[0] [0]
-----
activation_109 (Activation)  (None, 14, 14, 128) 0
batch_normalization_109[0] [0]
-----
conv2d_110 (Conv2D)          (None, 14, 14, 160) 143360
activation_109[0] [0]
-----
batch_normalization_110 (BatchN (None, 14, 14, 160) 480
conv2d_110[0] [0]
-----
activation_110 (Activation)  (None, 14, 14, 160) 0
batch_normalization_110[0] [0]
-----
conv2d_108 (Conv2D)          (None, 14, 14, 192) 208896
block17_8_ac[0] [0]
```

```
conv2d_111 (Conv2D)           (None, 14, 14, 192)  215040
activation_110[0] [0]

-----
batch_normalization_108 (BatchN (None, 14, 14, 192)  576
conv2d_108[0] [0]

-----
batch_normalization_111 (BatchN (None, 14, 14, 192)  576
conv2d_111[0] [0]

-----
activation_108 (Activation)   (None, 14, 14, 192)  0
batch_normalization_108[0] [0]

-----
activation_111 (Activation)   (None, 14, 14, 192)  0
batch_normalization_111[0] [0]

-----
block17_9_mixed (Concatenate) (None, 14, 14, 384)  0
activation_108[0] [0]
activation_111[0] [0]

-----
block17_9_conv (Conv2D)       (None, 14, 14, 1088) 418880
block17_9_mixed[0] [0]

-----
block17_9 (Lambda)           (None, 14, 14, 1088) 0
block17_8_ac[0] [0]
block17_9_conv[0] [0]

-----
block17_9_ac (Activation)    (None, 14, 14, 1088) 0           block17_9[0] [0]

-----
conv2d_113 (Conv2D)          (None, 14, 14, 128)  139264
block17_9_ac[0] [0]

-----
batch_normalization_113 (BatchN (None, 14, 14, 128) 384
conv2d_113[0] [0]

-----
activation_113 (Activation)   (None, 14, 14, 128)  0
batch_normalization_113[0] [0]
```

```
-----  
conv2d_114 (Conv2D)           (None, 14, 14, 160) 143360  
activation_113[0] [0]  
-----  
batch_normalization_114 (BatchN (None, 14, 14, 160) 480  
conv2d_114[0] [0]  
-----  
activation_114 (Activation)   (None, 14, 14, 160) 0  
batch_normalization_114[0] [0]  
-----  
conv2d_112 (Conv2D)           (None, 14, 14, 192) 208896  
block17_9_ac[0] [0]  
-----  
conv2d_115 (Conv2D)           (None, 14, 14, 192) 215040  
activation_114[0] [0]  
-----  
batch_normalization_112 (BatchN (None, 14, 14, 192) 576  
conv2d_112[0] [0]  
-----  
batch_normalization_115 (BatchN (None, 14, 14, 192) 576  
conv2d_115[0] [0]  
-----  
activation_112 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_112[0] [0]  
-----  
activation_115 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_115[0] [0]  
-----  
block17_10_mixed (Concatenate) (None, 14, 14, 384) 0  
activation_112[0] [0]  
activation_115[0] [0]  
-----  
block17_10_conv (Conv2D)       (None, 14, 14, 1088) 418880  
block17_10_mixed[0] [0]  
-----  
block17_10 (Lambda)           (None, 14, 14, 1088) 0  
block17_9_ac[0] [0]
```

```
block17_10_conv[0] [0]
-----
block17_10_ac (Activation)      (None, 14, 14, 1088) 0
block17_10[0] [0]
-----
conv2d_117 (Conv2D)           (None, 14, 14, 128) 139264
block17_10_ac[0] [0]
-----
batch_normalization_117 (BatchN (None, 14, 14, 128) 384
conv2d_117[0] [0]
-----
activation_117 (Activation)    (None, 14, 14, 128) 0
batch_normalization_117[0] [0]
-----
conv2d_118 (Conv2D)           (None, 14, 14, 160) 143360
activation_117[0] [0]
-----
batch_normalization_118 (BatchN (None, 14, 14, 160) 480
conv2d_118[0] [0]
-----
activation_118 (Activation)    (None, 14, 14, 160) 0
batch_normalization_118[0] [0]
-----
conv2d_116 (Conv2D)           (None, 14, 14, 192) 208896
block17_10_ac[0] [0]
-----
conv2d_119 (Conv2D)           (None, 14, 14, 192) 215040
activation_118[0] [0]
-----
batch_normalization_116 (BatchN (None, 14, 14, 192) 576
conv2d_116[0] [0]
-----
batch_normalization_119 (BatchN (None, 14, 14, 192) 576
conv2d_119[0] [0]
-----
activation_116 (Activation)    (None, 14, 14, 192) 0
```

```
batch_normalization_116[0] [0]
-----
activation_119 (Activation)      (None, 14, 14, 192)  0
batch_normalization_119[0] [0]
-----
block17_11_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_116[0] [0]
activation_119[0] [0]
-----
block17_11_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_11_mixed[0] [0]
-----
block17_11 (Lambda)            (None, 14, 14, 1088)  0
block17_10_ac[0] [0]
block17_11_conv[0] [0]
-----
block17_11_ac (Activation)     (None, 14, 14, 1088)  0
block17_11[0] [0]
-----
conv2d_121 (Conv2D)           (None, 14, 14, 128)   139264
block17_11_ac[0] [0]
-----
batch_normalization_121 (BatchN (None, 14, 14, 128)  384
conv2d_121[0] [0]
-----
activation_121 (Activation)    (None, 14, 14, 128)  0
batch_normalization_121[0] [0]
-----
conv2d_122 (Conv2D)           (None, 14, 14, 160)   143360
activation_121[0] [0]
-----
batch_normalization_122 (BatchN (None, 14, 14, 160)  480
conv2d_122[0] [0]
-----
activation_122 (Activation)    (None, 14, 14, 160)  0
batch_normalization_122[0] [0]
```

```
-----  
conv2d_120 (Conv2D)           (None, 14, 14, 192) 208896  
block17_11_ac[0] [0]  
-----  
conv2d_123 (Conv2D)           (None, 14, 14, 192) 215040  
activation_122[0] [0]  
-----  
batch_normalization_120 (BatchN (None, 14, 14, 192) 576  
conv2d_120[0] [0]  
-----  
batch_normalization_123 (BatchN (None, 14, 14, 192) 576  
conv2d_123[0] [0]  
-----  
activation_120 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_120[0] [0]  
-----  
activation_123 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_123[0] [0]  
-----  
block17_12_mixed (Concatenate) (None, 14, 14, 384) 0  
activation_120[0] [0]  
activation_123[0] [0]  
-----  
block17_12_conv (Conv2D)       (None, 14, 14, 1088) 418880  
block17_12_mixed[0] [0]  
-----  
block17_12 (Lambda)           (None, 14, 14, 1088) 0  
block17_11_ac[0] [0]  
block17_12_conv[0] [0]  
-----  
block17_12_ac (Activation)    (None, 14, 14, 1088) 0  
block17_12[0] [0]  
-----  
conv2d_125 (Conv2D)           (None, 14, 14, 128) 139264  
block17_12_ac[0] [0]  
-----  
batch_normalization_125 (BatchN (None, 14, 14, 128) 384
```

```
conv2d_125[0] [0]
-----
activation_125 (Activation)      (None, 14, 14, 128)  0
batch_normalization_125[0] [0]
-----
conv2d_126 (Conv2D)           (None, 14, 14, 160)  143360
activation_125[0] [0]
-----
batch_normalization_126 (BatchN (None, 14, 14, 160)  480
conv2d_126[0] [0]
-----
activation_126 (Activation)      (None, 14, 14, 160)  0
batch_normalization_126[0] [0]
-----
conv2d_124 (Conv2D)           (None, 14, 14, 192)  208896
block17_12_ac[0] [0]
-----
conv2d_127 (Conv2D)           (None, 14, 14, 192)  215040
activation_126[0] [0]
-----
batch_normalization_124 (BatchN (None, 14, 14, 192)  576
conv2d_124[0] [0]
-----
batch_normalization_127 (BatchN (None, 14, 14, 192)  576
conv2d_127[0] [0]
-----
activation_124 (Activation)      (None, 14, 14, 192)  0
batch_normalization_124[0] [0]
-----
activation_127 (Activation)      (None, 14, 14, 192)  0
batch_normalization_127[0] [0]
-----
block17_13_mixed (Concatenate) (None, 14, 14, 384)  0
activation_124[0] [0]
activation_127[0] [0]
```

```
block17_13_conv (Conv2D)           (None, 14, 14, 1088) 418880
block17_13_mixed[0] [0]
```

```
block17_13 (Lambda)             (None, 14, 14, 1088) 0
block17_12_ac[0] [0]
block17_13_conv[0] [0]
```

```
block17_13_ac (Activation)      (None, 14, 14, 1088) 0
block17_13[0] [0]
```

```
conv2d_129 (Conv2D)            (None, 14, 14, 128) 139264
block17_13_ac[0] [0]
```

```
batch_normalization_129 (BatchN (None, 14, 14, 128) 384
conv2d_129[0] [0]
```

```
activation_129 (Activation)    (None, 14, 14, 128) 0
batch_normalization_129[0] [0]
```

```
conv2d_130 (Conv2D)            (None, 14, 14, 160) 143360
activation_129[0] [0]
```

```
batch_normalization_130 (BatchN (None, 14, 14, 160) 480
conv2d_130[0] [0]
```

```
activation_130 (Activation)    (None, 14, 14, 160) 0
batch_normalization_130[0] [0]
```

```
conv2d_128 (Conv2D)            (None, 14, 14, 192) 208896
block17_13_ac[0] [0]
```

```
conv2d_131 (Conv2D)            (None, 14, 14, 192) 215040
activation_130[0] [0]
```

```
batch_normalization_128 (BatchN (None, 14, 14, 192) 576
conv2d_128[0] [0]
```

```
-----  
batch_normalization_131 (BatchN (None, 14, 14, 192) 576  
conv2d_131[0] [0]  
  
-----  
activation_128 (Activation)      (None, 14, 14, 192) 0  
batch_normalization_128[0] [0]  
  
-----  
activation_131 (Activation)      (None, 14, 14, 192) 0  
batch_normalization_131[0] [0]  
  
-----  
block17_14_mixed (Concatenate)  (None, 14, 14, 384) 0  
activation_128[0] [0]  
activation_131[0] [0]  
  
-----  
block17_14_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_14_mixed[0] [0]  
  
-----  
block17_14 (Lambda)            (None, 14, 14, 1088) 0  
block17_13_ac[0] [0]  
block17_14_conv[0] [0]  
  
-----  
block17_14_ac (Activation)     (None, 14, 14, 1088) 0  
block17_14[0] [0]  
  
-----  
conv2d_133 (Conv2D)           (None, 14, 14, 128) 139264  
block17_14_ac[0] [0]  
  
-----  
batch_normalization_133 (BatchN (None, 14, 14, 128) 384  
conv2d_133[0] [0]  
  
-----  
activation_133 (Activation)    (None, 14, 14, 128) 0  
batch_normalization_133[0] [0]  
  
-----  
conv2d_134 (Conv2D)           (None, 14, 14, 160) 143360  
activation_133[0] [0]  
  
-----  
batch_normalization_134 (BatchN (None, 14, 14, 160) 480
```

```
conv2d_134[0] [0]
-----
activation_134 (Activation)      (None, 14, 14, 160)  0
batch_normalization_134[0] [0]
-----
conv2d_132 (Conv2D)           (None, 14, 14, 192)  208896
block17_14_ac[0] [0]
-----
conv2d_135 (Conv2D)           (None, 14, 14, 192)  215040
activation_134[0] [0]
-----
batch_normalization_132 (BatchN (None, 14, 14, 192)  576
conv2d_132[0] [0]
-----
batch_normalization_135 (BatchN (None, 14, 14, 192)  576
conv2d_135[0] [0]
-----
activation_132 (Activation)    (None, 14, 14, 192)  0
batch_normalization_132[0] [0]
-----
activation_135 (Activation)    (None, 14, 14, 192)  0
batch_normalization_135[0] [0]
-----
block17_15_mixed (Concatenate) (None, 14, 14, 384)  0
activation_132[0] [0]
activation_135[0] [0]
-----
block17_15_conv (Conv2D)       (None, 14, 14, 1088) 418880
block17_15_mixed[0] [0]
-----
block17_15 (Lambda)           (None, 14, 14, 1088)  0
block17_14_ac[0] [0]
block17_15_conv[0] [0]
-----
block17_15_ac (Activation)    (None, 14, 14, 1088)  0
block17_15[0] [0]
```

```
-----  
conv2d_137 (Conv2D)           (None, 14, 14, 128) 139264  
block17_15_ac[0] [0]  
-----
```

```
-----  
batch_normalization_137 (BatchN (None, 14, 14, 128) 384  
conv2d_137[0] [0]  
-----
```

```
-----  
activation_137 (Activation)   (None, 14, 14, 128) 0  
batch_normalization_137[0] [0]  
-----
```

```
-----  
conv2d_138 (Conv2D)           (None, 14, 14, 160) 143360  
activation_137[0] [0]  
-----
```

```
-----  
batch_normalization_138 (BatchN (None, 14, 14, 160) 480  
conv2d_138[0] [0]  
-----
```

```
-----  
activation_138 (Activation)   (None, 14, 14, 160) 0  
batch_normalization_138[0] [0]  
-----
```

```
-----  
conv2d_136 (Conv2D)           (None, 14, 14, 192) 208896  
block17_15_ac[0] [0]  
-----
```

```
-----  
conv2d_139 (Conv2D)           (None, 14, 14, 192) 215040  
activation_138[0] [0]  
-----
```

```
-----  
batch_normalization_136 (BatchN (None, 14, 14, 192) 576  
conv2d_136[0] [0]  
-----
```

```
-----  
batch_normalization_139 (BatchN (None, 14, 14, 192) 576  
conv2d_139[0] [0]  
-----
```

```
-----  
activation_136 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_136[0] [0]  
-----
```

```
-----  
activation_139 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_139[0] [0]  
-----
```

```
--  
block17_16_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_136[0] [0]  
activation_139[0] [0]  
  
--  
block17_16_conv (Conv2D)          (None, 14, 14, 1088) 418880  
block17_16_mixed[0] [0]  
  
--  
block17_16 (Lambda)              (None, 14, 14, 1088) 0  
block17_15_ac[0] [0]  
block17_16_conv[0] [0]  
  
--  
block17_16_ac (Activation)      (None, 14, 14, 1088) 0  
block17_16[0] [0]  
  
--  
conv2d_141 (Conv2D)             (None, 14, 14, 128) 139264  
block17_16_ac[0] [0]  
  
--  
batch_normalization_141 (BatchN (None, 14, 14, 128) 384  
conv2d_141[0] [0]  
  
--  
activation_141 (Activation)     (None, 14, 14, 128) 0  
batch_normalization_141[0] [0]  
  
--  
conv2d_142 (Conv2D)             (None, 14, 14, 160) 143360  
activation_141[0] [0]  
  
--  
batch_normalization_142 (BatchN (None, 14, 14, 160) 480  
conv2d_142[0] [0]  
  
--  
activation_142 (Activation)     (None, 14, 14, 160) 0  
batch_normalization_142[0] [0]  
  
--  
conv2d_140 (Conv2D)             (None, 14, 14, 192) 208896  
block17_16_ac[0] [0]  
  
--  
conv2d_143 (Conv2D)             (None, 14, 14, 192) 215040
```

```
activation_142[0] [0]
-----
batch_normalization_140 (BatchN (None, 14, 14, 192) 576
conv2d_140[0] [0]
-----
batch_normalization_143 (BatchN (None, 14, 14, 192) 576
conv2d_143[0] [0]
-----
activation_140 (Activation)      (None, 14, 14, 192) 0
batch_normalization_140[0] [0]
-----
activation_143 (Activation)      (None, 14, 14, 192) 0
batch_normalization_143[0] [0]
-----
block17_17_mixed (Concatenate)  (None, 14, 14, 384) 0
activation_140[0] [0]
activation_143[0] [0]
-----
block17_17_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_17_mixed[0] [0]
-----
block17_17 (Lambda)            (None, 14, 14, 1088) 0
block17_16_ac[0] [0]
block17_17_conv[0] [0]
-----
block17_17_ac (Activation)     (None, 14, 14, 1088) 0
block17_17[0] [0]
-----
conv2d_145 (Conv2D)           (None, 14, 14, 128) 139264
block17_17_ac[0] [0]
-----
batch_normalization_145 (BatchN (None, 14, 14, 128) 384
conv2d_145[0] [0]
-----
activation_145 (Activation)    (None, 14, 14, 128) 0
batch_normalization_145[0] [0]
```

```
-----  
conv2d_146 (Conv2D)           (None, 14, 14, 160) 143360  
activation_145[0] [0]  
-----  
batch_normalization_146 (BatchN (None, 14, 14, 160) 480  
conv2d_146[0] [0]  
-----  
activation_146 (Activation)   (None, 14, 14, 160) 0  
batch_normalization_146[0] [0]  
-----  
conv2d_144 (Conv2D)           (None, 14, 14, 192) 208896  
block17_17_ac[0] [0]  
-----  
conv2d_147 (Conv2D)           (None, 14, 14, 192) 215040  
activation_146[0] [0]  
-----  
batch_normalization_144 (BatchN (None, 14, 14, 192) 576  
conv2d_144[0] [0]  
-----  
batch_normalization_147 (BatchN (None, 14, 14, 192) 576  
conv2d_147[0] [0]  
-----  
activation_144 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_144[0] [0]  
-----  
activation_147 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_147[0] [0]  
-----  
block17_18_mixed (Concatenate) (None, 14, 14, 384) 0  
activation_144[0] [0]  
activation_147[0] [0]  
-----  
block17_18_conv (Conv2D)      (None, 14, 14, 1088) 418880  
block17_18_mixed[0] [0]  
-----  
block17_18 (Lambda)           (None, 14, 14, 1088) 0  
block17_17_ac[0] [0]
```

```
block17_18_conv[0] [0]
-----
block17_18_ac (Activation)      (None, 14, 14, 1088) 0
block17_18[0] [0]
-----
conv2d_149 (Conv2D)           (None, 14, 14, 128) 139264
block17_18_ac[0] [0]
-----
batch_normalization_149 (BatchN (None, 14, 14, 128) 384
conv2d_149[0] [0]
-----
activation_149 (Activation)    (None, 14, 14, 128) 0
batch_normalization_149[0] [0]
-----
conv2d_150 (Conv2D)           (None, 14, 14, 160) 143360
activation_149[0] [0]
-----
batch_normalization_150 (BatchN (None, 14, 14, 160) 480
conv2d_150[0] [0]
-----
activation_150 (Activation)    (None, 14, 14, 160) 0
batch_normalization_150[0] [0]
-----
conv2d_148 (Conv2D)           (None, 14, 14, 192) 208896
block17_18_ac[0] [0]
-----
conv2d_151 (Conv2D)           (None, 14, 14, 192) 215040
activation_150[0] [0]
-----
batch_normalization_148 (BatchN (None, 14, 14, 192) 576
conv2d_148[0] [0]
-----
batch_normalization_151 (BatchN (None, 14, 14, 192) 576
conv2d_151[0] [0]
-----
activation_148 (Activation)    (None, 14, 14, 192) 0
```

```
batch_normalization_148[0] [0]
-----
activation_151 (Activation)      (None, 14, 14, 192)  0
batch_normalization_151[0] [0]
-----
block17_19_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_148[0] [0]
activation_151[0] [0]
-----
block17_19_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_19_mixed[0] [0]
-----
block17_19 (Lambda)            (None, 14, 14, 1088)  0
block17_18_ac[0] [0]
block17_19_conv[0] [0]
-----
block17_19_ac (Activation)     (None, 14, 14, 1088)  0
block17_19[0] [0]
-----
conv2d_153 (Conv2D)           (None, 14, 14, 128)   139264
block17_19_ac[0] [0]
-----
batch_normalization_153 (BatchN (None, 14, 14, 128)  384
conv2d_153[0] [0]
-----
activation_153 (Activation)    (None, 14, 14, 128)  0
batch_normalization_153[0] [0]
-----
conv2d_154 (Conv2D)           (None, 14, 14, 160)   143360
activation_153[0] [0]
-----
batch_normalization_154 (BatchN (None, 14, 14, 160)  480
conv2d_154[0] [0]
-----
activation_154 (Activation)    (None, 14, 14, 160)  0
batch_normalization_154[0] [0]
```

```
-----  
conv2d_152 (Conv2D)           (None, 14, 14, 192) 208896  
block17_19_ac[0] [0]  
-----  
conv2d_155 (Conv2D)           (None, 14, 14, 192) 215040  
activation_154[0] [0]  
-----  
batch_normalization_152 (BatchN (None, 14, 14, 192) 576  
conv2d_152[0] [0]  
-----  
batch_normalization_155 (BatchN (None, 14, 14, 192) 576  
conv2d_155[0] [0]  
-----  
activation_152 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_152[0] [0]  
-----  
activation_155 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_155[0] [0]  
-----  
block17_20_mixed (Concatenate) (None, 14, 14, 384) 0  
activation_152[0] [0]  
activation_155[0] [0]  
-----  
block17_20_conv (Conv2D)       (None, 14, 14, 1088) 418880  
block17_20_mixed[0] [0]  
-----  
block17_20 (Lambda)            (None, 14, 14, 1088) 0  
block17_19_ac[0] [0]  
block17_20_conv[0] [0]  
-----  
block17_20_ac (Activation)    (None, 14, 14, 1088) 0  
block17_20[0] [0]  
-----  
conv2d_160 (Conv2D)           (None, 14, 14, 256) 278528  
block17_20_ac[0] [0]  
-----  
batch_normalization_160 (BatchN (None, 14, 14, 256) 768
```

```
conv2d_160[0] [0]
-----
activation_160 (Activation)      (None, 14, 14, 256)  0
batch_normalization_160[0] [0]
-----
conv2d_156 (Conv2D)            (None, 14, 14, 256)  278528
block17_20_ac[0] [0]
-----
conv2d_158 (Conv2D)            (None, 14, 14, 256)  278528
block17_20_ac[0] [0]
-----
conv2d_161 (Conv2D)            (None, 14, 14, 288)  663552
activation_160[0] [0]
-----
batch_normalization_156 (BatchN (None, 14, 14, 256)  768
conv2d_156[0] [0]
-----
batch_normalization_158 (BatchN (None, 14, 14, 256)  768
conv2d_158[0] [0]
-----
batch_normalization_161 (BatchN (None, 14, 14, 288)  864
conv2d_161[0] [0]
-----
activation_156 (Activation)    (None, 14, 14, 256)  0
batch_normalization_156[0] [0]
-----
activation_158 (Activation)    (None, 14, 14, 256)  0
batch_normalization_158[0] [0]
-----
activation_161 (Activation)    (None, 14, 14, 288)  0
batch_normalization_161[0] [0]
-----
conv2d_157 (Conv2D)            (None, 6, 6, 384)    884736
activation_156[0] [0]
-----
conv2d_159 (Conv2D)            (None, 6, 6, 288)    663552
```

```
activation_158[0] [0]
-----
conv2d_162 (Conv2D)           (None, 6, 6, 320)    829440
activation_161[0] [0]
-----
batch_normalization_157 (BatchN (None, 6, 6, 384)    1152
conv2d_157[0] [0]
-----
batch_normalization_159 (BatchN (None, 6, 6, 288)    864
conv2d_159[0] [0]
-----
batch_normalization_162 (BatchN (None, 6, 6, 320)    960
conv2d_162[0] [0]
-----
activation_157 (Activation)   (None, 6, 6, 384)    0
batch_normalization_157[0] [0]
-----
activation_159 (Activation)   (None, 6, 6, 288)    0
batch_normalization_159[0] [0]
-----
activation_162 (Activation)   (None, 6, 6, 320)    0
batch_normalization_162[0] [0]
-----
max_pooling2d_3 (MaxPooling2D) (None, 6, 6, 1088)   0
block17_20_ac[0] [0]
-----
mixed_7a (Concatenate)        (None, 6, 6, 2080)   0
activation_157[0] [0]
activation_159[0] [0]
activation_162[0] [0]
max_pooling2d_3[0] [0]
-----
conv2d_164 (Conv2D)           (None, 6, 6, 192)    399360      mixed_7a[0] [0]
-----
batch_normalization_164 (BatchN (None, 6, 6, 192)    576
conv2d_164[0] [0]
```

```
-----  
activation_164 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_164[0] [0]  
-----  
conv2d_165 (Conv2D)            (None, 6, 6, 224)    129024  
activation_164[0] [0]  
-----  
batch_normalization_165 (BatchN (None, 6, 6, 224)    672  
conv2d_165[0] [0]  
-----  
activation_165 (Activation)      (None, 6, 6, 224)      0  
batch_normalization_165[0] [0]  
-----  
conv2d_163 (Conv2D)            (None, 6, 6, 192)    399360      mixed_7a[0] [0]  
-----  
conv2d_166 (Conv2D)            (None, 6, 6, 256)    172032  
activation_165[0] [0]  
-----  
batch_normalization_163 (BatchN (None, 6, 6, 192)    576  
conv2d_163[0] [0]  
-----  
batch_normalization_166 (BatchN (None, 6, 6, 256)    768  
conv2d_166[0] [0]  
-----  
activation_163 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_163[0] [0]  
-----  
activation_166 (Activation)      (None, 6, 6, 256)      0  
batch_normalization_166[0] [0]  
-----  
block8_1_mixed (Concatenate)    (None, 6, 6, 448)      0  
activation_163[0] [0]  
activation_166[0] [0]  
-----  
block8_1_conv (Conv2D)          (None, 6, 6, 2080)   933920  
block8_1_mixed[0] [0]
```

```
--  
block8_1 (Lambda)           (None, 6, 6, 2080)  0          mixed_7a[0] [0]  
block8_1_conv[0] [0]  
--  
--  
block8_1_ac (Activation)   (None, 6, 6, 2080)  0          block8_1[0] [0]  
--  
--  
conv2d_168 (Conv2D)        (None, 6, 6, 192)   399360  
block8_1_ac[0] [0]  
--  
--  
batch_normalization_168 (BatchN (None, 6, 6, 192)  576  
conv2d_168[0] [0]  
--  
--  
activation_168 (Activation) (None, 6, 6, 192)   0  
batch_normalization_168[0] [0]  
--  
--  
conv2d_169 (Conv2D)        (None, 6, 6, 224)   129024  
activation_168[0] [0]  
--  
--  
batch_normalization_169 (BatchN (None, 6, 6, 224)  672  
conv2d_169[0] [0]  
--  
--  
activation_169 (Activation) (None, 6, 6, 224)   0  
batch_normalization_169[0] [0]  
--  
--  
conv2d_167 (Conv2D)        (None, 6, 6, 192)   399360  
block8_1_ac[0] [0]  
--  
--  
conv2d_170 (Conv2D)        (None, 6, 6, 256)   172032  
activation_169[0] [0]  
--  
--  
batch_normalization_167 (BatchN (None, 6, 6, 192)  576  
conv2d_167[0] [0]  
--  
--  
batch_normalization_170 (BatchN (None, 6, 6, 256)   768  
conv2d_170[0] [0]  
--  
--
```

```
activation_167 (Activation)      (None, 6, 6, 192)    0
batch_normalization_167[0] [0]
-----
activation_170 (Activation)      (None, 6, 6, 256)    0
batch_normalization_170[0] [0]
-----
block8_2_mixed (Concatenate)   (None, 6, 6, 448)    0
activation_167[0] [0]
activation_170[0] [0]
-----
block8_2_conv (Conv2D)          (None, 6, 6, 2080)  933920
block8_2_mixed[0] [0]
-----
block8_2 (Lambda)              (None, 6, 6, 2080)    0
block8_1_ac[0] [0]
block8_2_conv[0] [0]
-----
block8_2_ac (Activation)       (None, 6, 6, 2080)    0           block8_2[0] [0]
-----
conv2d_172 (Conv2D)            (None, 6, 6, 192)   399360
block8_2_ac[0] [0]
-----
batch_normalization_172 (BatchN (None, 6, 6, 192)    576
conv2d_172[0] [0]
-----
activation_172 (Activation)     (None, 6, 6, 192)    0
batch_normalization_172[0] [0]
-----
conv2d_173 (Conv2D)            (None, 6, 6, 224)   129024
activation_172[0] [0]
-----
batch_normalization_173 (BatchN (None, 6, 6, 224)    672
conv2d_173[0] [0]
-----
activation_173 (Activation)     (None, 6, 6, 224)    0
batch_normalization_173[0] [0]
```

```
-----  
conv2d_171 (Conv2D)           (None, 6, 6, 192)    399360  
block8_2_ac[0] [0]  
-----  
conv2d_174 (Conv2D)           (None, 6, 6, 256)    172032  
activation_173[0] [0]  
-----  
batch_normalization_171 (BatchN (None, 6, 6, 192)    576  
conv2d_171[0] [0]  
-----  
batch_normalization_174 (BatchN (None, 6, 6, 256)    768  
conv2d_174[0] [0]  
-----  
activation_171 (Activation)    (None, 6, 6, 192)    0  
batch_normalization_171[0] [0]  
-----  
activation_174 (Activation)    (None, 6, 6, 256)    0  
batch_normalization_174[0] [0]  
-----  
block8_3_mixed (Concatenate)   (None, 6, 6, 448)    0  
activation_171[0] [0]  
activation_174[0] [0]  
-----  
block8_3_conv (Conv2D)         (None, 6, 6, 2080)   933920  
block8_3_mixed[0] [0]  
-----  
block8_3 (Lambda)              (None, 6, 6, 2080)   0  
block8_2_ac[0] [0]  
block8_3_conv[0] [0]  
-----  
block8_3_ac (Activation)      (None, 6, 6, 2080)   0          block8_3[0] [0]  
-----  
conv2d_176 (Conv2D)           (None, 6, 6, 192)    399360  
block8_3_ac[0] [0]  
-----  
batch_normalization_176 (BatchN (None, 6, 6, 192)    576  
conv2d_176[0] [0]
```

```
-----  
activation_176 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_176[0] [0]  
  
-----  
conv2d_177 (Conv2D)            (None, 6, 6, 224)    129024  
activation_176[0] [0]  
  
-----  
batch_normalization_177 (BatchN (None, 6, 6, 224)    672  
conv2d_177[0] [0]  
  
-----  
activation_177 (Activation)      (None, 6, 6, 224)      0  
batch_normalization_177[0] [0]  
  
-----  
conv2d_175 (Conv2D)            (None, 6, 6, 192)    399360  
block8_3_ac[0] [0]  
  
-----  
conv2d_178 (Conv2D)            (None, 6, 6, 256)    172032  
activation_177[0] [0]  
  
-----  
batch_normalization_175 (BatchN (None, 6, 6, 192)    576  
conv2d_175[0] [0]  
  
-----  
batch_normalization_178 (BatchN (None, 6, 6, 256)    768  
conv2d_178[0] [0]  
  
-----  
activation_175 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_175[0] [0]  
  
-----  
activation_178 (Activation)      (None, 6, 6, 256)      0  
batch_normalization_178[0] [0]  
  
-----  
block8_4_mixed (Concatenate)    (None, 6, 6, 448)      0  
activation_175[0] [0]  
activation_178[0] [0]  
  
-----  
block8_4_conv (Conv2D)          (None, 6, 6, 2080)   933920
```

```
block8_4_mixed[0] [0]
-----
block8_4 (Lambda)           (None, 6, 6, 2080)  0
block8_3_ac[0] [0]
block8_4_conv[0] [0]
-----
block8_4_ac (Activation)   (None, 6, 6, 2080)  0          block8_4[0] [0]
-----
conv2d_180 (Conv2D)         (None, 6, 6, 192)   399360
block8_4_ac[0] [0]
-----
batch_normalization_180 (BatchN (None, 6, 6, 192)  576
conv2d_180[0] [0]
-----
activation_180 (Activation) (None, 6, 6, 192)   0
batch_normalization_180[0] [0]
-----
conv2d_181 (Conv2D)         (None, 6, 6, 224)   129024
activation_180[0] [0]
-----
batch_normalization_181 (BatchN (None, 6, 6, 224)  672
conv2d_181[0] [0]
-----
activation_181 (Activation) (None, 6, 6, 224)   0
batch_normalization_181[0] [0]
-----
conv2d_179 (Conv2D)         (None, 6, 6, 192)   399360
block8_4_ac[0] [0]
-----
conv2d_182 (Conv2D)         (None, 6, 6, 256)   172032
activation_181[0] [0]
-----
batch_normalization_179 (BatchN (None, 6, 6, 192)  576
conv2d_179[0] [0]
-----
batch_normalization_182 (BatchN (None, 6, 6, 256)   768
```

```
conv2d_182[0] [0]
-----
activation_179 (Activation)      (None, 6, 6, 192)      0
batch_normalization_179[0] [0]
-----
activation_182 (Activation)      (None, 6, 6, 256)      0
batch_normalization_182[0] [0]
-----
block8_5_mixed (Concatenate)    (None, 6, 6, 448)      0
activation_179[0] [0]
activation_182[0] [0]
-----
block8_5_conv (Conv2D)          (None, 6, 6, 2080)    933920
block8_5_mixed[0] [0]
-----
block8_5 (Lambda)               (None, 6, 6, 2080)    0
block8_4_ac[0] [0]
block8_5_conv[0] [0]
-----
block8_5_ac (Activation)        (None, 6, 6, 2080)    0           block8_5[0] [0]
-----
conv2d_184 (Conv2D)             (None, 6, 6, 192)     399360
block8_5_ac[0] [0]
-----
batch_normalization_184 (BatchN (None, 6, 6, 192)     576
conv2d_184[0] [0]
-----
activation_184 (Activation)     (None, 6, 6, 192)     0
batch_normalization_184[0] [0]
-----
conv2d_185 (Conv2D)             (None, 6, 6, 224)    129024
activation_184[0] [0]
-----
batch_normalization_185 (BatchN (None, 6, 6, 224)    672
conv2d_185[0] [0]
```

```
activation_185 (Activation)      (None, 6, 6, 224)      0
batch_normalization_185[0] [0]
-----
conv2d_183 (Conv2D)            (None, 6, 6, 192)    399360
block8_5_ac[0] [0]
-----
conv2d_186 (Conv2D)            (None, 6, 6, 256)    172032
activation_185[0] [0]
-----
batch_normalization_183 (BatchN (None, 6, 6, 192)    576
conv2d_183[0] [0]
-----
batch_normalization_186 (BatchN (None, 6, 6, 256)    768
conv2d_186[0] [0]
-----
activation_183 (Activation)    (None, 6, 6, 192)      0
batch_normalization_183[0] [0]
-----
activation_186 (Activation)    (None, 6, 6, 256)      0
batch_normalization_186[0] [0]
-----
block8_6_mixed (Concatenate)   (None, 6, 6, 448)      0
activation_183[0] [0]
activation_186[0] [0]
-----
block8_6_conv (Conv2D)         (None, 6, 6, 2080)    933920
block8_6_mixed[0] [0]
-----
block8_6 (Lambda)              (None, 6, 6, 2080)    0
block8_5_ac[0] [0]
block8_6_conv[0] [0]
-----
block8_6_ac (Activation)       (None, 6, 6, 2080)    0           block8_6[0] [0]
-----
conv2d_188 (Conv2D)            (None, 6, 6, 192)    399360
block8_6_ac[0] [0]
```

```
-----  
batch_normalization_188 (BatchN (None, 6, 6, 192)      576  
conv2d_188[0] [0]  
  
-----  
activation_188 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_188[0] [0]  
  
-----  
conv2d_189 (Conv2D)            (None, 6, 6, 224)      129024  
activation_188[0] [0]  
  
-----  
batch_normalization_189 (BatchN (None, 6, 6, 224)      672  
conv2d_189[0] [0]  
  
-----  
activation_189 (Activation)      (None, 6, 6, 224)      0  
batch_normalization_189[0] [0]  
  
-----  
conv2d_187 (Conv2D)            (None, 6, 6, 192)      399360  
block8_6_ac[0] [0]  
  
-----  
conv2d_190 (Conv2D)            (None, 6, 6, 256)      172032  
activation_189[0] [0]  
  
-----  
batch_normalization_187 (BatchN (None, 6, 6, 192)      576  
conv2d_187[0] [0]  
  
-----  
batch_normalization_190 (BatchN (None, 6, 6, 256)      768  
conv2d_190[0] [0]  
  
-----  
activation_187 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_187[0] [0]  
  
-----  
activation_190 (Activation)      (None, 6, 6, 256)      0  
batch_normalization_190[0] [0]  
  
-----  
block8_7_mixed (Concatenate)    (None, 6, 6, 448)      0  
activation_187[0] [0]  
activation_190[0] [0]
```

```
-----  
block8_7_conv (Conv2D)           (None, 6, 6, 2080) 933920  
block8_7_mixed[0] [0]  
-----  
block8_7 (Lambda)               (None, 6, 6, 2080) 0  
block8_6_ac[0] [0]  
block8_7_conv[0] [0]  
-----  
block8_7_ac (Activation)       (None, 6, 6, 2080) 0          block8_7[0] [0]  
-----  
conv2d_192 (Conv2D)            (None, 6, 6, 192)   399360  
block8_7_ac[0] [0]  
-----  
batch_normalization_192 (BatchN (None, 6, 6, 192) 576  
conv2d_192[0] [0]  
-----  
activation_192 (Activation)    (None, 6, 6, 192) 0  
batch_normalization_192[0] [0]  
-----  
conv2d_193 (Conv2D)            (None, 6, 6, 224) 129024  
activation_192[0] [0]  
-----  
batch_normalization_193 (BatchN (None, 6, 6, 224) 672  
conv2d_193[0] [0]  
-----  
activation_193 (Activation)    (None, 6, 6, 224) 0  
batch_normalization_193[0] [0]  
-----  
conv2d_191 (Conv2D)            (None, 6, 6, 192) 399360  
block8_7_ac[0] [0]  
-----  
conv2d_194 (Conv2D)            (None, 6, 6, 256) 172032  
activation_193[0] [0]  
-----  
batch_normalization_191 (BatchN (None, 6, 6, 192) 576  
conv2d_191[0] [0]
```

```
-----  
batch_normalization_194 (BatchN (None, 6, 6, 256)      768  
conv2d_194[0] [0]  
  
-----  
activation_191 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_191[0] [0]  
  
-----  
activation_194 (Activation)      (None, 6, 6, 256)      0  
batch_normalization_194[0] [0]  
  
-----  
block8_8_mixed (Concatenate)    (None, 6, 6, 448)      0  
activation_191[0] [0]  
activation_194[0] [0]  
  
-----  
block8_8_conv (Conv2D)          (None, 6, 6, 2080)    933920  
block8_8_mixed[0] [0]  
  
-----  
block8_8 (Lambda)              (None, 6, 6, 2080)    0  
block8_7_ac[0] [0]  
block8_8_conv[0] [0]  
  
-----  
block8_8_ac (Activation)       (None, 6, 6, 2080)    0           block8_8[0] [0]  
  
-----  
conv2d_196 (Conv2D)            (None, 6, 6, 192)     399360  
block8_8_ac[0] [0]  
  
-----  
batch_normalization_196 (BatchN (None, 6, 6, 192)      576  
conv2d_196[0] [0]  
  
-----  
activation_196 (Activation)     (None, 6, 6, 192)      0  
batch_normalization_196[0] [0]  
  
-----  
conv2d_197 (Conv2D)            (None, 6, 6, 224)     129024  
activation_196[0] [0]  
  
-----  
batch_normalization_197 (BatchN (None, 6, 6, 224)      672
```

```
conv2d_197[0] [0]
-----
activation_197 (Activation)      (None, 6, 6, 224)      0
batch_normalization_197[0] [0]
-----
conv2d_195 (Conv2D)            (None, 6, 6, 192)    399360
block8_8_ac[0] [0]
-----
conv2d_198 (Conv2D)            (None, 6, 6, 256)    172032
activation_197[0] [0]
-----
batch_normalization_195 (BatchN (None, 6, 6, 192)    576
conv2d_195[0] [0]
-----
batch_normalization_198 (BatchN (None, 6, 6, 256)    768
conv2d_198[0] [0]
-----
activation_195 (Activation)    (None, 6, 6, 192)      0
batch_normalization_195[0] [0]
-----
activation_198 (Activation)    (None, 6, 6, 256)      0
batch_normalization_198[0] [0]
-----
block8_9_mixed (Concatenate)  (None, 6, 6, 448)      0
activation_195[0] [0]
activation_198[0] [0]
-----
block8_9_conv (Conv2D)         (None, 6, 6, 2080)   933920
block8_9_mixed[0] [0]
-----
block8_9 (Lambda)              (None, 6, 6, 2080)   0
block8_8_ac[0] [0]
block8_9_conv[0] [0]
-----
block8_9_ac (Activation)     (None, 6, 6, 2080)   0           block8_9[0] [0]
```

```
conv2d_200 (Conv2D)           (None, 6, 6, 192)    399360
block8_9_ac[0] [0]
-----
batch_normalization_200 (BatchN (None, 6, 6, 192)    576
conv2d_200[0] [0]
-----
activation_200 (Activation)   (None, 6, 6, 192)    0
batch_normalization_200[0] [0]
-----
conv2d_201 (Conv2D)           (None, 6, 6, 224)    129024
activation_200[0] [0]
-----
batch_normalization_201 (BatchN (None, 6, 6, 224)    672
conv2d_201[0] [0]
-----
activation_201 (Activation)   (None, 6, 6, 224)    0
batch_normalization_201[0] [0]
-----
conv2d_199 (Conv2D)           (None, 6, 6, 192)    399360
block8_9_ac[0] [0]
-----
conv2d_202 (Conv2D)           (None, 6, 6, 256)    172032
activation_201[0] [0]
-----
batch_normalization_199 (BatchN (None, 6, 6, 192)    576
conv2d_199[0] [0]
-----
batch_normalization_202 (BatchN (None, 6, 6, 256)    768
conv2d_202[0] [0]
-----
activation_199 (Activation)   (None, 6, 6, 192)    0
batch_normalization_199[0] [0]
-----
activation_202 (Activation)   (None, 6, 6, 256)    0
batch_normalization_202[0] [0]
```

```

block8_10_mixed (Concatenate)  (None, 6, 6, 448)    0
activation_199[0] [0]
activation_202[0] [0]

-----
block8_10_conv (Conv2D)        (None, 6, 6, 2080)   933920
block8_10_mixed[0] [0]

-----
block8_10 (Lambda)            (None, 6, 6, 2080)   0
block8_9_ac[0] [0]
block8_10_conv[0] [0]

-----
conv_7b (Conv2D)              (None, 6, 6, 1536)   3194880   block8_10[0] [0]

-----
conv_7b_bn (BatchNormalization) (None, 6, 6, 1536)   4608      conv_7b[0] [0]

-----
conv_7b_ac (Activation)       (None, 6, 6, 1536)   0
conv_7b_bn[0] [0]

=====
=====
Total params: 54,336,736
Trainable params: 54,276,192
Non-trainable params: 60,544

```

[16]: # We freeze the model by setting trainable parameter to False
`model.trainable = False`

Now we want to create a model for the experiments by modifying the last output layer of the InceptionResNet model.

[17]:
`output = model.output
output = GlobalAveragePooling2D()(output)
output = Dense(units = 512, activation='relu')(output)
output = Dropout(rate=0.4)(output)
output = Dense(units = 256, activation='relu')(output)
output = Dropout(rate=0.3)(output)
output = Dense(units=11, activation='softmax')(output)
print(output)`

`Tensor("dense_2/Identity:0", shape=(None, 11), dtype=float32)`

[18]:
`model = Model(inputs=model.input, outputs=output)
model.summary()`

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[None, 256, 256, 3]	0	
conv2d (Conv2D)	(None, 127, 127, 32)	864	input_1[0] [0]
batch_normalization (BatchNorma	(None, 127, 127, 32)	96	conv2d[0] [0]
activation (Activation)	(None, 127, 127, 32)	0	batch_normalization[0] [0]
conv2d_1 (Conv2D)	(None, 125, 125, 32)	9216	activation[0] [0]
batch_normalization_1 (BatchNor	(None, 125, 125, 32)	96	conv2d_1[0] [0]
activation_1 (Activation)	(None, 125, 125, 32)	0	batch_normalization_1[0] [0]
conv2d_2 (Conv2D)	(None, 125, 125, 64)	18432	activation_1[0] [0]
batch_normalization_2 (BatchNor	(None, 125, 125, 64)	192	conv2d_2[0] [0]
activation_2 (Activation)	(None, 125, 125, 64)	0	batch_normalization_2[0] [0]
max_pooling2d (MaxPooling2D)	(None, 62, 62, 64)	0	activation_2[0] [0]
conv2d_3 (Conv2D)	(None, 62, 62, 80)	5120	max_pooling2d[0] [0]

```
-----  
batch_normalization_3 (BatchNor (None, 62, 62, 80) 240           conv2d_3[0] [0]  
-----  
activation_3 (Activation)      (None, 62, 62, 80) 0  
batch_normalization_3[0] [0]  
-----  
conv2d_4 (Conv2D)            (None, 60, 60, 192) 138240  
activation_3[0] [0]  
-----  
batch_normalization_4 (BatchNor (None, 60, 60, 192) 576           conv2d_4[0] [0]  
-----  
activation_4 (Activation)      (None, 60, 60, 192) 0  
batch_normalization_4[0] [0]  
-----  
max_pooling2d_1 (MaxPooling2D) (None, 29, 29, 192) 0  
activation_4[0] [0]  
-----  
conv2d_8 (Conv2D)            (None, 29, 29, 64) 12288  
max_pooling2d_1[0] [0]  
-----  
batch_normalization_8 (BatchNor (None, 29, 29, 64) 192           conv2d_8[0] [0]  
-----  
activation_8 (Activation)      (None, 29, 29, 64) 0  
batch_normalization_8[0] [0]  
-----  
conv2d_6 (Conv2D)            (None, 29, 29, 48) 9216  
max_pooling2d_1[0] [0]  
-----  
conv2d_9 (Conv2D)            (None, 29, 29, 96) 55296  
activation_8[0] [0]  
-----  
batch_normalization_6 (BatchNor (None, 29, 29, 48) 144           conv2d_6[0] [0]  
-----  
batch_normalization_9 (BatchNor (None, 29, 29, 96) 288           conv2d_9[0] [0]  
-----
```

```
activation_6 (Activation)      (None, 29, 29, 48)  0
batch_normalization_6[0] [0]

-----
activation_9 (Activation)      (None, 29, 29, 96)  0
batch_normalization_9[0] [0]

-----
average_pooling2d (AveragePooli (None, 29, 29, 192)  0
max_pooling2d_1[0] [0]

-----
conv2d_5 (Conv2D)            (None, 29, 29, 96)  18432
max_pooling2d_1[0] [0]

-----
conv2d_7 (Conv2D)            (None, 29, 29, 64)   76800
activation_6[0] [0]

-----
conv2d_10 (Conv2D)           (None, 29, 29, 96)  82944
activation_9[0] [0]

-----
conv2d_11 (Conv2D)           (None, 29, 29, 64)  12288
average_pooling2d[0] [0]

-----
batch_normalization_5 (BatchNor (None, 29, 29, 96)  288          conv2d_5[0] [0]

-----
batch_normalization_7 (BatchNor (None, 29, 29, 64)  192          conv2d_7[0] [0]

-----
batch_normalization_10 (BatchNo (None, 29, 29, 96)  288          conv2d_10[0] [0]

-----
batch_normalization_11 (BatchNo (None, 29, 29, 64)  192          conv2d_11[0] [0]

-----
activation_5 (Activation)     (None, 29, 29, 96)  0
batch_normalization_5[0] [0]

-----
activation_7 (Activation)     (None, 29, 29, 64)  0
batch_normalization_7[0] [0]
```

```
activation_10 (Activation)      (None, 29, 29, 96)  0
batch_normalization_10[0] [0]
-----
activation_11 (Activation)      (None, 29, 29, 64)  0
batch_normalization_11[0] [0]
-----
mixed_5b (Concatenate)         (None, 29, 29, 320)  0
activation_5[0] [0]
activation_7[0] [0]
activation_10[0] [0]
activation_11[0] [0]
-----
conv2d_15 (Conv2D)             (None, 29, 29, 32)   10240      mixed_5b[0] [0]
-----
batch_normalization_15 (BatchNo (None, 29, 29, 32)   96          conv2d_15[0] [0]
-----
activation_15 (Activation)      (None, 29, 29, 32)  0
batch_normalization_15[0] [0]
-----
conv2d_13 (Conv2D)             (None, 29, 29, 32)   10240      mixed_5b[0] [0]
-----
conv2d_16 (Conv2D)             (None, 29, 29, 48)   13824
activation_15[0] [0]
-----
batch_normalization_13 (BatchNo (None, 29, 29, 32)   96          conv2d_13[0] [0]
-----
batch_normalization_16 (BatchNo (None, 29, 29, 48)   144          conv2d_16[0] [0]
-----
activation_13 (Activation)      (None, 29, 29, 32)  0
batch_normalization_13[0] [0]
-----
activation_16 (Activation)      (None, 29, 29, 48)  0
batch_normalization_16[0] [0]
-----
conv2d_12 (Conv2D)             (None, 29, 29, 32)   10240      mixed_5b[0] [0]
```

```
-----  
conv2d_14 (Conv2D)           (None, 29, 29, 32)  9216  
activation_13[0] [0]  
-----  
conv2d_17 (Conv2D)           (None, 29, 29, 64)  27648  
activation_16[0] [0]  
-----  
batch_normalization_12 (BatchNo (None, 29, 29, 32)  96          conv2d_12[0] [0]  
-----  
batch_normalization_14 (BatchNo (None, 29, 29, 32)  96          conv2d_14[0] [0]  
-----  
batch_normalization_17 (BatchNo (None, 29, 29, 64)  192         conv2d_17[0] [0]  
-----  
activation_12 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_12[0] [0]  
-----  
activation_14 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_14[0] [0]  
-----  
activation_17 (Activation)   (None, 29, 29, 64)  0  
batch_normalization_17[0] [0]  
-----  
block35_1_mixed (Concatenate) (None, 29, 29, 128) 0  
activation_12[0] [0]  
activation_14[0] [0]  
activation_17[0] [0]  
-----  
block35_1_conv (Conv2D)       (None, 29, 29, 320) 41280  
block35_1_mixed[0] [0]  
-----  
block35_1 (Lambda)           (None, 29, 29, 320)  0          mixed_5b[0] [0]  
block35_1_conv[0] [0]  
-----  
block35_1_ac (Activation)   (None, 29, 29, 320)  0          block35_1[0] [0]  
-----  
conv2d_21 (Conv2D)           (None, 29, 29, 32)  10240
```

```
block35_1_ac[0] [0]
-----
batch_normalization_21 (BatchNo (None, 29, 29, 32) 96           conv2d_21[0] [0]
-----
activation_21 (Activation)      (None, 29, 29, 32) 0
batch_normalization_21[0] [0]
-----
conv2d_19 (Conv2D)            (None, 29, 29, 32) 10240
block35_1_ac[0] [0]
-----
conv2d_22 (Conv2D)            (None, 29, 29, 48) 13824
activation_21[0] [0]
-----
batch_normalization_19 (BatchNo (None, 29, 29, 32) 96           conv2d_19[0] [0]
-----
batch_normalization_22 (BatchNo (None, 29, 29, 48) 144           conv2d_22[0] [0]
-----
activation_19 (Activation)    (None, 29, 29, 32) 0
batch_normalization_19[0] [0]
-----
activation_22 (Activation)    (None, 29, 29, 48) 0
batch_normalization_22[0] [0]
-----
conv2d_18 (Conv2D)            (None, 29, 29, 32) 10240
block35_1_ac[0] [0]
-----
conv2d_20 (Conv2D)            (None, 29, 29, 32) 9216
activation_19[0] [0]
-----
conv2d_23 (Conv2D)            (None, 29, 29, 64) 27648
activation_22[0] [0]
-----
batch_normalization_18 (BatchNo (None, 29, 29, 32) 96           conv2d_18[0] [0]
-----
batch_normalization_20 (BatchNo (None, 29, 29, 32) 96           conv2d_20[0] [0]
```

```
-----  
batch_normalization_23 (BatchNo (None, 29, 29, 64) 192           conv2d_23[0] [0]  
-----  
activation_18 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_18[0] [0]  
-----  
activation_20 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_20[0] [0]  
-----  
activation_23 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_23[0] [0]  
-----  
block35_2_mixed (Concatenate)   (None, 29, 29, 128) 0  
activation_18[0] [0]  
activation_20[0] [0]  
activation_23[0] [0]  
-----  
block35_2_conv (Conv2D)         (None, 29, 29, 320) 41280  
block35_2_mixed[0] [0]  
-----  
block35_2 (Lambda)              (None, 29, 29, 320) 0  
block35_1_ac[0] [0]  
block35_2_conv[0] [0]  
-----  
block35_2_ac (Activation)      (None, 29, 29, 320) 0           block35_2[0] [0]  
-----  
conv2d_27 (Conv2D)             (None, 29, 29, 32) 10240  
block35_2_ac[0] [0]  
-----  
batch_normalization_27 (BatchNo (None, 29, 29, 32) 96           conv2d_27[0] [0]  
-----  
activation_27 (Activation)      (None, 29, 29, 32) 0  
batch_normalization_27[0] [0]  
-----  
conv2d_25 (Conv2D)             (None, 29, 29, 32) 10240  
block35_2_ac[0] [0]
```

```
-----  
conv2d_28 (Conv2D)           (None, 29, 29, 48)  13824  
activation_27[0] [0]  
-----  
batch_normalization_25 (BatchNo (None, 29, 29, 32)  96          conv2d_25[0] [0]  
-----  
batch_normalization_28 (BatchNo (None, 29, 29, 48)  144          conv2d_28[0] [0]  
-----  
activation_25 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_25[0] [0]  
-----  
activation_28 (Activation)   (None, 29, 29, 48)  0  
batch_normalization_28[0] [0]  
-----  
conv2d_24 (Conv2D)           (None, 29, 29, 32)  10240  
block35_2_ac[0] [0]  
-----  
conv2d_26 (Conv2D)           (None, 29, 29, 32)  9216  
activation_25[0] [0]  
-----  
conv2d_29 (Conv2D)           (None, 29, 29, 64)  27648  
activation_28[0] [0]  
-----  
batch_normalization_24 (BatchNo (None, 29, 29, 32)  96          conv2d_24[0] [0]  
-----  
batch_normalization_26 (BatchNo (None, 29, 29, 32)  96          conv2d_26[0] [0]  
-----  
batch_normalization_29 (BatchNo (None, 29, 29, 64)  192          conv2d_29[0] [0]  
-----  
activation_24 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_24[0] [0]  
-----  
activation_26 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_26[0] [0]
```

```
-----  
activation_29 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_29[0] [0]  
-----  
-----  
block35_3_mixed (Concatenate)   (None, 29, 29, 128)  0  
activation_24[0] [0]  
activation_26[0] [0]  
activation_29[0] [0]  
-----  
-----  
block35_3_conv (Conv2D)        (None, 29, 29, 320)  41280  
block35_3_mixed[0] [0]  
-----  
-----  
block35_3 (Lambda)             (None, 29, 29, 320)  0  
block35_2_ac[0] [0]  
block35_3_conv[0] [0]  
-----  
-----  
block35_3_ac (Activation)     (None, 29, 29, 320)  0          block35_3[0] [0]  
-----  
-----  
conv2d_33 (Conv2D)            (None, 29, 29, 32)   10240  
block35_3_ac[0] [0]  
-----  
-----  
batch_normalization_33 (BatchNo (None, 29, 29, 32)  96          conv2d_33[0] [0]  
-----  
-----  
activation_33 (Activation)    (None, 29, 29, 32)   0  
batch_normalization_33[0] [0]  
-----  
-----  
conv2d_31 (Conv2D)            (None, 29, 29, 32)   10240  
block35_3_ac[0] [0]  
-----  
-----  
conv2d_34 (Conv2D)            (None, 29, 29, 48)   13824  
activation_33[0] [0]  
-----  
-----  
batch_normalization_31 (BatchNo (None, 29, 29, 32)  96          conv2d_31[0] [0]  
-----  
-----  
batch_normalization_34 (BatchNo (None, 29, 29, 48)  144         conv2d_34[0] [0]  
-----
```

```
activation_31 (Activation)      (None, 29, 29, 32)  0
batch_normalization_31[0] [0]
-----
activation_34 (Activation)      (None, 29, 29, 48)  0
batch_normalization_34[0] [0]
-----
conv2d_30 (Conv2D)            (None, 29, 29, 32)  10240
block35_3_ac[0] [0]
-----
conv2d_32 (Conv2D)            (None, 29, 29, 32)  9216
activation_31[0] [0]
-----
conv2d_35 (Conv2D)            (None, 29, 29, 64)  27648
activation_34[0] [0]
-----
batch_normalization_30 (BatchNo (None, 29, 29, 32)  96           conv2d_30[0] [0]
-----
batch_normalization_32 (BatchNo (None, 29, 29, 32)  96           conv2d_32[0] [0]
-----
batch_normalization_35 (BatchNo (None, 29, 29, 64)  192          conv2d_35[0] [0]
-----
activation_30 (Activation)    (None, 29, 29, 32)  0
batch_normalization_30[0] [0]
-----
activation_32 (Activation)    (None, 29, 29, 32)  0
batch_normalization_32[0] [0]
-----
activation_35 (Activation)    (None, 29, 29, 64)  0
batch_normalization_35[0] [0]
-----
block35_4_mixed (Concatenate) (None, 29, 29, 128)  0
activation_30[0] [0]
activation_32[0] [0]
activation_35[0] [0]
-----
block35_4_conv (Conv2D)       (None, 29, 29, 320) 41280
```

```
block35_4_mixed[0] [0]
-----
block35_4 (Lambda)           (None, 29, 29, 320)  0
block35_3_ac[0] [0]
block35_4_conv[0] [0]
-----
block35_4_ac (Activation)   (None, 29, 29, 320)  0          block35_4[0] [0]
-----
conv2d_39 (Conv2D)          (None, 29, 29, 32)   10240
block35_4_ac[0] [0]
-----
batch_normalization_39 (BatchNo (None, 29, 29, 32)  96          conv2d_39[0] [0]
-----
activation_39 (Activation)  (None, 29, 29, 32)   0
batch_normalization_39[0] [0]
-----
conv2d_37 (Conv2D)          (None, 29, 29, 32)   10240
block35_4_ac[0] [0]
-----
conv2d_40 (Conv2D)          (None, 29, 29, 48)   13824
activation_39[0] [0]
-----
batch_normalization_37 (BatchNo (None, 29, 29, 32)  96          conv2d_37[0] [0]
-----
batch_normalization_40 (BatchNo (None, 29, 29, 48)  144          conv2d_40[0] [0]
-----
activation_37 (Activation)  (None, 29, 29, 32)   0
batch_normalization_37[0] [0]
-----
activation_40 (Activation)  (None, 29, 29, 48)   0
batch_normalization_40[0] [0]
-----
conv2d_36 (Conv2D)          (None, 29, 29, 32)   10240
block35_4_ac[0] [0]
```

```
conv2d_38 (Conv2D)           (None, 29, 29, 32)  9216
activation_37[0] [0]

-----
conv2d_41 (Conv2D)           (None, 29, 29, 64)  27648
activation_40[0] [0]

-----
batch_normalization_36 (BatchNo (None, 29, 29, 32)  96           conv2d_36[0] [0]

-----
batch_normalization_38 (BatchNo (None, 29, 29, 32)  96           conv2d_38[0] [0]

-----
batch_normalization_41 (BatchNo (None, 29, 29, 64)  192          conv2d_41[0] [0]

-----
activation_36 (Activation)   (None, 29, 29, 32)  0
batch_normalization_36[0] [0]

-----
activation_38 (Activation)   (None, 29, 29, 32)  0
batch_normalization_38[0] [0]

-----
activation_41 (Activation)   (None, 29, 29, 64)  0
batch_normalization_41[0] [0]

-----
block35_5_mixed (Concatenate) (None, 29, 29, 128) 0
activation_36[0] [0]
activation_38[0] [0]
activation_41[0] [0]

-----
block35_5_conv (Conv2D)      (None, 29, 29, 320) 41280
block35_5_mixed[0] [0]

-----
block35_5 (Lambda)          (None, 29, 29, 320)  0
block35_4_ac[0] [0]
block35_5_conv[0] [0]

-----
block35_5_ac (Activation)   (None, 29, 29, 320)  0           block35_5[0] [0]

-----
conv2d_45 (Conv2D)           (None, 29, 29, 32)  10240
```

```
block35_5_ac[0] [0]
-----
batch_normalization_45 (BatchNo (None, 29, 29, 32) 96           conv2d_45[0] [0]
-----
activation_45 (Activation)      (None, 29, 29, 32) 0
batch_normalization_45[0] [0]
-----
conv2d_43 (Conv2D)            (None, 29, 29, 32) 10240
block35_5_ac[0] [0]
-----
conv2d_46 (Conv2D)            (None, 29, 29, 48) 13824
activation_45[0] [0]
-----
batch_normalization_43 (BatchNo (None, 29, 29, 32) 96           conv2d_43[0] [0]
-----
batch_normalization_46 (BatchNo (None, 29, 29, 48) 144           conv2d_46[0] [0]
-----
activation_43 (Activation)    (None, 29, 29, 32) 0
batch_normalization_43[0] [0]
-----
activation_46 (Activation)    (None, 29, 29, 48) 0
batch_normalization_46[0] [0]
-----
conv2d_42 (Conv2D)            (None, 29, 29, 32) 10240
block35_5_ac[0] [0]
-----
conv2d_44 (Conv2D)            (None, 29, 29, 32) 9216
activation_43[0] [0]
-----
conv2d_47 (Conv2D)            (None, 29, 29, 64) 27648
activation_46[0] [0]
-----
batch_normalization_42 (BatchNo (None, 29, 29, 32) 96           conv2d_42[0] [0]
-----
batch_normalization_44 (BatchNo (None, 29, 29, 32) 96           conv2d_44[0] [0]
```

```
-----  
batch_normalization_47 (BatchNo (None, 29, 29, 64) 192           conv2d_47[0] [0]  
-----  
activation_42 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_42[0] [0]  
-----  
activation_44 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_44[0] [0]  
-----  
activation_47 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_47[0] [0]  
-----  
block35_6_mixed (Concatenate)   (None, 29, 29, 128) 0  
activation_42[0] [0]  
activation_44[0] [0]  
activation_47[0] [0]  
-----  
block35_6_conv (Conv2D)         (None, 29, 29, 320) 41280  
block35_6_mixed[0] [0]  
-----  
block35_6 (Lambda)              (None, 29, 29, 320) 0  
block35_5_ac[0] [0]  
block35_6_conv[0] [0]  
-----  
block35_6_ac (Activation)      (None, 29, 29, 320) 0           block35_6[0] [0]  
-----  
conv2d_51 (Conv2D)             (None, 29, 29, 32) 10240  
block35_6_ac[0] [0]  
-----  
batch_normalization_51 (BatchNo (None, 29, 29, 32) 96           conv2d_51[0] [0]  
-----  
activation_51 (Activation)      (None, 29, 29, 32) 0  
batch_normalization_51[0] [0]  
-----  
conv2d_49 (Conv2D)             (None, 29, 29, 32) 10240  
block35_6_ac[0] [0]
```

```
-----  
conv2d_52 (Conv2D)           (None, 29, 29, 48)  13824  
activation_51[0] [0]  
-----  
batch_normalization_49 (BatchNo (None, 29, 29, 32)  96          conv2d_49[0] [0]  
-----  
batch_normalization_52 (BatchNo (None, 29, 29, 48)  144          conv2d_52[0] [0]  
-----  
activation_49 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_49[0] [0]  
-----  
activation_52 (Activation)   (None, 29, 29, 48)  0  
batch_normalization_52[0] [0]  
-----  
conv2d_48 (Conv2D)           (None, 29, 29, 32)  10240  
block35_6_ac[0] [0]  
-----  
conv2d_50 (Conv2D)           (None, 29, 29, 32)  9216  
activation_49[0] [0]  
-----  
conv2d_53 (Conv2D)           (None, 29, 29, 64)  27648  
activation_52[0] [0]  
-----  
batch_normalization_48 (BatchNo (None, 29, 29, 32)  96          conv2d_48[0] [0]  
-----  
batch_normalization_50 (BatchNo (None, 29, 29, 32)  96          conv2d_50[0] [0]  
-----  
batch_normalization_53 (BatchNo (None, 29, 29, 64)  192          conv2d_53[0] [0]  
-----  
activation_48 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_48[0] [0]  
-----  
activation_50 (Activation)   (None, 29, 29, 32)  0  
batch_normalization_50[0] [0]
```

```
-----  
activation_53 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_53[0] [0]  
-----  
-----  
block35_7_mixed (Concatenate)   (None, 29, 29, 128)  0  
activation_48[0] [0]  
activation_50[0] [0]  
activation_53[0] [0]  
-----  
-----  
block35_7_conv (Conv2D)         (None, 29, 29, 320) 41280  
block35_7_mixed[0] [0]  
-----  
-----  
block35_7 (Lambda)              (None, 29, 29, 320)  0  
block35_6_ac[0] [0]  
block35_7_conv[0] [0]  
-----  
-----  
block35_7_ac (Activation)       (None, 29, 29, 320)  0          block35_7[0] [0]  
-----  
-----  
conv2d_57 (Conv2D)             (None, 29, 29, 32)   10240  
block35_7_ac[0] [0]  
-----  
-----  
batch_normalization_57 (BatchNo (None, 29, 29, 32)   96          conv2d_57[0] [0]  
-----  
-----  
activation_57 (Activation)     (None, 29, 29, 32)   0  
batch_normalization_57[0] [0]  
-----  
-----  
conv2d_55 (Conv2D)             (None, 29, 29, 32)   10240  
block35_7_ac[0] [0]  
-----  
-----  
conv2d_58 (Conv2D)             (None, 29, 29, 48)   13824  
activation_57[0] [0]  
-----  
-----  
batch_normalization_55 (BatchNo (None, 29, 29, 32)   96          conv2d_55[0] [0]  
-----  
-----  
batch_normalization_58 (BatchNo (None, 29, 29, 48)   144          conv2d_58[0] [0]  
-----
```

```
activation_55 (Activation)      (None, 29, 29, 32)  0
batch_normalization_55[0] [0]
-----
activation_58 (Activation)      (None, 29, 29, 48)  0
batch_normalization_58[0] [0]
-----
conv2d_54 (Conv2D)            (None, 29, 29, 32)  10240
block35_7_ac[0] [0]
-----
conv2d_56 (Conv2D)            (None, 29, 29, 32)  9216
activation_55[0] [0]
-----
conv2d_59 (Conv2D)            (None, 29, 29, 64)  27648
activation_58[0] [0]
-----
batch_normalization_54 (BatchNo (None, 29, 29, 32)  96           conv2d_54[0] [0]
-----
batch_normalization_56 (BatchNo (None, 29, 29, 32)  96           conv2d_56[0] [0]
-----
batch_normalization_59 (BatchNo (None, 29, 29, 64)  192          conv2d_59[0] [0]
-----
activation_54 (Activation)    (None, 29, 29, 32)  0
batch_normalization_54[0] [0]
-----
activation_56 (Activation)    (None, 29, 29, 32)  0
batch_normalization_56[0] [0]
-----
activation_59 (Activation)    (None, 29, 29, 64)  0
batch_normalization_59[0] [0]
-----
block35_8_mixed (Concatenate) (None, 29, 29, 128) 0
activation_54[0] [0]
activation_56[0] [0]
activation_59[0] [0]
-----
block35_8_conv (Conv2D)       (None, 29, 29, 320) 41280
```

```
block35_8_mixed[0] [0]
-----
block35_8 (Lambda)           (None, 29, 29, 320)  0
block35_7_ac[0] [0]
block35_8_conv[0] [0]
-----
block35_8_ac (Activation)   (None, 29, 29, 320)  0          block35_8[0] [0]
-----
conv2d_63 (Conv2D)          (None, 29, 29, 32)   10240
block35_8_ac[0] [0]
-----
batch_normalization_63 (BatchNo (None, 29, 29, 32)  96          conv2d_63[0] [0]
-----
activation_63 (Activation)  (None, 29, 29, 32)   0
batch_normalization_63[0] [0]
-----
conv2d_61 (Conv2D)          (None, 29, 29, 32)   10240
block35_8_ac[0] [0]
-----
conv2d_64 (Conv2D)          (None, 29, 29, 48)   13824
activation_63[0] [0]
-----
batch_normalization_61 (BatchNo (None, 29, 29, 32)  96          conv2d_61[0] [0]
-----
batch_normalization_64 (BatchNo (None, 29, 29, 48)  144          conv2d_64[0] [0]
-----
activation_61 (Activation)  (None, 29, 29, 32)   0
batch_normalization_61[0] [0]
-----
activation_64 (Activation)  (None, 29, 29, 48)   0
batch_normalization_64[0] [0]
-----
conv2d_60 (Conv2D)          (None, 29, 29, 32)   10240
block35_8_ac[0] [0]
```

```
conv2d_62 (Conv2D)           (None, 29, 29, 32)  9216
activation_61[0] [0]

-----
conv2d_65 (Conv2D)           (None, 29, 29, 64)  27648
activation_64[0] [0]

-----
batch_normalization_60 (BatchNo (None, 29, 29, 32)  96           conv2d_60[0] [0]

-----
batch_normalization_62 (BatchNo (None, 29, 29, 32)  96           conv2d_62[0] [0]

-----
batch_normalization_65 (BatchNo (None, 29, 29, 64)  192          conv2d_65[0] [0]

-----
activation_60 (Activation)   (None, 29, 29, 32)  0
batch_normalization_60[0] [0]

-----
activation_62 (Activation)   (None, 29, 29, 32)  0
batch_normalization_62[0] [0]

-----
activation_65 (Activation)   (None, 29, 29, 64)  0
batch_normalization_65[0] [0]

-----
block35_9_mixed (Concatenate) (None, 29, 29, 128) 0
activation_60[0] [0]
activation_62[0] [0]
activation_65[0] [0]

-----
block35_9_conv (Conv2D)      (None, 29, 29, 320) 41280
block35_9_mixed[0] [0]

-----
block35_9 (Lambda)          (None, 29, 29, 320)  0
block35_8_ac[0] [0]
block35_9_conv[0] [0]

-----
block35_9_ac (Activation)   (None, 29, 29, 320)  0           block35_9[0] [0]

-----
conv2d_69 (Conv2D)           (None, 29, 29, 32)  10240
```

```
block35_9_ac[0] [0]
-----
batch_normalization_69 (BatchNo (None, 29, 29, 32) 96           conv2d_69[0] [0]
-----
activation_69 (Activation)      (None, 29, 29, 32) 0
batch_normalization_69[0] [0]
-----
conv2d_67 (Conv2D)            (None, 29, 29, 32) 10240
block35_9_ac[0] [0]
-----
conv2d_70 (Conv2D)            (None, 29, 29, 48) 13824
activation_69[0] [0]
-----
batch_normalization_67 (BatchNo (None, 29, 29, 32) 96           conv2d_67[0] [0]
-----
batch_normalization_70 (BatchNo (None, 29, 29, 48) 144           conv2d_70[0] [0]
-----
activation_67 (Activation)    (None, 29, 29, 32) 0
batch_normalization_67[0] [0]
-----
activation_70 (Activation)    (None, 29, 29, 48) 0
batch_normalization_70[0] [0]
-----
conv2d_66 (Conv2D)            (None, 29, 29, 32) 10240
block35_9_ac[0] [0]
-----
conv2d_68 (Conv2D)            (None, 29, 29, 32) 9216
activation_67[0] [0]
-----
conv2d_71 (Conv2D)            (None, 29, 29, 64) 27648
activation_70[0] [0]
-----
batch_normalization_66 (BatchNo (None, 29, 29, 32) 96           conv2d_66[0] [0]
-----
batch_normalization_68 (BatchNo (None, 29, 29, 32) 96           conv2d_68[0] [0]
```

```
-----  
batch_normalization_71 (BatchNo (None, 29, 29, 64) 192           conv2d_71[0] [0]  
-----  
activation_66 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_66[0] [0]  
-----  
activation_68 (Activation)      (None, 29, 29, 32)  0  
batch_normalization_68[0] [0]  
-----  
activation_71 (Activation)      (None, 29, 29, 64)  0  
batch_normalization_71[0] [0]  
-----  
block35_10_mixed (Concatenate) (None, 29, 29, 128)  0  
activation_66[0] [0]  
activation_68[0] [0]  
activation_71[0] [0]  
-----  
block35_10_conv (Conv2D)       (None, 29, 29, 320) 41280  
block35_10_mixed[0] [0]  
-----  
block35_10 (Lambda)            (None, 29, 29, 320)  0  
block35_9_ac[0] [0]  
block35_10_conv[0] [0]  
-----  
block35_10_ac (Activation)    (None, 29, 29, 320)  0  
block35_10[0] [0]  
-----  
conv2d_73 (Conv2D)            (None, 29, 29, 256) 81920  
block35_10_ac[0] [0]  
-----  
batch_normalization_73 (BatchNo (None, 29, 29, 256) 768           conv2d_73[0] [0]  
-----  
activation_73 (Activation)    (None, 29, 29, 256)  0  
batch_normalization_73[0] [0]  
-----  
conv2d_74 (Conv2D)            (None, 29, 29, 256) 589824
```

```
activation_73[0] [0]
-----
batch_normalization_74 (BatchNo (None, 29, 29, 256) 768           conv2d_74[0] [0]
-----
activation_74 (Activation)      (None, 29, 29, 256) 0
batch_normalization_74[0] [0]
-----
conv2d_72 (Conv2D)            (None, 14, 14, 384) 1105920
block35_10_ac[0] [0]
-----
conv2d_75 (Conv2D)            (None, 14, 14, 384) 884736
activation_74[0] [0]
-----
batch_normalization_72 (BatchNo (None, 14, 14, 384) 1152           conv2d_72[0] [0]
-----
batch_normalization_75 (BatchNo (None, 14, 14, 384) 1152           conv2d_75[0] [0]
-----
activation_72 (Activation)    (None, 14, 14, 384) 0
batch_normalization_72[0] [0]
-----
activation_75 (Activation)    (None, 14, 14, 384) 0
batch_normalization_75[0] [0]
-----
max_pooling2d_2 (MaxPooling2D) (None, 14, 14, 320) 0
block35_10_ac[0] [0]
-----
mixed_6a (Concatenate)       (None, 14, 14, 1088) 0
activation_72[0] [0]
activation_75[0] [0]
max_pooling2d_2[0] [0]
-----
conv2d_77 (Conv2D)           (None, 14, 14, 128) 139264       mixed_6a[0] [0]
-----
batch_normalization_77 (BatchNo (None, 14, 14, 128) 384           conv2d_77[0] [0]
-----
```

```
activation_77 (Activation)      (None, 14, 14, 128)  0
batch_normalization_77[0] [0]

-----
conv2d_78 (Conv2D)            (None, 14, 14, 160)  143360
activation_77[0] [0]

-----
batch_normalization_78 (BatchNo (None, 14, 14, 160)  480           conv2d_78[0] [0]

-----
activation_78 (Activation)      (None, 14, 14, 160)  0
batch_normalization_78[0] [0]

-----
conv2d_76 (Conv2D)            (None, 14, 14, 192)  208896       mixed_6a[0] [0]

-----
conv2d_79 (Conv2D)            (None, 14, 14, 192)  215040
activation_78[0] [0]

-----
batch_normalization_76 (BatchNo (None, 14, 14, 192)  576           conv2d_76[0] [0]

-----
batch_normalization_79 (BatchNo (None, 14, 14, 192)  576           conv2d_79[0] [0]

-----
activation_76 (Activation)      (None, 14, 14, 192)  0
batch_normalization_76[0] [0]

-----
activation_79 (Activation)      (None, 14, 14, 192)  0
batch_normalization_79[0] [0]

-----
block17_1_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_76[0] [0]
activation_79[0] [0]

-----
block17_1_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_1_mixed[0] [0]

-----
block17_1 (Lambda)             (None, 14, 14, 1088) 0           mixed_6a[0] [0]
block17_1_conv[0] [0]
```

```
-----  
block17_1_ac (Activation)      (None, 14, 14, 1088) 0          block17_1[0] [0]  
-----  
-----  
conv2d_81 (Conv2D)           (None, 14, 14, 128) 139264  
block17_1_ac[0] [0]  
-----  
-----  
batch_normalization_81 (BatchNo (None, 14, 14, 128) 384      conv2d_81[0] [0]  
-----  
-----  
activation_81 (Activation)    (None, 14, 14, 128) 0  
batch_normalization_81[0] [0]  
-----  
-----  
conv2d_82 (Conv2D)           (None, 14, 14, 160) 143360  
activation_81[0] [0]  
-----  
-----  
batch_normalization_82 (BatchNo (None, 14, 14, 160) 480      conv2d_82[0] [0]  
-----  
-----  
activation_82 (Activation)    (None, 14, 14, 160) 0  
batch_normalization_82[0] [0]  
-----  
-----  
conv2d_80 (Conv2D)           (None, 14, 14, 192) 208896  
block17_1_ac[0] [0]  
-----  
-----  
conv2d_83 (Conv2D)           (None, 14, 14, 192) 215040  
activation_82[0] [0]  
-----  
-----  
batch_normalization_80 (BatchNo (None, 14, 14, 192) 576      conv2d_80[0] [0]  
-----  
-----  
batch_normalization_83 (BatchNo (None, 14, 14, 192) 576      conv2d_83[0] [0]  
-----  
-----  
activation_80 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_80[0] [0]  
-----  
-----  
activation_83 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_83[0] [0]  
-----  
-----
```

```
block17_2_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_80[0] [0]
activation_83[0] [0]

-----
block17_2_conv (Conv2D)          (None, 14, 14, 1088) 418880
block17_2_mixed[0] [0]

-----
block17_2 (Lambda)              (None, 14, 14, 1088) 0
block17_1_ac[0] [0]
block17_2_conv[0] [0]

-----
block17_2_ac (Activation)       (None, 14, 14, 1088) 0           block17_2[0] [0]

-----
conv2d_85 (Conv2D)              (None, 14, 14, 128) 139264
block17_2_ac[0] [0]

-----
batch_normalization_85 (BatchNo (None, 14, 14, 128) 384           conv2d_85[0] [0]

-----
activation_85 (Activation)      (None, 14, 14, 128) 0
batch_normalization_85[0] [0]

-----
conv2d_86 (Conv2D)              (None, 14, 14, 160) 143360
activation_85[0] [0]

-----
batch_normalization_86 (BatchNo (None, 14, 14, 160) 480           conv2d_86[0] [0]

-----
activation_86 (Activation)      (None, 14, 14, 160) 0
batch_normalization_86[0] [0]

-----
conv2d_84 (Conv2D)              (None, 14, 14, 192) 208896
block17_2_ac[0] [0]

-----
conv2d_87 (Conv2D)              (None, 14, 14, 192) 215040
activation_86[0] [0]

-----
batch_normalization_84 (BatchNo (None, 14, 14, 192) 576           conv2d_84[0] [0]
```

```
-----  
batch_normalization_87 (BatchNo (None, 14, 14, 192) 576           conv2d_87[0] [0]  
-----  
activation_84 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_84[0] [0]  
-----  
activation_87 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_87[0] [0]  
-----  
block17_3_mixed (Concatenate)   (None, 14, 14, 384)  0  
activation_84[0] [0]  
activation_87[0] [0]  
-----  
block17_3_conv (Conv2D)         (None, 14, 14, 1088) 418880  
block17_3_mixed[0] [0]  
-----  
block17_3 (Lambda)              (None, 14, 14, 1088) 0  
block17_2_ac[0] [0]  
block17_3_conv[0] [0]  
-----  
block17_3_ac (Activation)      (None, 14, 14, 1088) 0           block17_3[0] [0]  
-----  
conv2d_89 (Conv2D)              (None, 14, 14, 128)  139264  
block17_3_ac[0] [0]  
-----  
batch_normalization_89 (BatchNo (None, 14, 14, 128) 384           conv2d_89[0] [0]  
-----  
activation_89 (Activation)      (None, 14, 14, 128)  0  
batch_normalization_89[0] [0]  
-----  
conv2d_90 (Conv2D)              (None, 14, 14, 160)  143360  
activation_89[0] [0]  
-----  
batch_normalization_90 (BatchNo (None, 14, 14, 160) 480           conv2d_90[0] [0]  
-----
```

```
activation_90 (Activation)      (None, 14, 14, 160)  0
batch_normalization_90[0] [0]

-----
conv2d_88 (Conv2D)            (None, 14, 14, 192)  208896
block17_3_ac[0] [0]

-----
conv2d_91 (Conv2D)            (None, 14, 14, 192)  215040
activation_90[0] [0]

-----
batch_normalization_88 (BatchNo (None, 14, 14, 192) 576           conv2d_88[0] [0]

-----
batch_normalization_91 (BatchNo (None, 14, 14, 192) 576           conv2d_91[0] [0]

-----
activation_88 (Activation)    (None, 14, 14, 192)  0
batch_normalization_88[0] [0]

-----
activation_91 (Activation)    (None, 14, 14, 192)  0
batch_normalization_91[0] [0]

-----
block17_4_mixed (Concatenate) (None, 14, 14, 384)  0
activation_88[0] [0]
activation_91[0] [0]

-----
block17_4_conv (Conv2D)       (None, 14, 14, 1088) 418880
block17_4_mixed[0] [0]

-----
block17_4 (Lambda)           (None, 14, 14, 1088) 0
block17_3_ac[0] [0]
block17_4_conv[0] [0]

-----
block17_4_ac (Activation)    (None, 14, 14, 1088) 0           block17_4[0] [0]

-----
conv2d_93 (Conv2D)           (None, 14, 14, 128)   139264
block17_4_ac[0] [0]

-----
batch_normalization_93 (BatchNo (None, 14, 14, 128) 384           conv2d_93[0] [0]
```

```
-----  
activation_93 (Activation)      (None, 14, 14, 128)  0  
batch_normalization_93[0] [0]  
  
-----  
conv2d_94 (Conv2D)            (None, 14, 14, 160)  143360  
activation_93[0] [0]  
  
-----  
batch_normalization_94 (BatchNo (None, 14, 14, 160)  480           conv2d_94[0] [0]  
  
-----  
activation_94 (Activation)      (None, 14, 14, 160)  0  
batch_normalization_94[0] [0]  
  
-----  
conv2d_92 (Conv2D)            (None, 14, 14, 192)  208896  
block17_4_ac[0] [0]  
  
-----  
conv2d_95 (Conv2D)            (None, 14, 14, 192)  215040  
activation_94[0] [0]  
  
-----  
batch_normalization_92 (BatchNo (None, 14, 14, 192)  576           conv2d_92[0] [0]  
  
-----  
batch_normalization_95 (BatchNo (None, 14, 14, 192)  576           conv2d_95[0] [0]  
  
-----  
activation_92 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_92[0] [0]  
  
-----  
activation_95 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_95[0] [0]  
  
-----  
block17_5_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_92[0] [0]  
activation_95[0] [0]  
  
-----  
block17_5_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_5_mixed[0] [0]  
  
-----
```

```
block17_5 (Lambda)           (None, 14, 14, 1088) 0
block17_4_ac[0] [0]
block17_5_conv[0] [0]

-----
-----  
block17_5_ac (Activation)      (None, 14, 14, 1088) 0          block17_5[0] [0]

-----
-----  
conv2d_97 (Conv2D)           (None, 14, 14, 128) 139264
block17_5_ac[0] [0]

-----
-----  
batch_normalization_97 (BatchNo (None, 14, 14, 128) 384        conv2d_97[0] [0]

-----
-----  
activation_97 (Activation)     (None, 14, 14, 128) 0
batch_normalization_97[0] [0]

-----
-----  
conv2d_98 (Conv2D)           (None, 14, 14, 160) 143360
activation_97[0] [0]

-----
-----  
batch_normalization_98 (BatchNo (None, 14, 14, 160) 480        conv2d_98[0] [0]

-----
-----  
activation_98 (Activation)     (None, 14, 14, 160) 0
batch_normalization_98[0] [0]

-----
-----  
conv2d_96 (Conv2D)           (None, 14, 14, 192) 208896
block17_5_ac[0] [0]

-----
-----  
conv2d_99 (Conv2D)           (None, 14, 14, 192) 215040
activation_98[0] [0]

-----
-----  
batch_normalization_96 (BatchNo (None, 14, 14, 192) 576        conv2d_96[0] [0]

-----
-----  
batch_normalization_99 (BatchNo (None, 14, 14, 192) 576        conv2d_99[0] [0]

-----
-----  
activation_96 (Activation)     (None, 14, 14, 192) 0
batch_normalization_96[0] [0]
```

```
activation_99 (Activation)      (None, 14, 14, 192)  0
batch_normalization_99[0] [0]
-----
-----  
block17_6_mixed (Concatenate)   (None, 14, 14, 384)  0
activation_96[0] [0]
activation_99[0] [0]
-----
-----  
block17_6_conv (Conv2D)         (None, 14, 14, 1088) 418880
block17_6_mixed[0] [0]
-----
-----  
block17_6 (Lambda)             (None, 14, 14, 1088) 0
block17_5_ac[0] [0]
block17_6_conv[0] [0]
-----
-----  
block17_6_ac (Activation)     (None, 14, 14, 1088) 0          block17_6[0] [0]
-----
-----  
conv2d_101 (Conv2D)           (None, 14, 14, 128)   139264
block17_6_ac[0] [0]
-----
-----  
batch_normalization_101 (BatchN (None, 14, 14, 128) 384
conv2d_101[0] [0]
-----
-----  
activation_101 (Activation)    (None, 14, 14, 128)  0
batch_normalization_101[0] [0]
-----
-----  
conv2d_102 (Conv2D)           (None, 14, 14, 160)  143360
activation_101[0] [0]
-----
-----  
batch_normalization_102 (BatchN (None, 14, 14, 160) 480
conv2d_102[0] [0]
-----
-----  
activation_102 (Activation)    (None, 14, 14, 160)  0
batch_normalization_102[0] [0]
-----
-----  
conv2d_100 (Conv2D)           (None, 14, 14, 192) 208896
block17_6_ac[0] [0]
```

```
-----  
conv2d_103 (Conv2D)           (None, 14, 14, 192) 215040  
activation_102[0] [0]  
-----  
batch_normalization_100 (BatchN (None, 14, 14, 192) 576  
conv2d_100[0] [0]  
-----  
batch_normalization_103 (BatchN (None, 14, 14, 192) 576  
conv2d_103[0] [0]  
-----  
activation_100 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_100[0] [0]  
-----  
activation_103 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_103[0] [0]  
-----  
block17_7_mixed (Concatenate) (None, 14, 14, 384) 0  
activation_100[0] [0]  
activation_103[0] [0]  
-----  
block17_7_conv (Conv2D)       (None, 14, 14, 1088) 418880  
block17_7_mixed[0] [0]  
-----  
block17_7 (Lambda)           (None, 14, 14, 1088) 0  
block17_6_ac[0] [0]  
block17_7_conv[0] [0]  
-----  
block17_7_ac (Activation)    (None, 14, 14, 1088) 0          block17_7[0] [0]  
-----  
conv2d_105 (Conv2D)          (None, 14, 14, 128) 139264  
block17_7_ac[0] [0]  
-----  
batch_normalization_105 (BatchN (None, 14, 14, 128) 384  
conv2d_105[0] [0]  
-----  
activation_105 (Activation)   (None, 14, 14, 128) 0  
batch_normalization_105[0] [0]
```

```
-----  
conv2d_106 (Conv2D)           (None, 14, 14, 160) 143360  
activation_105[0] [0]  
  
-----  
batch_normalization_106 (BatchN (None, 14, 14, 160) 480  
conv2d_106[0] [0]  
  
-----  
activation_106 (Activation)   (None, 14, 14, 160) 0  
batch_normalization_106[0] [0]  
  
-----  
conv2d_104 (Conv2D)           (None, 14, 14, 192) 208896  
block17_7_ac[0] [0]  
  
-----  
conv2d_107 (Conv2D)           (None, 14, 14, 192) 215040  
activation_106[0] [0]  
  
-----  
batch_normalization_104 (BatchN (None, 14, 14, 192) 576  
conv2d_104[0] [0]  
  
-----  
batch_normalization_107 (BatchN (None, 14, 14, 192) 576  
conv2d_107[0] [0]  
  
-----  
activation_104 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_104[0] [0]  
  
-----  
activation_107 (Activation)   (None, 14, 14, 192) 0  
batch_normalization_107[0] [0]  
  
-----  
block17_8_mixed (Concatenate) (None, 14, 14, 384) 0  
activation_104[0] [0]  
activation_107[0] [0]  
  
-----  
block17_8_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_8_mixed[0] [0]  
  
-----  
block17_8 (Lambda)            (None, 14, 14, 1088) 0
```

```
block17_7_ac[0][0]
block17_8_conv[0][0]

-----
-----  
block17_8_ac (Activation)      (None, 14, 14, 1088) 0          block17_8[0][0]
-----  
-----  
conv2d_109 (Conv2D)           (None, 14, 14, 128) 139264
block17_8_ac[0][0]
-----  
-----  
batch_normalization_109 (BatchN (None, 14, 14, 128) 384
conv2d_109[0][0]
-----  
-----  
activation_109 (Activation)    (None, 14, 14, 128) 0
batch_normalization_109[0][0]
-----  
-----  
conv2d_110 (Conv2D)           (None, 14, 14, 160) 143360
activation_109[0][0]
-----  
-----  
batch_normalization_110 (BatchN (None, 14, 14, 160) 480
conv2d_110[0][0]
-----  
-----  
activation_110 (Activation)    (None, 14, 14, 160) 0
batch_normalization_110[0][0]
-----  
-----  
conv2d_108 (Conv2D)           (None, 14, 14, 192) 208896
block17_8_ac[0][0]
-----  
-----  
conv2d_111 (Conv2D)           (None, 14, 14, 192) 215040
activation_110[0][0]
-----  
-----  
batch_normalization_108 (BatchN (None, 14, 14, 192) 576
conv2d_108[0][0]
-----  
-----  
batch_normalization_111 (BatchN (None, 14, 14, 192) 576
conv2d_111[0][0]
-----  
-----  
activation_108 (Activation)    (None, 14, 14, 192) 0
```

```
batch_normalization_108[0] [0]
-----
activation_111 (Activation)      (None, 14, 14, 192)  0
batch_normalization_111[0] [0]
-----
block17_9_mixed (Concatenate)   (None, 14, 14, 384)  0
activation_108[0] [0]
activation_111[0] [0]
-----
block17_9_conv (Conv2D)         (None, 14, 14, 1088) 418880
block17_9_mixed[0] [0]
-----
block17_9 (Lambda)             (None, 14, 14, 1088)  0
block17_8_ac[0] [0]
block17_9_conv[0] [0]
-----
block17_9_ac (Activation)     (None, 14, 14, 1088)  0           block17_9[0] [0]
-----
conv2d_113 (Conv2D)            (None, 14, 14, 128)   139264
block17_9_ac[0] [0]
-----
batch_normalization_113 (BatchN (None, 14, 14, 128)  384
conv2d_113[0] [0]
-----
activation_113 (Activation)    (None, 14, 14, 128)  0
batch_normalization_113[0] [0]
-----
conv2d_114 (Conv2D)            (None, 14, 14, 160)  143360
activation_113[0] [0]
-----
batch_normalization_114 (BatchN (None, 14, 14, 160)  480
conv2d_114[0] [0]
-----
activation_114 (Activation)    (None, 14, 14, 160)  0
batch_normalization_114[0] [0]
```

```
conv2d_112 (Conv2D)           (None, 14, 14, 192)  208896
block17_9_ac[0] [0]

-----
conv2d_115 (Conv2D)           (None, 14, 14, 192)  215040
activation_114[0] [0]

-----
batch_normalization_112 (BatchN (None, 14, 14, 192)  576
conv2d_112[0] [0]

-----
batch_normalization_115 (BatchN (None, 14, 14, 192)  576
conv2d_115[0] [0]

-----
activation_112 (Activation)   (None, 14, 14, 192)  0
batch_normalization_112[0] [0]

-----
activation_115 (Activation)   (None, 14, 14, 192)  0
batch_normalization_115[0] [0]

-----
block17_10_mixed (Concatenate) (None, 14, 14, 384)  0
activation_112[0] [0]
activation_115[0] [0]

-----
block17_10_conv (Conv2D)      (None, 14, 14, 1088) 418880
block17_10_mixed[0] [0]

-----
block17_10 (Lambda)          (None, 14, 14, 1088) 0
block17_9_ac[0] [0]
block17_10_conv[0] [0]

-----
block17_10_ac (Activation)   (None, 14, 14, 1088) 0
block17_10[0] [0]

-----
conv2d_117 (Conv2D)          (None, 14, 14, 128)   139264
block17_10_ac[0] [0]

-----
batch_normalization_117 (BatchN (None, 14, 14, 128)  384
conv2d_117[0] [0]
```

```
-----  
activation_117 (Activation)      (None, 14, 14, 128)  0  
batch_normalization_117[0] [0]  
  
-----  
conv2d_118 (Conv2D)            (None, 14, 14, 160)  143360  
activation_117[0] [0]  
  
-----  
batch_normalization_118 (BatchN (None, 14, 14, 160)  480  
conv2d_118[0] [0]  
  
-----  
activation_118 (Activation)      (None, 14, 14, 160)  0  
batch_normalization_118[0] [0]  
  
-----  
conv2d_116 (Conv2D)            (None, 14, 14, 192)  208896  
block17_10_ac[0] [0]  
  
-----  
conv2d_119 (Conv2D)            (None, 14, 14, 192)  215040  
activation_118[0] [0]  
  
-----  
batch_normalization_116 (BatchN (None, 14, 14, 192)  576  
conv2d_116[0] [0]  
  
-----  
batch_normalization_119 (BatchN (None, 14, 14, 192)  576  
conv2d_119[0] [0]  
  
-----  
activation_116 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_116[0] [0]  
  
-----  
activation_119 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_119[0] [0]  
  
-----  
block17_11_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_116[0] [0]  
activation_119[0] [0]  
  
-----  
block17_11_conv (Conv2D)        (None, 14, 14, 1088) 418880
```

```
block17_11_mixed[0] [0]
-----
block17_11 (Lambda)           (None, 14, 14, 1088) 0
block17_10_ac[0] [0]
block17_11_conv[0] [0]
-----
block17_11_ac (Activation)   (None, 14, 14, 1088) 0
block17_11[0] [0]
-----
conv2d_121 (Conv2D)          (None, 14, 14, 128) 139264
block17_11_ac[0] [0]
-----
batch_normalization_121 (BatchN (None, 14, 14, 128) 384
conv2d_121[0] [0]
-----
activation_121 (Activation) (None, 14, 14, 128) 0
batch_normalization_121[0] [0]
-----
conv2d_122 (Conv2D)          (None, 14, 14, 160) 143360
activation_121[0] [0]
-----
batch_normalization_122 (BatchN (None, 14, 14, 160) 480
conv2d_122[0] [0]
-----
activation_122 (Activation) (None, 14, 14, 160) 0
batch_normalization_122[0] [0]
-----
conv2d_120 (Conv2D)          (None, 14, 14, 192) 208896
block17_11_ac[0] [0]
-----
conv2d_123 (Conv2D)          (None, 14, 14, 192) 215040
activation_122[0] [0]
-----
batch_normalization_120 (BatchN (None, 14, 14, 192) 576
conv2d_120[0] [0]
```

```
batch_normalization_123 (BatchN (None, 14, 14, 192) 576
conv2d_123[0] [0]
-----
activation_120 (Activation)      (None, 14, 14, 192) 0
batch_normalization_120[0] [0]
-----
activation_123 (Activation)      (None, 14, 14, 192) 0
batch_normalization_123[0] [0]
-----
block17_12_mixed (Concatenate)  (None, 14, 14, 384) 0
activation_120[0] [0]
activation_123[0] [0]
-----
block17_12_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_12_mixed[0] [0]
-----
block17_12 (Lambda)            (None, 14, 14, 1088) 0
block17_11_ac[0] [0]
block17_12_conv[0] [0]
-----
block17_12_ac (Activation)     (None, 14, 14, 1088) 0
block17_12[0] [0]
-----
conv2d_125 (Conv2D)           (None, 14, 14, 128) 139264
block17_12_ac[0] [0]
-----
batch_normalization_125 (BatchN (None, 14, 14, 128) 384
conv2d_125[0] [0]
-----
activation_125 (Activation)    (None, 14, 14, 128) 0
batch_normalization_125[0] [0]
-----
conv2d_126 (Conv2D)           (None, 14, 14, 160) 143360
activation_125[0] [0]
-----
batch_normalization_126 (BatchN (None, 14, 14, 160) 480
conv2d_126[0] [0]
```

```
-----  
activation_126 (Activation)      (None, 14, 14, 160)  0  
batch_normalization_126[0] [0]  
  
-----  
conv2d_124 (Conv2D)            (None, 14, 14, 192)  208896  
block17_12_ac[0] [0]  
  
-----  
conv2d_127 (Conv2D)            (None, 14, 14, 192)  215040  
activation_126[0] [0]  
  
-----  
batch_normalization_124 (BatchN (None, 14, 14, 192)  576  
conv2d_124[0] [0]  
  
-----  
batch_normalization_127 (BatchN (None, 14, 14, 192)  576  
conv2d_127[0] [0]  
  
-----  
activation_124 (Activation)     (None, 14, 14, 192)  0  
batch_normalization_124[0] [0]  
  
-----  
activation_127 (Activation)     (None, 14, 14, 192)  0  
batch_normalization_127[0] [0]  
  
-----  
block17_13_mixed (Concatenate) (None, 14, 14, 384)  0  
activation_124[0] [0]  
activation_127[0] [0]  
  
-----  
block17_13_conv (Conv2D)       (None, 14, 14, 1088) 418880  
block17_13_mixed[0] [0]  
  
-----  
block17_13 (Lambda)            (None, 14, 14, 1088) 0  
block17_12_ac[0] [0]  
block17_13_conv[0] [0]  
  
-----  
block17_13_ac (Activation)    (None, 14, 14, 1088) 0  
block17_13[0] [0]  
  
-----
```

```
conv2d_129 (Conv2D)           (None, 14, 14, 128) 139264
block17_13_ac[0] [0]
-----
batch_normalization_129 (BatchN (None, 14, 14, 128) 384
conv2d_129[0] [0]
-----
activation_129 (Activation)   (None, 14, 14, 128) 0
batch_normalization_129[0] [0]
-----
conv2d_130 (Conv2D)           (None, 14, 14, 160) 143360
activation_129[0] [0]
-----
batch_normalization_130 (BatchN (None, 14, 14, 160) 480
conv2d_130[0] [0]
-----
activation_130 (Activation)   (None, 14, 14, 160) 0
batch_normalization_130[0] [0]
-----
conv2d_128 (Conv2D)           (None, 14, 14, 192) 208896
block17_13_ac[0] [0]
-----
conv2d_131 (Conv2D)           (None, 14, 14, 192) 215040
activation_130[0] [0]
-----
batch_normalization_128 (BatchN (None, 14, 14, 192) 576
conv2d_128[0] [0]
-----
batch_normalization_131 (BatchN (None, 14, 14, 192) 576
conv2d_131[0] [0]
-----
activation_128 (Activation)   (None, 14, 14, 192) 0
batch_normalization_128[0] [0]
-----
activation_131 (Activation)   (None, 14, 14, 192) 0
batch_normalization_131[0] [0]
```

```
block17_14_mixed (Concatenate)  (None, 14, 14, 384)  0
activation_128[0] [0]
activation_131[0] [0]

-----
block17_14_conv (Conv2D)      (None, 14, 14, 1088) 418880
block17_14_mixed[0] [0]

-----
block17_14 (Lambda)          (None, 14, 14, 1088) 0
block17_13_ac[0] [0]
block17_14_conv[0] [0]

-----
block17_14_ac (Activation)   (None, 14, 14, 1088) 0
block17_14[0] [0]

-----
conv2d_133 (Conv2D)          (None, 14, 14, 128) 139264
block17_14_ac[0] [0]

-----
batch_normalization_133 (BatchN (None, 14, 14, 128) 384
conv2d_133[0] [0]

-----
activation_133 (Activation)  (None, 14, 14, 128) 0
batch_normalization_133[0] [0]

-----
conv2d_134 (Conv2D)          (None, 14, 14, 160) 143360
activation_133[0] [0]

-----
batch_normalization_134 (BatchN (None, 14, 14, 160) 480
conv2d_134[0] [0]

-----
activation_134 (Activation)  (None, 14, 14, 160) 0
batch_normalization_134[0] [0]

-----
conv2d_132 (Conv2D)          (None, 14, 14, 192) 208896
block17_14_ac[0] [0]

-----
conv2d_135 (Conv2D)          (None, 14, 14, 192) 215040
activation_134[0] [0]
```

```
-----  
batch_normalization_132 (BatchN (None, 14, 14, 192) 576  
conv2d_132[0] [0]  
  
-----  
batch_normalization_135 (BatchN (None, 14, 14, 192) 576  
conv2d_135[0] [0]  
  
-----  
activation_132 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_132[0] [0]  
  
-----  
activation_135 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_135[0] [0]  
  
-----  
block17_15_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_132[0] [0]  
activation_135[0] [0]  
  
-----  
block17_15_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_15_mixed[0] [0]  
  
-----  
block17_15 (Lambda)            (None, 14, 14, 1088) 0  
block17_14_ac[0] [0]  
block17_15_conv[0] [0]  
  
-----  
block17_15_ac (Activation)     (None, 14, 14, 1088) 0  
block17_15[0] [0]  
  
-----  
conv2d_137 (Conv2D)           (None, 14, 14, 128)   139264  
block17_15_ac[0] [0]  
  
-----  
batch_normalization_137 (BatchN (None, 14, 14, 128) 384  
conv2d_137[0] [0]  
  
-----  
activation_137 (Activation)    (None, 14, 14, 128)  0  
batch_normalization_137[0] [0]  
  
-----
```

```
conv2d_138 (Conv2D)           (None, 14, 14, 160) 143360
activation_137[0] [0]

-----
batch_normalization_138 (BatchN (None, 14, 14, 160) 480
conv2d_138[0] [0]

-----
activation_138 (Activation)   (None, 14, 14, 160) 0
batch_normalization_138[0] [0]

-----
conv2d_136 (Conv2D)           (None, 14, 14, 192) 208896
block17_15_ac[0] [0]

-----
conv2d_139 (Conv2D)           (None, 14, 14, 192) 215040
activation_138[0] [0]

-----
batch_normalization_136 (BatchN (None, 14, 14, 192) 576
conv2d_136[0] [0]

-----
batch_normalization_139 (BatchN (None, 14, 14, 192) 576
conv2d_139[0] [0]

-----
activation_136 (Activation)   (None, 14, 14, 192) 0
batch_normalization_136[0] [0]

-----
activation_139 (Activation)   (None, 14, 14, 192) 0
batch_normalization_139[0] [0]

-----
block17_16_mixed (Concatenate) (None, 14, 14, 384) 0
activation_136[0] [0]
activation_139[0] [0]

-----
block17_16_conv (Conv2D)       (None, 14, 14, 1088) 418880
block17_16_mixed[0] [0]

-----
block17_16 (Lambda)           (None, 14, 14, 1088) 0
block17_15_ac[0] [0]
block17_16_conv[0] [0]
```

```
-----  
block17_16_ac (Activation)      (None, 14, 14, 1088) 0  
block17_16[0] [0]  
  
-----  
conv2d_141 (Conv2D)           (None, 14, 14, 128) 139264  
block17_16_ac[0] [0]  
  
-----  
batch_normalization_141 (BatchN (None, 14, 14, 128) 384  
conv2d_141[0] [0]  
  
-----  
activation_141 (Activation)    (None, 14, 14, 128) 0  
batch_normalization_141[0] [0]  
  
-----  
conv2d_142 (Conv2D)           (None, 14, 14, 160) 143360  
activation_141[0] [0]  
  
-----  
batch_normalization_142 (BatchN (None, 14, 14, 160) 480  
conv2d_142[0] [0]  
  
-----  
activation_142 (Activation)    (None, 14, 14, 160) 0  
batch_normalization_142[0] [0]  
  
-----  
conv2d_140 (Conv2D)           (None, 14, 14, 192) 208896  
block17_16_ac[0] [0]  
  
-----  
conv2d_143 (Conv2D)           (None, 14, 14, 192) 215040  
activation_142[0] [0]  
  
-----  
batch_normalization_140 (BatchN (None, 14, 14, 192) 576  
conv2d_140[0] [0]  
  
-----  
batch_normalization_143 (BatchN (None, 14, 14, 192) 576  
conv2d_143[0] [0]  
  
-----  
activation_140 (Activation)    (None, 14, 14, 192) 0  
batch_normalization_140[0] [0]
```

```
-----  
activation_143 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_143[0] [0]  
  
-----  
block17_17_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_140[0] [0]  
activation_143[0] [0]  
  
-----  
block17_17_conv (Conv2D)        (None, 14, 14, 1088) 418880  
block17_17_mixed[0] [0]  
  
-----  
block17_17 (Lambda)            (None, 14, 14, 1088)  0  
block17_16_ac[0] [0]  
block17_17_conv[0] [0]  
  
-----  
block17_17_ac (Activation)     (None, 14, 14, 1088)  0  
block17_17[0] [0]  
  
-----  
conv2d_145 (Conv2D)           (None, 14, 14, 128)   139264  
block17_17_ac[0] [0]  
  
-----  
batch_normalization_145 (BatchN (None, 14, 14, 128)  384  
conv2d_145[0] [0]  
  
-----  
activation_145 (Activation)    (None, 14, 14, 128)  0  
batch_normalization_145[0] [0]  
  
-----  
conv2d_146 (Conv2D)           (None, 14, 14, 160)   143360  
activation_145[0] [0]  
  
-----  
batch_normalization_146 (BatchN (None, 14, 14, 160)  480  
conv2d_146[0] [0]  
  
-----  
activation_146 (Activation)    (None, 14, 14, 160)  0  
batch_normalization_146[0] [0]  
  
-----
```

```
conv2d_144 (Conv2D)           (None, 14, 14, 192) 208896
block17_17_ac[0] [0]

-----
conv2d_147 (Conv2D)           (None, 14, 14, 192) 215040
activation_146[0] [0]

-----
batch_normalization_144 (BatchN (None, 14, 14, 192) 576
conv2d_144[0] [0]

-----
batch_normalization_147 (BatchN (None, 14, 14, 192) 576
conv2d_147[0] [0]

-----
activation_144 (Activation)   (None, 14, 14, 192) 0
batch_normalization_144[0] [0]

-----
activation_147 (Activation)   (None, 14, 14, 192) 0
batch_normalization_147[0] [0]

-----
block17_18_mixed (Concatenate) (None, 14, 14, 384) 0
activation_144[0] [0]
activation_147[0] [0]

-----
block17_18_conv (Conv2D)      (None, 14, 14, 1088) 418880
block17_18_mixed[0] [0]

-----
block17_18 (Lambda)          (None, 14, 14, 1088) 0
block17_17_ac[0] [0]
block17_18_conv[0] [0]

-----
block17_18_ac (Activation)   (None, 14, 14, 1088) 0
block17_18[0] [0]

-----
conv2d_149 (Conv2D)          (None, 14, 14, 128) 139264
block17_18_ac[0] [0]

-----
batch_normalization_149 (BatchN (None, 14, 14, 128) 384
conv2d_149[0] [0]
```

```
-----  
activation_149 (Activation)      (None, 14, 14, 128)  0  
batch_normalization_149[0] [0]  
  
-----  
conv2d_150 (Conv2D)            (None, 14, 14, 160)  143360  
activation_149[0] [0]  
  
-----  
batch_normalization_150 (BatchN (None, 14, 14, 160)  480  
conv2d_150[0] [0]  
  
-----  
activation_150 (Activation)      (None, 14, 14, 160)  0  
batch_normalization_150[0] [0]  
  
-----  
conv2d_148 (Conv2D)            (None, 14, 14, 192)  208896  
block17_18_ac[0] [0]  
  
-----  
conv2d_151 (Conv2D)            (None, 14, 14, 192)  215040  
activation_150[0] [0]  
  
-----  
batch_normalization_148 (BatchN (None, 14, 14, 192)  576  
conv2d_148[0] [0]  
  
-----  
batch_normalization_151 (BatchN (None, 14, 14, 192)  576  
conv2d_151[0] [0]  
  
-----  
activation_148 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_148[0] [0]  
  
-----  
activation_151 (Activation)      (None, 14, 14, 192)  0  
batch_normalization_151[0] [0]  
  
-----  
block17_19_mixed (Concatenate)  (None, 14, 14, 384)  0  
activation_148[0] [0]  
activation_151[0] [0]  
  
-----  
block17_19_conv (Conv2D)        (None, 14, 14, 1088) 418880
```

```
block17_19_mixed[0] [0]
-----
block17_19 (Lambda)           (None, 14, 14, 1088) 0
block17_18_ac[0] [0]
block17_19_conv[0] [0]
-----
block17_19_ac (Activation)   (None, 14, 14, 1088) 0
block17_19[0] [0]
-----
conv2d_153 (Conv2D)          (None, 14, 14, 128) 139264
block17_19_ac[0] [0]
-----
batch_normalization_153 (BatchN (None, 14, 14, 128) 384
conv2d_153[0] [0]
-----
activation_153 (Activation) (None, 14, 14, 128) 0
batch_normalization_153[0] [0]
-----
conv2d_154 (Conv2D)          (None, 14, 14, 160) 143360
activation_153[0] [0]
-----
batch_normalization_154 (BatchN (None, 14, 14, 160) 480
conv2d_154[0] [0]
-----
activation_154 (Activation) (None, 14, 14, 160) 0
batch_normalization_154[0] [0]
-----
conv2d_152 (Conv2D)          (None, 14, 14, 192) 208896
block17_19_ac[0] [0]
-----
conv2d_155 (Conv2D)          (None, 14, 14, 192) 215040
activation_154[0] [0]
-----
batch_normalization_152 (BatchN (None, 14, 14, 192) 576
conv2d_152[0] [0]
```

```
batch_normalization_155 (BatchN (None, 14, 14, 192) 576
conv2d_155[0] [0]
-----
activation_152 (Activation)      (None, 14, 14, 192) 0
batch_normalization_152[0] [0]
-----
activation_155 (Activation)      (None, 14, 14, 192) 0
batch_normalization_155[0] [0]
-----
block17_20_mixed (Concatenate)  (None, 14, 14, 384) 0
activation_152[0] [0]
activation_155[0] [0]
-----
block17_20_conv (Conv2D)        (None, 14, 14, 1088) 418880
block17_20_mixed[0] [0]
-----
block17_20 (Lambda)            (None, 14, 14, 1088) 0
block17_19_ac[0] [0]
block17_20_conv[0] [0]
-----
block17_20_ac (Activation)     (None, 14, 14, 1088) 0
block17_20[0] [0]
-----
conv2d_160 (Conv2D)           (None, 14, 14, 256) 278528
block17_20_ac[0] [0]
-----
batch_normalization_160 (BatchN (None, 14, 14, 256) 768
conv2d_160[0] [0]
-----
activation_160 (Activation)    (None, 14, 14, 256) 0
batch_normalization_160[0] [0]
-----
conv2d_156 (Conv2D)           (None, 14, 14, 256) 278528
block17_20_ac[0] [0]
-----
conv2d_158 (Conv2D)           (None, 14, 14, 256) 278528
block17_20_ac[0] [0]
```

```
-----  
conv2d_161 (Conv2D)           (None, 14, 14, 288) 663552  
activation_160[0] [0]  
  
-----  
batch_normalization_156 (BatchN (None, 14, 14, 256) 768  
conv2d_156[0] [0]  
  
-----  
batch_normalization_158 (BatchN (None, 14, 14, 256) 768  
conv2d_158[0] [0]  
  
-----  
batch_normalization_161 (BatchN (None, 14, 14, 288) 864  
conv2d_161[0] [0]  
  
-----  
activation_156 (Activation)   (None, 14, 14, 256) 0  
batch_normalization_156[0] [0]  
  
-----  
activation_158 (Activation)   (None, 14, 14, 256) 0  
batch_normalization_158[0] [0]  
  
-----  
activation_161 (Activation)   (None, 14, 14, 288) 0  
batch_normalization_161[0] [0]  
  
-----  
conv2d_157 (Conv2D)           (None, 6, 6, 384) 884736  
activation_156[0] [0]  
  
-----  
conv2d_159 (Conv2D)           (None, 6, 6, 288) 663552  
activation_158[0] [0]  
  
-----  
conv2d_162 (Conv2D)           (None, 6, 6, 320) 829440  
activation_161[0] [0]  
  
-----  
batch_normalization_157 (BatchN (None, 6, 6, 384) 1152  
conv2d_157[0] [0]  
  
-----  
batch_normalization_159 (BatchN (None, 6, 6, 288) 864  
conv2d_159[0] [0]
```

```
-----  
batch_normalization_162 (BatchN (None, 6, 6, 320)      960  
conv2d_162[0] [0]  
  
-----  
activation_157 (Activation)      (None, 6, 6, 384)      0  
batch_normalization_157[0] [0]  
  
-----  
activation_159 (Activation)      (None, 6, 6, 288)      0  
batch_normalization_159[0] [0]  
  
-----  
activation_162 (Activation)      (None, 6, 6, 320)      0  
batch_normalization_162[0] [0]  
  
-----  
max_pooling2d_3 (MaxPooling2D)  (None, 6, 6, 1088)      0  
block17_20_ac[0] [0]  
  
-----  
mixed_7a (Concatenate)          (None, 6, 6, 2080)      0  
activation_157[0] [0]  
activation_159[0] [0]  
activation_162[0] [0]  
max_pooling2d_3[0] [0]  
  
-----  
conv2d_164 (Conv2D)            (None, 6, 6, 192)      399360      mixed_7a[0] [0]  
  
-----  
batch_normalization_164 (BatchN (None, 6, 6, 192)      576  
conv2d_164[0] [0]  
  
-----  
activation_164 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_164[0] [0]  
  
-----  
conv2d_165 (Conv2D)            (None, 6, 6, 224)      129024  
activation_164[0] [0]  
  
-----  
batch_normalization_165 (BatchN (None, 6, 6, 224)      672  
conv2d_165[0] [0]
```

```
activation_165 (Activation)      (None, 6, 6, 224)    0
batch_normalization_165[0] [0]

-----
conv2d_163 (Conv2D)            (None, 6, 6, 192)    399360     mixed_7a[0] [0]

-----
conv2d_166 (Conv2D)            (None, 6, 6, 256)    172032
activation_165[0] [0]

-----
batch_normalization_163 (BatchN (None, 6, 6, 192)    576
conv2d_163[0] [0]

-----
batch_normalization_166 (BatchN (None, 6, 6, 256)    768
conv2d_166[0] [0]

-----
activation_163 (Activation)    (None, 6, 6, 192)    0
batch_normalization_163[0] [0]

-----
activation_166 (Activation)    (None, 6, 6, 256)    0
batch_normalization_166[0] [0]

-----
block8_1_mixed (Concatenate)   (None, 6, 6, 448)    0
activation_163[0] [0]
activation_166[0] [0]

-----
block8_1_conv (Conv2D)         (None, 6, 6, 2080)   933920
block8_1_mixed[0] [0]

-----
block8_1 (Lambda)              (None, 6, 6, 2080)   0          mixed_7a[0] [0]
block8_1_conv[0] [0]

-----
block8_1_ac (Activation)      (None, 6, 6, 2080)   0          block8_1[0] [0]

-----
conv2d_168 (Conv2D)            (None, 6, 6, 192)    399360
block8_1_ac[0] [0]

-----
batch_normalization_168 (BatchN (None, 6, 6, 192)    576
```

```
conv2d_168[0] [0]
-----
activation_168 (Activation)      (None, 6, 6, 192)      0
batch_normalization_168[0] [0]
-----
conv2d_169 (Conv2D)            (None, 6, 6, 224)      129024
activation_168[0] [0]
-----
batch_normalization_169 (BatchN (None, 6, 6, 224)      672
conv2d_169[0] [0]
-----
activation_169 (Activation)      (None, 6, 6, 224)      0
batch_normalization_169[0] [0]
-----
conv2d_167 (Conv2D)            (None, 6, 6, 192)      399360
block8_1_ac[0] [0]
-----
conv2d_170 (Conv2D)            (None, 6, 6, 256)      172032
activation_169[0] [0]
-----
batch_normalization_167 (BatchN (None, 6, 6, 192)      576
conv2d_167[0] [0]
-----
batch_normalization_170 (BatchN (None, 6, 6, 256)      768
conv2d_170[0] [0]
-----
activation_167 (Activation)      (None, 6, 6, 192)      0
batch_normalization_167[0] [0]
-----
activation_170 (Activation)      (None, 6, 6, 256)      0
batch_normalization_170[0] [0]
-----
block8_2_mixed (Concatenate)    (None, 6, 6, 448)      0
activation_167[0] [0]
activation_170[0] [0]
```

```
block8_2_conv (Conv2D)           (None, 6, 6, 2080)  933920
block8_2_mixed[0] [0]

-----
block8_2 (Lambda)              (None, 6, 6, 2080)  0
block8_1_ac[0] [0]
block8_2_conv[0] [0]

-----
block8_2_ac (Activation)       (None, 6, 6, 2080)  0          block8_2[0] [0]

-----
conv2d_172 (Conv2D)            (None, 6, 6, 192)   399360
block8_2_ac[0] [0]

-----
batch_normalization_172 (BatchN (None, 6, 6, 192)  576
conv2d_172[0] [0]

-----
activation_172 (Activation)    (None, 6, 6, 192)  0
batch_normalization_172[0] [0]

-----
conv2d_173 (Conv2D)            (None, 6, 6, 224)   129024
activation_172[0] [0]

-----
batch_normalization_173 (BatchN (None, 6, 6, 224)  672
conv2d_173[0] [0]

-----
activation_173 (Activation)    (None, 6, 6, 224)  0
batch_normalization_173[0] [0]

-----
conv2d_171 (Conv2D)            (None, 6, 6, 192)   399360
block8_2_ac[0] [0]

-----
conv2d_174 (Conv2D)            (None, 6, 6, 256)   172032
activation_173[0] [0]

-----
batch_normalization_171 (BatchN (None, 6, 6, 192)  576
conv2d_171[0] [0]
```

```
batch_normalization_174 (BatchN (None, 6, 6, 256)      768
conv2d_174[0] [0]
-----
activation_171 (Activation)      (None, 6, 6, 192)      0
batch_normalization_171[0] [0]
-----
activation_174 (Activation)      (None, 6, 6, 256)      0
batch_normalization_174[0] [0]
-----
block8_3_mixed (Concatenate)    (None, 6, 6, 448)      0
activation_171[0] [0]
activation_174[0] [0]
-----
block8_3_conv (Conv2D)          (None, 6, 6, 2080)    933920
block8_3_mixed[0] [0]
-----
block8_3 (Lambda)              (None, 6, 6, 2080)      0
block8_2_ac[0] [0]
block8_3_conv[0] [0]
-----
block8_3_ac (Activation)       (None, 6, 6, 2080)      0           block8_3[0] [0]
-----
conv2d_176 (Conv2D)            (None, 6, 6, 192)     399360
block8_3_ac[0] [0]
-----
batch_normalization_176 (BatchN (None, 6, 6, 192)      576
conv2d_176[0] [0]
-----
activation_176 (Activation)    (None, 6, 6, 192)      0
batch_normalization_176[0] [0]
-----
conv2d_177 (Conv2D)            (None, 6, 6, 224)     129024
activation_176[0] [0]
-----
batch_normalization_177 (BatchN (None, 6, 6, 224)      672
conv2d_177[0] [0]
```

```
-----  
activation_177 (Activation)      (None, 6, 6, 224)      0  
batch_normalization_177[0] [0]  
-----  
conv2d_175 (Conv2D)            (None, 6, 6, 192)    399360  
block8_3_ac[0] [0]  
-----  
conv2d_178 (Conv2D)            (None, 6, 6, 256)    172032  
activation_177[0] [0]  
-----  
batch_normalization_175 (BatchN (None, 6, 6, 192)    576  
conv2d_175[0] [0]  
-----  
batch_normalization_178 (BatchN (None, 6, 6, 256)    768  
conv2d_178[0] [0]  
-----  
activation_175 (Activation)     (None, 6, 6, 192)      0  
batch_normalization_175[0] [0]  
-----  
activation_178 (Activation)     (None, 6, 6, 256)      0  
batch_normalization_178[0] [0]  
-----  
block8_4_mixed (Concatenate)   (None, 6, 6, 448)      0  
activation_175[0] [0]  
activation_178[0] [0]  
-----  
block8_4_conv (Conv2D)          (None, 6, 6, 2080)   933920  
block8_4_mixed[0] [0]  
-----  
block8_4 (Lambda)              (None, 6, 6, 2080)   0  
block8_3_ac[0] [0]  
block8_4_conv[0] [0]  
-----  
block8_4_ac (Activation)       (None, 6, 6, 2080)   0           block8_4[0] [0]  
-----  
conv2d_180 (Conv2D)            (None, 6, 6, 192)    399360  
block8_4_ac[0] [0]
```

```
-----  
batch_normalization_180 (BatchN (None, 6, 6, 192)      576  
conv2d_180[0] [0]  
  
-----  
activation_180 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_180[0] [0]  
  
-----  
conv2d_181 (Conv2D)            (None, 6, 6, 224)      129024  
activation_180[0] [0]  
  
-----  
batch_normalization_181 (BatchN (None, 6, 6, 224)      672  
conv2d_181[0] [0]  
  
-----  
activation_181 (Activation)      (None, 6, 6, 224)      0  
batch_normalization_181[0] [0]  
  
-----  
conv2d_179 (Conv2D)            (None, 6, 6, 192)      399360  
block8_4_ac[0] [0]  
  
-----  
conv2d_182 (Conv2D)            (None, 6, 6, 256)      172032  
activation_181[0] [0]  
  
-----  
batch_normalization_179 (BatchN (None, 6, 6, 192)      576  
conv2d_179[0] [0]  
  
-----  
batch_normalization_182 (BatchN (None, 6, 6, 256)      768  
conv2d_182[0] [0]  
  
-----  
activation_179 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_179[0] [0]  
  
-----  
activation_182 (Activation)      (None, 6, 6, 256)      0  
batch_normalization_182[0] [0]  
  
-----  
block8_5_mixed (Concatenate)    (None, 6, 6, 448)      0  
activation_179[0] [0]
```

```
activation_182[0] [0]
-----
block8_5_conv (Conv2D)           (None, 6, 6, 2080) 933920
block8_5_mixed[0] [0]
-----
block8_5 (Lambda)              (None, 6, 6, 2080) 0
block8_4_ac[0] [0]
block8_5_conv[0] [0]
-----
block8_5_ac (Activation)       (None, 6, 6, 2080) 0          block8_5[0] [0]
-----
conv2d_184 (Conv2D)            (None, 6, 6, 192)   399360
block8_5_ac[0] [0]
-----
batch_normalization_184 (BatchN (None, 6, 6, 192)   576
conv2d_184[0] [0]
-----
activation_184 (Activation)    (None, 6, 6, 192)   0
batch_normalization_184[0] [0]
-----
conv2d_185 (Conv2D)            (None, 6, 6, 224)   129024
activation_184[0] [0]
-----
batch_normalization_185 (BatchN (None, 6, 6, 224)   672
conv2d_185[0] [0]
-----
activation_185 (Activation)    (None, 6, 6, 224)   0
batch_normalization_185[0] [0]
-----
conv2d_183 (Conv2D)            (None, 6, 6, 192)   399360
block8_5_ac[0] [0]
-----
conv2d_186 (Conv2D)            (None, 6, 6, 256)   172032
activation_185[0] [0]
-----
batch_normalization_183 (BatchN (None, 6, 6, 192)   576
```

```
conv2d_183[0] [0]
-----
batch_normalization_186 (BatchN (None, 6, 6, 256)      768
conv2d_186[0] [0]
-----
activation_183 (Activation)      (None, 6, 6, 192)      0
batch_normalization_183[0] [0]
-----
activation_186 (Activation)      (None, 6, 6, 256)      0
batch_normalization_186[0] [0]
-----
block8_6_mixed (Concatenate)    (None, 6, 6, 448)      0
activation_183[0] [0]
activation_186[0] [0]
-----
block8_6_conv (Conv2D)          (None, 6, 6, 2080)    933920
block8_6_mixed[0] [0]
-----
block8_6 (Lambda)              (None, 6, 6, 2080)    0
block8_5_ac[0] [0]
block8_6_conv[0] [0]
-----
block8_6_ac (Activation)       (None, 6, 6, 2080)    0           block8_6[0] [0]
-----
conv2d_188 (Conv2D)            (None, 6, 6, 192)     399360
block8_6_ac[0] [0]
-----
batch_normalization_188 (BatchN (None, 6, 6, 192)      576
conv2d_188[0] [0]
-----
activation_188 (Activation)    (None, 6, 6, 192)      0
batch_normalization_188[0] [0]
-----
conv2d_189 (Conv2D)            (None, 6, 6, 224)     129024
activation_188[0] [0]
```

```
batch_normalization_189 (BatchN (None, 6, 6, 224)      672
conv2d_189[0] [0]

-----
activation_189 (Activation)      (None, 6, 6, 224)      0
batch_normalization_189[0] [0]

-----
conv2d_187 (Conv2D)            (None, 6, 6, 192)      399360
block8_6_ac[0] [0]

-----
conv2d_190 (Conv2D)            (None, 6, 6, 256)      172032
activation_189[0] [0]

-----
batch_normalization_187 (BatchN (None, 6, 6, 192)      576
conv2d_187[0] [0]

-----
batch_normalization_190 (BatchN (None, 6, 6, 256)      768
conv2d_190[0] [0]

-----
activation_187 (Activation)    (None, 6, 6, 192)      0
batch_normalization_187[0] [0]

-----
activation_190 (Activation)    (None, 6, 6, 256)      0
batch_normalization_190[0] [0]

-----
block8_7_mixed (Concatenate)  (None, 6, 6, 448)      0
activation_187[0] [0]
activation_190[0] [0]

-----
block8_7_conv (Conv2D)         (None, 6, 6, 2080)    933920
block8_7_mixed[0] [0]

-----
block8_7 (Lambda)              (None, 6, 6, 2080)    0
block8_6_ac[0] [0]
block8_7_conv[0] [0]

-----
block8_7_ac (Activation)      (None, 6, 6, 2080)    0           block8_7[0] [0]
```

```
-----  
conv2d_192 (Conv2D)           (None, 6, 6, 192)    399360  
block8_7_ac[0] [0]  
-----
```

```
-----  
batch_normalization_192 (BatchN (None, 6, 6, 192)    576  
conv2d_192[0] [0]  
-----
```

```
-----  
activation_192 (Activation)   (None, 6, 6, 192)    0  
batch_normalization_192[0] [0]  
-----
```

```
-----  
conv2d_193 (Conv2D)           (None, 6, 6, 224)    129024  
activation_192[0] [0]  
-----
```

```
-----  
batch_normalization_193 (BatchN (None, 6, 6, 224)    672  
conv2d_193[0] [0]  
-----
```

```
-----  
activation_193 (Activation)   (None, 6, 6, 224)    0  
batch_normalization_193[0] [0]  
-----
```

```
-----  
conv2d_191 (Conv2D)           (None, 6, 6, 192)    399360  
block8_7_ac[0] [0]  
-----
```

```
-----  
conv2d_194 (Conv2D)           (None, 6, 6, 256)    172032  
activation_193[0] [0]  
-----
```

```
-----  
batch_normalization_191 (BatchN (None, 6, 6, 192)    576  
conv2d_191[0] [0]  
-----
```

```
-----  
batch_normalization_194 (BatchN (None, 6, 6, 256)    768  
conv2d_194[0] [0]  
-----
```

```
-----  
activation_191 (Activation)   (None, 6, 6, 192)    0  
batch_normalization_191[0] [0]  
-----
```

```
-----  
activation_194 (Activation)   (None, 6, 6, 256)    0  
batch_normalization_194[0] [0]  
-----
```

```
--  
block8_8_mixed (Concatenate)      (None, 6, 6, 448)      0  
activation_191[0] [0]  
activation_194[0] [0]  
  
--  
block8_8_conv (Conv2D)           (None, 6, 6, 2080)    933920  
block8_8_mixed[0] [0]  
  
--  
block8_8 (Lambda)                (None, 6, 6, 2080)    0  
block8_7_ac[0] [0]  
block8_8_conv[0] [0]  
  
--  
block8_8_ac (Activation)        (None, 6, 6, 2080)    0          block8_8[0] [0]  
  
--  
conv2d_196 (Conv2D)             (None, 6, 6, 192)     399360  
block8_8_ac[0] [0]  
  
--  
batch_normalization_196 (BatchN (None, 6, 6, 192)      576  
conv2d_196[0] [0]  
  
--  
activation_196 (Activation)     (None, 6, 6, 192)     0  
batch_normalization_196[0] [0]  
  
--  
conv2d_197 (Conv2D)             (None, 6, 6, 224)    129024  
activation_196[0] [0]  
  
--  
batch_normalization_197 (BatchN (None, 6, 6, 224)    672  
conv2d_197[0] [0]  
  
--  
activation_197 (Activation)     (None, 6, 6, 224)    0  
batch_normalization_197[0] [0]  
  
--  
conv2d_195 (Conv2D)             (None, 6, 6, 192)    399360  
block8_8_ac[0] [0]  
  
--  
conv2d_198 (Conv2D)             (None, 6, 6, 256)    172032  
activation_197[0] [0]
```

```
-----  
batch_normalization_195 (BatchN (None, 6, 6, 192)      576  
conv2d_195[0] [0]  
  
-----  
batch_normalization_198 (BatchN (None, 6, 6, 256)      768  
conv2d_198[0] [0]  
  
-----  
activation_195 (Activation)      (None, 6, 6, 192)      0  
batch_normalization_195[0] [0]  
  
-----  
activation_198 (Activation)      (None, 6, 6, 256)      0  
batch_normalization_198[0] [0]  
  
-----  
block8_9_mixed (Concatenate)    (None, 6, 6, 448)      0  
activation_195[0] [0]  
activation_198[0] [0]  
  
-----  
block8_9_conv (Conv2D)          (None, 6, 6, 2080)    933920  
block8_9_mixed[0] [0]  
  
-----  
block8_9 (Lambda)               (None, 6, 6, 2080)    0  
block8_8_ac[0] [0]  
block8_9_conv[0] [0]  
  
-----  
block8_9_ac (Activation)       (None, 6, 6, 2080)    0           block8_9[0] [0]  
  
-----  
conv2d_200 (Conv2D)            (None, 6, 6, 192)     399360  
block8_9_ac[0] [0]  
  
-----  
batch_normalization_200 (BatchN (None, 6, 6, 192)      576  
conv2d_200[0] [0]  
  
-----  
activation_200 (Activation)     (None, 6, 6, 192)      0  
batch_normalization_200[0] [0]  
  
-----  
conv2d_201 (Conv2D)            (None, 6, 6, 224)     129024
```

```
activation_200[0] [0]
-----
batch_normalization_201 (BatchN (None, 6, 6, 224)      672
conv2d_201[0] [0]
-----
activation_201 (Activation)      (None, 6, 6, 224)      0
batch_normalization_201[0] [0]
-----
conv2d_199 (Conv2D)            (None, 6, 6, 192)      399360
block8_9_ac[0] [0]
-----
conv2d_202 (Conv2D)            (None, 6, 6, 256)      172032
activation_201[0] [0]
-----
batch_normalization_199 (BatchN (None, 6, 6, 192)      576
conv2d_199[0] [0]
-----
batch_normalization_202 (BatchN (None, 6, 6, 256)      768
conv2d_202[0] [0]
-----
activation_199 (Activation)    (None, 6, 6, 192)      0
batch_normalization_199[0] [0]
-----
activation_202 (Activation)    (None, 6, 6, 256)      0
batch_normalization_202[0] [0]
-----
block8_10_mixed (Concatenate) (None, 6, 6, 448)      0
activation_199[0] [0]
activation_202[0] [0]
-----
block8_10_conv (Conv2D)        (None, 6, 6, 2080)    933920
block8_10_mixed[0] [0]
-----
block8_10 (Lambda)            (None, 6, 6, 2080)    0
block8_9_ac[0] [0]
block8_10_conv[0] [0]
```

```

----- conv_7b (Conv2D) (None, 6, 6, 1536) 3194880 block8_10[0][0]
-----
----- conv_7b_bn (BatchNormalization) (None, 6, 6, 1536) 4608 conv_7b[0][0]
-----
----- conv_7b_ac (Activation) (None, 6, 6, 1536) 0 conv_7b_bn[0][0]
-----
----- global_average_pooling2d (GlobalAveragePooling2D) (None, 1536) 0 conv_7b_ac[0][0]
-----
----- dense (Dense) (None, 512) 786944 global_average_pooling2d[0][0]
-----
----- dropout (Dropout) (None, 512) 0 dense[0][0]
-----
----- dense_1 (Dense) (None, 256) 131328 dropout[0][0]
-----
----- dropout_1 (Dropout) (None, 256) 0 dense_1[0][0]
-----
----- dense_2 (Dense) (None, 11) 2827 dropout_1[0][0]
=====
=====
Total params: 55,257,835
Trainable params: 921,099
Non-trainable params: 54,336,736
-----
```

[19]: `model.compile(optimizer='adam', loss="categorical_crossentropy",
 →metrics=['accuracy'])`

[20]: `early_stopper = EarlyStopping(monitor='val_loss', patience=10)
checkpoint = ModelCheckpoint(filepath='weights.hdf5', save_best_only=True,
 →verbose=1)`

[21]: `results = model.fit(train_gen, steps_per_epoch=(train_gen.n)//64,
 →validation_data=valid_gen,
 validation_steps=(valid_gen.n)//64, epochs=5)`

WARNING:tensorflow:sample_weight modes were coerced from

```

...
    to
['...']

WARNING:tensorflow:sample_weight modes were coerced from
...
    to
['...']

Train for 154 steps, validate for 53 steps
Epoch 1/5
154/154 [=====] - 192s 1s/step - loss: 1.4587 -
accuracy: 0.5157 - val_loss: 1.4237 - val_accuracy: 0.6562
Epoch 2/5
154/154 [=====] - 177s 1s/step - loss: 1.0723 -
accuracy: 0.6499 - val_loss: 1.1345 - val_accuracy: 0.6963
Epoch 3/5
154/154 [=====] - 171s 1s/step - loss: 0.9750 -
accuracy: 0.6806 - val_loss: 1.1678 - val_accuracy: 0.6984
Epoch 4/5
154/154 [=====] - 170s 1s/step - loss: 0.9187 -
accuracy: 0.7006 - val_loss: 1.1239 - val_accuracy: 0.7120
Epoch 5/5
154/154 [=====] - 179s 1s/step - loss: 0.8679 -
accuracy: 0.7153 - val_loss: 0.9311 - val_accuracy: 0.7373

```

Due to limit in time and computation power, we trained the model only for 5 epochs and obtained accuracy score of 0.73. There are several ways to increase this result: - Train for longer time; - Unfreeze the parameters and train the model again;

5 Model evaluation

```
[24]: # model.load_weights("food11/weights.hdf5")
test_results = model.evaluate_generator(test_gen, steps=test_gen.n//64,verbose=1)
print(f"The accuracy score of the model on test set: {test_results[1]}")
```

```

WARNING:tensorflow:From <ipython-input-24-cfbc64339a9b>:2:
Model.evaluate_generator (from tensorflow.python.keras.engine.training) is
deprecated and will be removed in a future version.
Instructions for updating:
Please use Model.evaluate, which supports generators.
WARNING:tensorflow:sample_weight modes were coerced from
...
    to
['...']

52/52 [=====] - 36s 701ms/step - loss: 0.8346 -
accuracy: 0.7488
The accuracy score of the model on test set: 0.7487980723381042

```

```
[25]: categories = ["Bread", "Diary Product", "Dessert", "Egg", "Fried food", "Meat",  
→"Noodles-Pasta", "Rice", "Seafood", "Soup", "Vegetable-Fruit"]
```

```
[31]: from sklearn.metrics import confusion_matrix, classification_report,  
→accuracy_score

preds, gts, imgs = [], [], []
row_count = 0

for category in os.listdir("food11/evaluation"):
    for img_name in os.listdir(os.path.join("food11/evaluation", category)):
        img = PIL.Image.open(os.path.join("food11/evaluation", category,  
→img_name)).resize((256,256))
        imgs.append(img)
        img = np.asarray(img, dtype=float)
        img /= 255.
        img = img.reshape(-1, 256, 256, 3)
        pred = int(np.argmax(model.predict(img), axis=1))
        preds.append(categories[pred])
        gts.append(category)
```

```
[32]: fig = plt.figure(figsize=(80,80))
for i in range(20):
    random_index = np.random.randint(0, len(imgs))
    fig.add_subplot(20, 1, i+1)
    plt.xlabel(f"Prediction: {preds[random_index]}\nGround Truth:  
→{gts[random_index]}")
    plt.imshow(imgs[random_index])
    plt.xticks(())
    plt.yticks(())
plt.show()
```



Pineapple Tassies/Fruit
Smoothie - 12oz



Mediterranean Vegetable/Fruit
Smoothie - 12oz



Almond Flour Brownie
Graze Fresh Dessert



Almond Flour Meat
Graze Fresh Meal



Almond Flour Meat
Graze Fresh Meal



Pineapple - French
Smoothie - 12oz



Pineapple - French
Smoothie - 12oz



Mediterranean Vegetable/Fruit
Smoothie - 12oz



Graze Smoothie
Graze Fresh Dessert



Almond Flour Meat
Graze Fresh Meal



Almond Flour Meat
Graze Fresh Meal



Pineapple Smoothie
Smoothie - 12oz



Almond Flour Meat
Graze Fresh Meal



Almond Flour Meat
Graze Fresh Meal



Mediterranean Vegetable/Fruit
Smoothie - 12oz



Mediterranean Vegetable/Fruit
Smoothie - 12oz



Pineapple Smoothie
Smoothie - 12oz



Pineapple Smoothie
Smoothie - 12oz

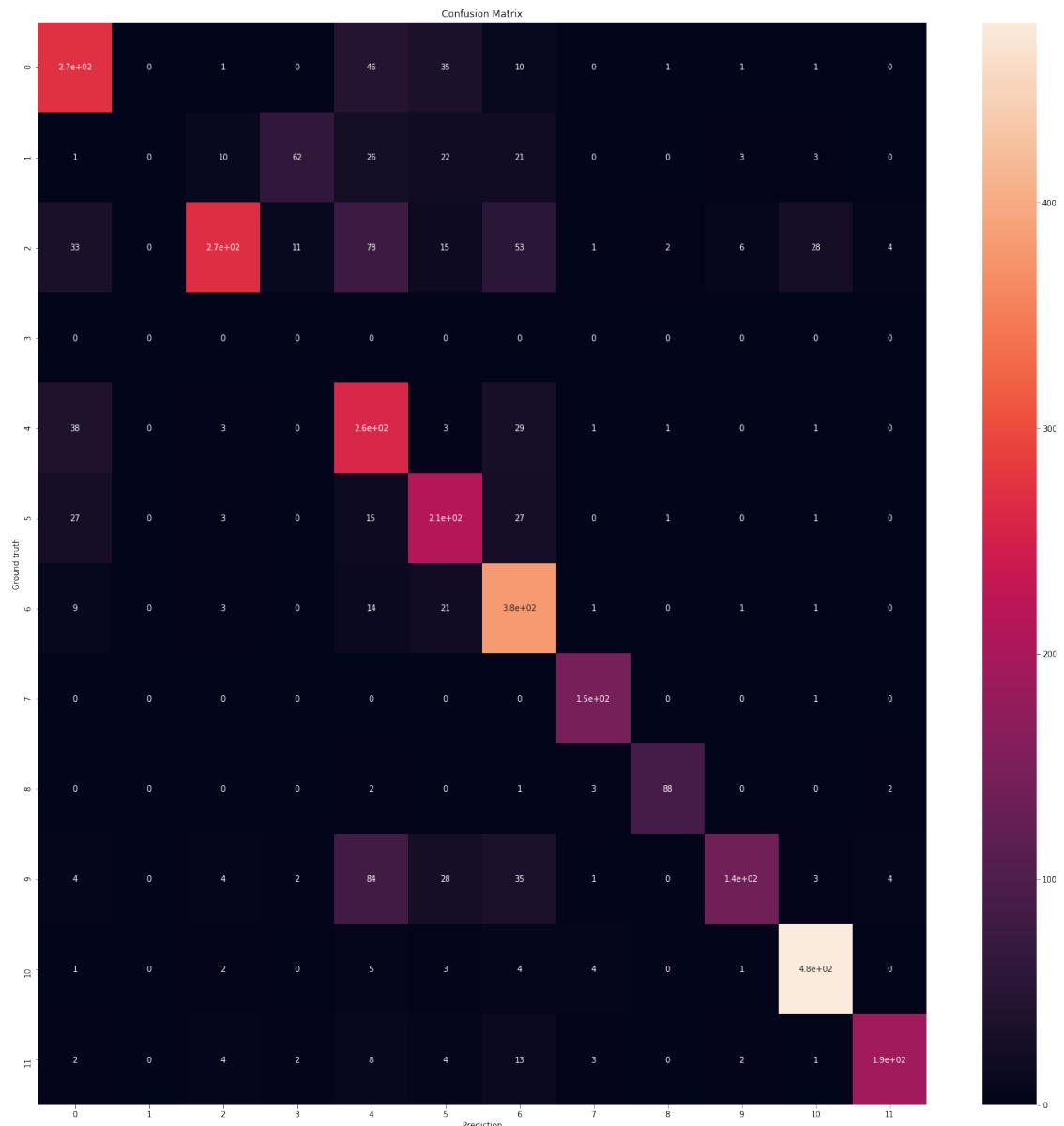
```
[33]: classification_report(np.asarray(gts), np.array(preds))
```

```
C:\Users\Lab\.conda\envs\tfgpu\lib\site-
packages\sklearn\metrics\_classification.py:1272: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
    _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Lab\.conda\envs\tfgpu\lib\site-
packages\sklearn\metrics\_classification.py:1272: UndefinedMetricWarning: Recall
and F-score are ill-defined and being set to 0.0 in labels with no true samples.
Use `zero_division` parameter to control this behavior.
    _warn_prf(average, modifier, msg_start, len(result))
```

```
[33]: '
          precision    recall   f1-score   support\n\n
Bread      0.70      0.74      0.72     368\n  Dairy product      0.00      0.00
Dessert    0.00     148\n      Dessert      0.90      0.54      0.67     500\n
Diary Product      0.00      0.00      0.00      0\n      Egg
Fried food    0.48      0.77      0.59     335\n      Fried food      0.62      0.74
Meat        0.68      287\n      Meat       0.66      0.88      0.76     432\n
Noodles-Pasta      0.91      0.99      0.95     147\n      Rice
Seafood      0.95      0.92      0.93     96\n      Seafood      0.91      0.46
Soup         0.61      303\n      Soup       0.92      0.96      0.94
accuracy    500\nVegetable-Fruit      0.95      0.83      0.89     231\n\n
macro avg      0.73     3347\n      macro avg      0.67      0.65      0.65     3347\n
weighted avg    0.75      0.73      0.72     3347\n'
```

```
[34]: plt.figure(figsize=(25,25))
cm = confusion_matrix(np.asarray(gts), np.array(preds))
ax = plt.subplot()
sns.heatmap(cm, annot=True, ax=ax)
ax.set_xlabel("Prediction")
ax.set_ylabel("Ground truth")
ax.set_title("Confusion Matrix")
```

```
[34]: Text(0.5, 1, 'Confusion Matrix')
```



That's it for this project! Thank you for following!