

```
In [3]: import warnings
warnings.filterwarnings("ignore")
import os
import cv2
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
from tqdm import tqdm
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
import tensorflow as tf
from tensorflow.keras.utils import to_categorical
```

```
In [2]: # Load class labels from directory
base_dir = 'Fruits'
class_labels = os.listdir(base_dir)
class_labels.sort()
print(class_labels)

['Apple_Bad', 'Apple_Good']
```

```
In [3]: # Display the distribution of samples for each class
chart_data = []
for target in class_labels:
    path = os.path.join(base_dir, target)
    size = len(os.listdir(path))
    chart_data.append(size)
    print(f'The target {target} has {size} samples in the dataset')
```

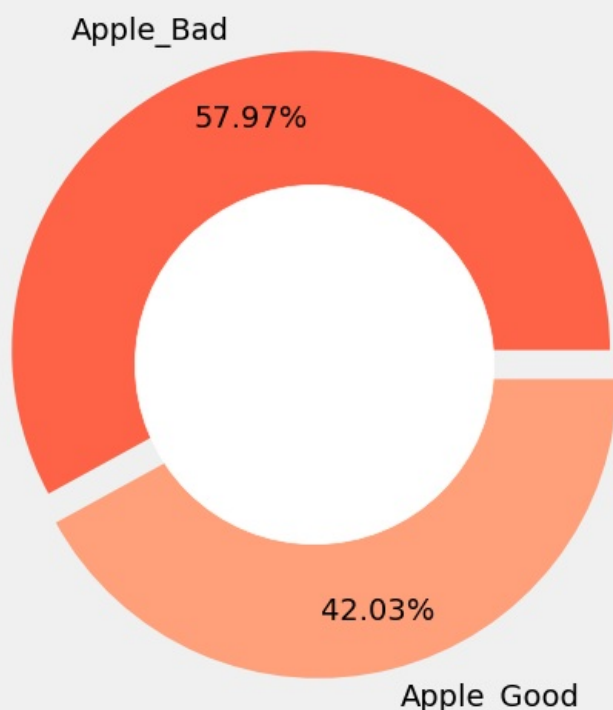
The target Apple\_Bad has 1346 samples in the dataset  
The target Apple\_Good has 976 samples in the dataset

```
In [4]: # Plot the distribution using a pie chart
with plt.style.context(style="fivethirtyeight"):
    plt.figure(figsize=(6, 6))
    plt.pie(chart_data,
            explode=[0.05]*len(class_labels), # Positional argument
            colors=["tomato", "lightsalmon"],
            labels=class_labels,
            autopct='%.2f%%', # Keyword argument
            pctdistance=0.80)

    # Create a white center circle
    centre_circle = plt.Circle((0, 0), 0.6, color='white')
    fig = plt.gcf()
    fig.gca().add_artist(centre_circle)

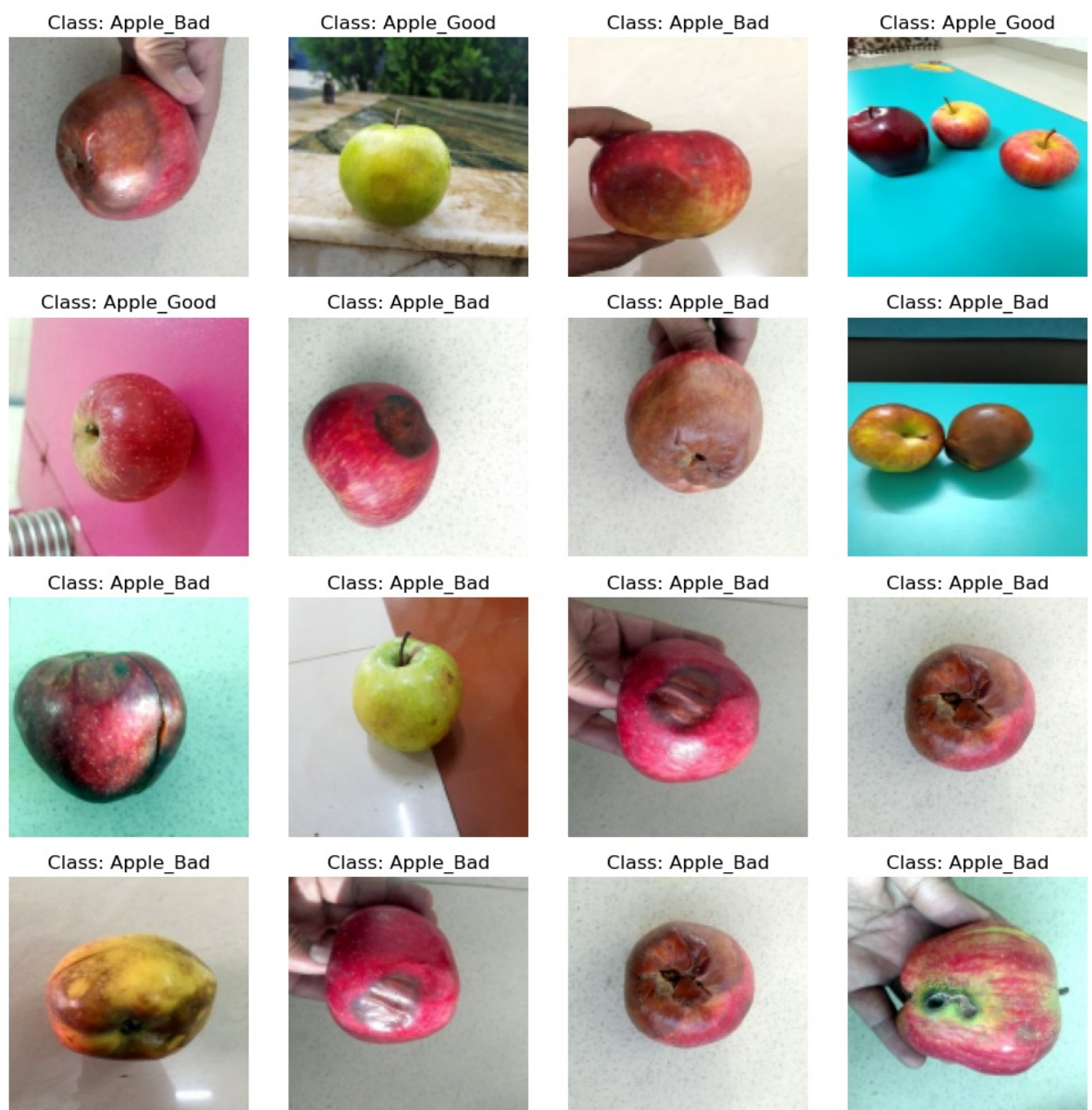
    plt.title("Analyzing training data using donut chart")
    plt.show()
```

## Analyzing training data using donut chart



```
In [5]: # Load images and labels
data = []
```





```
In [7]: y=to_categorical(labels)
X_train,X_test,y_train,y_test=train_test_split(data,y, test_size=0.2, random_state=42, shuffle=True)
print(X_train.shape, X_test.shape,y_train.shape,y_test.shape)
```

(1857, 128, 128, 3) (465, 128, 128, 3) (1857, 2) (465, 2)

```
In [10]: densenet_model=tf.keras.applications.DenseNet201(include_top=False,
weights="imagenet", input_tensor=None, input_shape=(128,128,3),pooling="max",classes=1000)
densenet_model.trainable=False
```

```
In [11]: inputs=densenet_model.input
m=tf.keras.layers.Dense(512, activation='relu')(densenet_model.output)
outputs=tf.keras.layers.Dense(len(class_labels), activation='softmax')(m)
dense_model=tf.keras.Model(inputs=inputs,outputs=outputs)
```

```
In [12]: dense_model.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
```

```
In [13]: dense_model.summary()
```

Model: "functional"

Layer (type)	Output Shape	Param #	Connected to
input_layer_2 (InputLayer)	(None, 128, 128, 3)	0	-
zero_padding2d_4 (ZeroPadding2D)	(None, 134, 134, 3)	0	input_layer_2[0][0]
conv1_conv (Conv2D)	(None, 64, 64, 64)	9,408	zero_padding2d_4[0][0]
conv1_bn (BatchNormalization)	(None, 64, 64, 64)	256	conv1_conv[0][0]
conv1_relu (Activation)	(None, 64, 64, 64)	0	conv1_bn[0][0]
zero_padding2d_5 (ZeroPadding2D)	(None, 66, 66, 64)	0	conv1_relu[0][0]
pool1 (MaxPooling2D)	(None, 32, 32, 64)	0	zero_padding2d_5[0][0]
conv2_block1_0_bn (BatchNormalization)	(None, 32, 32, 64)	256	pool1[0][0]
conv2_block1_0_relu (Activation)	(None, 32, 32, 64)	0	conv2_block1_0_bn[0][0]
conv2_block1_1_conv (Conv2D)	(None, 32, 32, 128)	8,192	conv2_block1_0_relu[0][0]
conv2_block1_1_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block1_1_conv[0][0]
conv2_block1_1_relu (Activation)	(None, 32, 32, 128)	0	conv2_block1_1_bn[0][0]
conv2_block1_2_conv (Conv2D)	(None, 32, 32, 32)	36,864	conv2_block1_1_relu[0][0]
conv2_block1_concat (Concatenate)	(None, 32, 32, 96)	0	pool1[0][0], conv2_block1_2_conv[0][0]
conv2_block2_0_bn (BatchNormalization)	(None, 32, 32, 96)	384	conv2_block1_concat[0][0]
conv2_block2_0_relu (Activation)	(None, 32, 32, 96)	0	conv2_block2_0_bn[0][0]
conv2_block2_1_conv (Conv2D)	(None, 32, 32, 128)	12,288	conv2_block2_0_relu[0][0]
conv2_block2_1_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block2_1_conv[0][0]
conv2_block2_1_relu (Activation)	(None, 32, 32, 128)	0	conv2_block2_1_bn[0][0]
conv2_block2_2_conv (Conv2D)	(None, 32, 32, 32)	36,864	conv2_block2_1_relu[0][0]
conv2_block2_concat (Concatenate)	(None, 32, 32, 128)	0	conv2_block1_concat[0][0], conv2_block2_2_conv[0][0]
conv2_block3_0_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block2_concat[0][0]
conv2_block3_0_relu (Activation)	(None, 32, 32, 128)	0	conv2_block3_0_bn[0][0]
conv2_block3_1_conv (Conv2D)	(None, 32, 32, 128)	16,384	conv2_block3_0_relu[0][0]
conv2_block3_1_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block3_1_conv[0][0]

conv2_block3_1_relu (Activation)	(None, 32, 32, 128)	0	conv2_block3_1_bn[0][0]
conv2_block3_2_conv (Conv2D)	(None, 32, 32, 32)	36,864	conv2_block3_1_relu[0][0]
conv2_block3_concat (Concatenate)	(None, 32, 32, 160)	0	conv2_block2_concat[0][0] conv2_block3_2_conv[0][0]
conv2_block4_0_bn (BatchNormalization)	(None, 32, 32, 160)	640	conv2_block3_concat[0][0]
conv2_block4_0_relu (Activation)	(None, 32, 32, 160)	0	conv2_block4_0_bn[0][0]
conv2_block4_1_conv (Conv2D)	(None, 32, 32, 128)	20,480	conv2_block4_0_relu[0][0]
conv2_block4_1_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block4_1_conv[0][0]
conv2_block4_1_relu (Activation)	(None, 32, 32, 128)	0	conv2_block4_1_bn[0][0]
conv2_block4_2_conv (Conv2D)	(None, 32, 32, 32)	36,864	conv2_block4_1_relu[0][0]
conv2_block4_concat (Concatenate)	(None, 32, 32, 192)	0	conv2_block3_concat[0][0] conv2_block4_2_conv[0][0]
conv2_block5_0_bn (BatchNormalization)	(None, 32, 32, 192)	768	conv2_block4_concat[0][0]
conv2_block5_0_relu (Activation)	(None, 32, 32, 192)	0	conv2_block5_0_bn[0][0]
conv2_block5_1_conv (Conv2D)	(None, 32, 32, 128)	24,576	conv2_block5_0_relu[0][0]
conv2_block5_1_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block5_1_conv[0][0]
conv2_block5_1_relu (Activation)	(None, 32, 32, 128)	0	conv2_block5_1_bn[0][0]
conv2_block5_2_conv (Conv2D)	(None, 32, 32, 32)	36,864	conv2_block5_1_relu[0][0]
conv2_block5_concat (Concatenate)	(None, 32, 32, 224)	0	conv2_block4_concat[0][0] conv2_block5_2_conv[0][0]
conv2_block6_0_bn (BatchNormalization)	(None, 32, 32, 224)	896	conv2_block5_concat[0][0]
conv2_block6_0_relu (Activation)	(None, 32, 32, 224)	0	conv2_block6_0_bn[0][0]
conv2_block6_1_conv (Conv2D)	(None, 32, 32, 128)	28,672	conv2_block6_0_relu[0][0]
conv2_block6_1_bn (BatchNormalization)	(None, 32, 32, 128)	512	conv2_block6_1_conv[0][0]
conv2_block6_1_relu (Activation)	(None, 32, 32, 128)	0	conv2_block6_1_bn[0][0]
conv2_block6_2_conv (Conv2D)	(None, 32, 32, 32)	36,864	conv2_block6_1_relu[0][0]
conv2_block6_concat (Concatenate)	(None, 32, 32, 256)	0	conv2_block5_concat[0][0] conv2_block6_2_conv[0][0]
pool2_bn (BatchNormalization)	(None, 32, 32, 256)	1,024	conv2_block6_concat[0][0]
pool2_relu (Activation)	(None, 32, 32, 256)	0	pool2_bn[0][0]
pool2_conv (Conv2D)	(None, 32, 32, 128)	32,768	pool2_relu[0][0]
pool2_pool (AveragePooling2D)	(None, 16, 16, 128)	0	pool2_conv[0][0]
conv3_block1_0_bn (BatchNormalization)	(None, 16, 16, 128)	512	pool2_pool[0][0]
conv3_block1_0_relu (Activation)	(None, 16, 16, 128)	0	conv3_block1_0_bn[0][0]
conv3_block1_1_conv (Conv2D)	(None, 16, 16, 128)	16,384	conv3_block1_0_relu[0][0]
conv3_block1_1_bn	(None, 16, 16, 128)	512	conv3_block1_1_conv[0][0]

(BatchNormalization)			
conv3_block1_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block1_1_bn[0][0]
conv3_block1_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block1_1_relu[0][0]
conv3_block1_concat (Concatenate)	(None, 16, 16, 160)	0	pool2_pool[0][0], conv3_block1_2_conv[0][0]
conv3_block2_0_bn (BatchNormalization)	(None, 16, 16, 160)	640	conv3_block1_concat[0][0]
conv3_block2_0_relu (Activation)	(None, 16, 16, 160)	0	conv3_block2_0_bn[0][0]
conv3_block2_1_conv (Conv2D)	(None, 16, 16, 128)	20,480	conv3_block2_0_relu[0][0]
conv3_block2_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block2_1_conv[0][0]
conv3_block2_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block2_1_bn[0][0]
conv3_block2_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block2_1_relu[0][0]
conv3_block2_concat (Concatenate)	(None, 16, 16, 192)	0	conv3_block1_concat[0][0] conv3_block2_2_conv[0][0]
conv3_block3_0_bn (BatchNormalization)	(None, 16, 16, 192)	768	conv3_block2_concat[0][0]
conv3_block3_0_relu (Activation)	(None, 16, 16, 192)	0	conv3_block3_0_bn[0][0]
conv3_block3_1_conv (Conv2D)	(None, 16, 16, 128)	24,576	conv3_block3_0_relu[0][0]
conv3_block3_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block3_1_conv[0][0]
conv3_block3_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block3_1_bn[0][0]
conv3_block3_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block3_1_relu[0][0]
conv3_block3_concat (Concatenate)	(None, 16, 16, 224)	0	conv3_block2_concat[0][0] conv3_block3_2_conv[0][0]
conv3_block4_0_bn (BatchNormalization)	(None, 16, 16, 224)	896	conv3_block3_concat[0][0]
conv3_block4_0_relu (Activation)	(None, 16, 16, 224)	0	conv3_block4_0_bn[0][0]
conv3_block4_1_conv (Conv2D)	(None, 16, 16, 128)	28,672	conv3_block4_0_relu[0][0]
conv3_block4_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block4_1_conv[0][0]
conv3_block4_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block4_1_bn[0][0]
conv3_block4_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block4_1_relu[0][0]
conv3_block4_concat (Concatenate)	(None, 16, 16, 256)	0	conv3_block3_concat[0][0] conv3_block4_2_conv[0][0]
conv3_block5_0_bn (BatchNormalization)	(None, 16, 16, 256)	1,024	conv3_block4_concat[0][0]
conv3_block5_0_relu (Activation)	(None, 16, 16, 256)	0	conv3_block5_0_bn[0][0]
conv3_block5_1_conv (Conv2D)	(None, 16, 16, 128)	32,768	conv3_block5_0_relu[0][0]
conv3_block5_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block5_1_conv[0][0]
conv3_block5_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block5_1_bn[0][0]
conv3_block5_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block5_1_relu[0][0]



conv3_block5_concat (Concatenate)	(None, 16, 16, 288)	0	conv3_block4_concat[0][0] conv3_block5_2_conv[0][0]
conv3_block6_0_bn (BatchNormalization)	(None, 16, 16, 288)	1,152	conv3_block5_concat[0][0]
conv3_block6_0_relu (Activation)	(None, 16, 16, 288)	0	conv3_block6_0_bn[0][0]
conv3_block6_1_conv (Conv2D)	(None, 16, 16, 128)	36,864	conv3_block6_0_relu[0][0]
conv3_block6_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block6_1_conv[0][0]
conv3_block6_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block6_1_bn[0][0]
conv3_block6_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block6_1_relu[0][0]
conv3_block6_concat (Concatenate)	(None, 16, 16, 320)	0	conv3_block5_concat[0][0] conv3_block6_2_conv[0][0]
conv3_block7_0_bn (BatchNormalization)	(None, 16, 16, 320)	1,280	conv3_block6_concat[0][0]
conv3_block7_0_relu (Activation)	(None, 16, 16, 320)	0	conv3_block7_0_bn[0][0]
conv3_block7_1_conv (Conv2D)	(None, 16, 16, 128)	40,960	conv3_block7_0_relu[0][0]
conv3_block7_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block7_1_conv[0][0]
conv3_block7_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block7_1_bn[0][0]
conv3_block7_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block7_1_relu[0][0]
conv3_block7_concat (Concatenate)	(None, 16, 16, 352)	0	conv3_block6_concat[0][0] conv3_block7_2_conv[0][0]
conv3_block8_0_bn (BatchNormalization)	(None, 16, 16, 352)	1,408	conv3_block7_concat[0][0]
conv3_block8_0_relu (Activation)	(None, 16, 16, 352)	0	conv3_block8_0_bn[0][0]
conv3_block8_1_conv (Conv2D)	(None, 16, 16, 128)	45,056	conv3_block8_0_relu[0][0]
conv3_block8_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block8_1_conv[0][0]
conv3_block8_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block8_1_bn[0][0]
conv3_block8_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block8_1_relu[0][0]
conv3_block8_concat (Concatenate)	(None, 16, 16, 384)	0	conv3_block7_concat[0][0] conv3_block8_2_conv[0][0]
conv3_block9_0_bn (BatchNormalization)	(None, 16, 16, 384)	1,536	conv3_block8_concat[0][0]
conv3_block9_0_relu (Activation)	(None, 16, 16, 384)	0	conv3_block9_0_bn[0][0]
conv3_block9_1_conv (Conv2D)	(None, 16, 16, 128)	49,152	conv3_block9_0_relu[0][0]
conv3_block9_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block9_1_conv[0][0]
conv3_block9_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block9_1_bn[0][0]
conv3_block9_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block9_1_relu[0][0]
conv3_block9_concat (Concatenate)	(None, 16, 16, 416)	0	conv3_block8_concat[0][0] conv3_block9_2_conv[0][0]
conv3_block10_0_bn (BatchNormalization)	(None, 16, 16, 416)	1,664	conv3_block9_concat[0][0]
conv3_block10_0_relu	(None, 16, 16, 416)	0	conv3_block10_0_bn[0][0]

(Activation)			
conv3_block10_1_conv (Conv2D)	(None, 16, 16, 128)	53,248	conv3_block10_0_relu[0][0]
conv3_block10_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block10_1_conv[0][0]
conv3_block10_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block10_1_bn[0][0]
conv3_block10_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block10_1_relu[0][0]
conv3_block10_concat (Concatenate)	(None, 16, 16, 448)	0	conv3_block9_concat[0][0] conv3_block10_2_conv[0][0]
conv3_block11_0_bn (BatchNormalization)	(None, 16, 16, 448)	1,792	conv3_block10_concat[0][0]
conv3_block11_0_relu (Activation)	(None, 16, 16, 448)	0	conv3_block11_0_bn[0][0]
conv3_block11_1_conv (Conv2D)	(None, 16, 16, 128)	57,344	conv3_block11_0_relu[0][0]
conv3_block11_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block11_1_conv[0][0]
conv3_block11_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block11_1_bn[0][0]
conv3_block11_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block11_1_relu[0][0]
conv3_block11_concat (Concatenate)	(None, 16, 16, 480)	0	conv3_block10_concat[0][0] conv3_block11_2_conv[0][0]
conv3_block12_0_bn (BatchNormalization)	(None, 16, 16, 480)	1,920	conv3_block11_concat[0][0]
conv3_block12_0_relu (Activation)	(None, 16, 16, 480)	0	conv3_block12_0_bn[0][0]
conv3_block12_1_conv (Conv2D)	(None, 16, 16, 128)	61,440	conv3_block12_0_relu[0][0]
conv3_block12_1_bn (BatchNormalization)	(None, 16, 16, 128)	512	conv3_block12_1_conv[0][0]
conv3_block12_1_relu (Activation)	(None, 16, 16, 128)	0	conv3_block12_1_bn[0][0]
conv3_block12_2_conv (Conv2D)	(None, 16, 16, 32)	36,864	conv3_block12_1_relu[0][0]
conv3_block12_concat (Concatenate)	(None, 16, 16, 512)	0	conv3_block11_concat[0][0] conv3_block12_2_conv[0][0]
pool3_bn (BatchNormalization)	(None, 16, 16, 512)	2,048	conv3_block12_concat[0][0]
pool3_relu (Activation)	(None, 16, 16, 512)	0	pool3_bn[0][0]
pool3_conv (Conv2D)	(None, 16, 16, 256)	131,072	pool3_relu[0][0]
pool3_pool (AveragePooling2D)	(None, 8, 8, 256)	0	pool3_conv[0][0]
conv4_block1_0_bn (BatchNormalization)	(None, 8, 8, 256)	1,024	pool3_pool[0][0]
conv4_block1_0_relu (Activation)	(None, 8, 8, 256)	0	conv4_block1_0_bn[0][0]
conv4_block1_1_conv (Conv2D)	(None, 8, 8, 128)	32,768	conv4_block1_0_relu[0][0]
conv4_block1_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block1_1_conv[0][0]
conv4_block1_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block1_1_bn[0][0]
conv4_block1_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block1_1_relu[0][0]
conv4_block1_concat (Concatenate)	(None, 8, 8, 288)	0	pool3_pool[0][0], conv4_block1_2_conv[0][0]
conv4_block2_0_bn (BatchNormalization)	(None, 8, 8, 288)	1,152	conv4_block1_concat[0][0]



conv4_block2_0_relu (Activation)	(None, 8, 8, 288)	0	conv4_block2_0_bn[0][0]
conv4_block2_1_conv (Conv2D)	(None, 8, 8, 128)	36,864	conv4_block2_0_relu[0][0]
conv4_block2_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block2_1_conv[0][0]
conv4_block2_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block2_1_bn[0][0]
conv4_block2_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block2_1_relu[0][0]
conv4_block2_concat (Concatenate)	(None, 8, 8, 320)	0	conv4_block1_concat[0][0] conv4_block2_2_conv[0][0]
conv4_block3_0_bn (BatchNormalization)	(None, 8, 8, 320)	1,280	conv4_block2_concat[0][0]
conv4_block3_0_relu (Activation)	(None, 8, 8, 320)	0	conv4_block3_0_bn[0][0]
conv4_block3_1_conv (Conv2D)	(None, 8, 8, 128)	40,960	conv4_block3_0_relu[0][0]
conv4_block3_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block3_1_conv[0][0]
conv4_block3_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block3_1_bn[0][0]
conv4_block3_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block3_1_relu[0][0]
conv4_block3_concat (Concatenate)	(None, 8, 8, 352)	0	conv4_block2_concat[0][0] conv4_block3_2_conv[0][0]
conv4_block4_0_bn (BatchNormalization)	(None, 8, 8, 352)	1,408	conv4_block3_concat[0][0]
conv4_block4_0_relu (Activation)	(None, 8, 8, 352)	0	conv4_block4_0_bn[0][0]
conv4_block4_1_conv (Conv2D)	(None, 8, 8, 128)	45,056	conv4_block4_0_relu[0][0]
conv4_block4_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block4_1_conv[0][0]
conv4_block4_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block4_1_bn[0][0]
conv4_block4_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block4_1_relu[0][0]
conv4_block4_concat (Concatenate)	(None, 8, 8, 384)	0	conv4_block3_concat[0][0] conv4_block4_2_conv[0][0]
conv4_block5_0_bn (BatchNormalization)	(None, 8, 8, 384)	1,536	conv4_block4_concat[0][0]
conv4_block5_0_relu (Activation)	(None, 8, 8, 384)	0	conv4_block5_0_bn[0][0]
conv4_block5_1_conv (Conv2D)	(None, 8, 8, 128)	49,152	conv4_block5_0_relu[0][0]
conv4_block5_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block5_1_conv[0][0]
conv4_block5_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block5_1_bn[0][0]
conv4_block5_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block5_1_relu[0][0]
conv4_block5_concat (Concatenate)	(None, 8, 8, 416)	0	conv4_block4_concat[0][0] conv4_block5_2_conv[0][0]
conv4_block6_0_bn (BatchNormalization)	(None, 8, 8, 416)	1,664	conv4_block5_concat[0][0]
conv4_block6_0_relu (Activation)	(None, 8, 8, 416)	0	conv4_block6_0_bn[0][0]
conv4_block6_1_conv (Conv2D)	(None, 8, 8, 128)	53,248	conv4_block6_0_relu[0][0]
conv4_block6_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block6_1_conv[0][0]

conv4_block6_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block6_1_bn[0][0]
conv4_block6_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block6_1_relu[0][0]
conv4_block6_concat (Concatenate)	(None, 8, 8, 448)	0	conv4_block5_concat[0][0] conv4_block6_2_conv[0][0]
conv4_block7_0_bn (BatchNormalization)	(None, 8, 8, 448)	1,792	conv4_block6_concat[0][0]
conv4_block7_0_relu (Activation)	(None, 8, 8, 448)	0	conv4_block7_0_bn[0][0]
conv4_block7_1_conv (Conv2D)	(None, 8, 8, 128)	57,344	conv4_block7_0_relu[0][0]
conv4_block7_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block7_1_conv[0][0]
conv4_block7_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block7_1_bn[0][0]
conv4_block7_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block7_1_relu[0][0]
conv4_block7_concat (Concatenate)	(None, 8, 8, 480)	0	conv4_block6_concat[0][0] conv4_block7_2_conv[0][0]
conv4_block8_0_bn (BatchNormalization)	(None, 8, 8, 480)	1,920	conv4_block7_concat[0][0]
conv4_block8_0_relu (Activation)	(None, 8, 8, 480)	0	conv4_block8_0_bn[0][0]
conv4_block8_1_conv (Conv2D)	(None, 8, 8, 128)	61,440	conv4_block8_0_relu[0][0]
conv4_block8_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block8_1_conv[0][0]
conv4_block8_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block8_1_bn[0][0]
conv4_block8_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block8_1_relu[0][0]
conv4_block8_concat (Concatenate)	(None, 8, 8, 512)	0	conv4_block7_concat[0][0] conv4_block8_2_conv[0][0]
conv4_block9_0_bn (BatchNormalization)	(None, 8, 8, 512)	2,048	conv4_block8_concat[0][0]
conv4_block9_0_relu (Activation)	(None, 8, 8, 512)	0	conv4_block9_0_bn[0][0]
conv4_block9_1_conv (Conv2D)	(None, 8, 8, 128)	65,536	conv4_block9_0_relu[0][0]
conv4_block9_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block9_1_conv[0][0]
conv4_block9_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block9_1_bn[0][0]
conv4_block9_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block9_1_relu[0][0]
conv4_block9_concat (Concatenate)	(None, 8, 8, 544)	0	conv4_block8_concat[0][0] conv4_block9_2_conv[0][0]
conv4_block10_0_bn (BatchNormalization)	(None, 8, 8, 544)	2,176	conv4_block9_concat[0][0]
conv4_block10_0_relu (Activation)	(None, 8, 8, 544)	0	conv4_block10_0_bn[0][0]
conv4_block10_1_conv (Conv2D)	(None, 8, 8, 128)	69,632	conv4_block10_0_relu[0][0]
conv4_block10_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block10_1_conv[0][0]
conv4_block10_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block10_1_bn[0][0]
conv4_block10_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block10_1_relu[0][0]
conv4_block10_concat	(None, 8, 8, 576)	0	conv4_block9_concat[0][0]

(Concatenate)			conv4_block10_2_conv[0][
conv4_block11_0_bn (BatchNormalization)	(None, 8, 8, 576)	2,304	conv4_block10_concat[0][
conv4_block11_0_relu (Activation)	(None, 8, 8, 576)	0	conv4_block11_0_bn[0][0]
conv4_block11_1_conv (Conv2D)	(None, 8, 8, 128)	73,728	conv4_block11_0_relu[0][
conv4_block11_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block11_1_conv[0][
conv4_block11_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block11_1_bn[0][0]
conv4_block11_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block11_1_relu[0][
conv4_block11_concat (Concatenate)	(None, 8, 8, 608)	0	conv4_block10_concat[0][ conv4_block11_2_conv[0][
conv4_block12_0_bn (BatchNormalization)	(None, 8, 8, 608)	2,432	conv4_block11_concat[0][
conv4_block12_0_relu (Activation)	(None, 8, 8, 608)	0	conv4_block12_0_bn[0][0]
conv4_block12_1_conv (Conv2D)	(None, 8, 8, 128)	77,824	conv4_block12_0_relu[0][
conv4_block12_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block12_1_conv[0][
conv4_block12_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block12_1_bn[0][0]
conv4_block12_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block12_1_relu[0][
conv4_block12_concat (Concatenate)	(None, 8, 8, 640)	0	conv4_block11_concat[0][ conv4_block12_2_conv[0][
conv4_block13_0_bn (BatchNormalization)	(None, 8, 8, 640)	2,560	conv4_block12_concat[0][
conv4_block13_0_relu (Activation)	(None, 8, 8, 640)	0	conv4_block13_0_bn[0][0]
conv4_block13_1_conv (Conv2D)	(None, 8, 8, 128)	81,920	conv4_block13_0_relu[0][
conv4_block13_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block13_1_conv[0][
conv4_block13_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block13_1_bn[0][0]
conv4_block13_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block13_1_relu[0][
conv4_block13_concat (Concatenate)	(None, 8, 8, 672)	0	conv4_block12_concat[0][ conv4_block13_2_conv[0][
conv4_block14_0_bn (BatchNormalization)	(None, 8, 8, 672)	2,688	conv4_block13_concat[0][
conv4_block14_0_relu (Activation)	(None, 8, 8, 672)	0	conv4_block14_0_bn[0][0]
conv4_block14_1_conv (Conv2D)	(None, 8, 8, 128)	86,016	conv4_block14_0_relu[0][
conv4_block14_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block14_1_conv[0][
conv4_block14_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block14_1_bn[0][0]
conv4_block14_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block14_1_relu[0][
conv4_block14_concat (Concatenate)	(None, 8, 8, 704)	0	conv4_block13_concat[0][ conv4_block14_2_conv[0][
conv4_block15_0_bn (BatchNormalization)	(None, 8, 8, 704)	2,816	conv4_block14_concat[0][
conv4_block15_0_relu (Activation)	(None, 8, 8, 704)	0	conv4_block15_0_bn[0][0]

conv4_block15_1_conv (Conv2D)	(None, 8, 8, 128)	90,112	conv4_block15_0_relu[0][
conv4_block15_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block15_1_conv[0][
conv4_block15_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block15_1_bn[0][0]
conv4_block15_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block15_1_relu[0][
conv4_block15_concat (Concatenate)	(None, 8, 8, 736)	0	conv4_block14_concat[0][ conv4_block15_2_conv[0][
conv4_block16_0_bn (BatchNormalization)	(None, 8, 8, 736)	2,944	conv4_block15_concat[0][
conv4_block16_0_relu (Activation)	(None, 8, 8, 736)	0	conv4_block16_0_bn[0][0]
conv4_block16_1_conv (Conv2D)	(None, 8, 8, 128)	94,208	conv4_block16_0_relu[0][
conv4_block16_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block16_1_conv[0][
conv4_block16_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block16_1_bn[0][0]
conv4_block16_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block16_1_relu[0][
conv4_block16_concat (Concatenate)	(None, 8, 8, 768)	0	conv4_block15_concat[0][ conv4_block16_2_conv[0][
conv4_block17_0_bn (BatchNormalization)	(None, 8, 8, 768)	3,072	conv4_block16_concat[0][
conv4_block17_0_relu (Activation)	(None, 8, 8, 768)	0	conv4_block17_0_bn[0][0]
conv4_block17_1_conv (Conv2D)	(None, 8, 8, 128)	98,304	conv4_block17_0_relu[0][
conv4_block17_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block17_1_conv[0][
conv4_block17_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block17_1_bn[0][0]
conv4_block17_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block17_1_relu[0][
conv4_block17_concat (Concatenate)	(None, 8, 8, 800)	0	conv4_block16_concat[0][ conv4_block17_2_conv[0][
conv4_block18_0_bn (BatchNormalization)	(None, 8, 8, 800)	3,200	conv4_block17_concat[0][
conv4_block18_0_relu (Activation)	(None, 8, 8, 800)	0	conv4_block18_0_bn[0][0]
conv4_block18_1_conv (Conv2D)	(None, 8, 8, 128)	102,400	conv4_block18_0_relu[0][
conv4_block18_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block18_1_conv[0][
conv4_block18_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block18_1_bn[0][0]
conv4_block18_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block18_1_relu[0][
conv4_block18_concat (Concatenate)	(None, 8, 8, 832)	0	conv4_block17_concat[0][ conv4_block18_2_conv[0][
conv4_block19_0_bn (BatchNormalization)	(None, 8, 8, 832)	3,328	conv4_block18_concat[0][
conv4_block19_0_relu (Activation)	(None, 8, 8, 832)	0	conv4_block19_0_bn[0][0]
conv4_block19_1_conv (Conv2D)	(None, 8, 8, 128)	106,496	conv4_block19_0_relu[0][
conv4_block19_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block19_1_conv[0][
conv4_block19_1_relu	(None, 8, 8, 128)	0	conv4_block19_1_bn[0][0]

(Activation)			
conv4_block19_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block19_1_relu[0][
conv4_block19_concat (Concatenate)	(None, 8, 8, 864)	0	conv4_block18_concat[0][ conv4_block19_2_conv[0][
conv4_block20_0_bn (BatchNormalization)	(None, 8, 8, 864)	3,456	conv4_block19_concat[0][
conv4_block20_0_relu (Activation)	(None, 8, 8, 864)	0	conv4_block20_0_bn[0][0]
conv4_block20_1_conv (Conv2D)	(None, 8, 8, 128)	110,592	conv4_block20_0_relu[0][
conv4_block20_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block20_1_conv[0][
conv4_block20_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block20_1_bn[0][0]
conv4_block20_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block20_1_relu[0][
conv4_block20_concat (Concatenate)	(None, 8, 8, 896)	0	conv4_block19_concat[0][ conv4_block20_2_conv[0][
conv4_block21_0_bn (BatchNormalization)	(None, 8, 8, 896)	3,584	conv4_block20_concat[0][
conv4_block21_0_relu (Activation)	(None, 8, 8, 896)	0	conv4_block21_0_bn[0][0]
conv4_block21_1_conv (Conv2D)	(None, 8, 8, 128)	114,688	conv4_block21_0_relu[0][
conv4_block21_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block21_1_conv[0][
conv4_block21_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block21_1_bn[0][0]
conv4_block21_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block21_1_relu[0][
conv4_block21_concat (Concatenate)	(None, 8, 8, 928)	0	conv4_block20_concat[0][ conv4_block21_2_conv[0][
conv4_block22_0_bn (BatchNormalization)	(None, 8, 8, 928)	3,712	conv4_block21_concat[0][
conv4_block22_0_relu (Activation)	(None, 8, 8, 928)	0	conv4_block22_0_bn[0][0]
conv4_block22_1_conv (Conv2D)	(None, 8, 8, 128)	118,784	conv4_block22_0_relu[0][
conv4_block22_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block22_1_conv[0][
conv4_block22_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block22_1_bn[0][0]
conv4_block22_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block22_1_relu[0][
conv4_block22_concat (Concatenate)	(None, 8, 8, 960)	0	conv4_block21_concat[0][ conv4_block22_2_conv[0][
conv4_block23_0_bn (BatchNormalization)	(None, 8, 8, 960)	3,840	conv4_block22_concat[0][
conv4_block23_0_relu (Activation)	(None, 8, 8, 960)	0	conv4_block23_0_bn[0][0]
conv4_block23_1_conv (Conv2D)	(None, 8, 8, 128)	122,880	conv4_block23_0_relu[0][
conv4_block23_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block23_1_conv[0][
conv4_block23_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block23_1_bn[0][0]
conv4_block23_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block23_1_relu[0][
conv4_block23_concat (Concatenate)	(None, 8, 8, 992)	0	conv4_block22_concat[0][ conv4_block23_2_conv[0][

conv4_block24_0_bn (BatchNormalization)	(None, 8, 8, 992)	3,968	conv4_block23_concat[0][
conv4_block24_0_relu (Activation)	(None, 8, 8, 992)	0	conv4_block24_0_bn[0][0]
conv4_block24_1_conv (Conv2D)	(None, 8, 8, 128)	126,976	conv4_block24_0_relu[0][
conv4_block24_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block24_1_conv[0][
conv4_block24_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block24_1_bn[0][0]
conv4_block24_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block24_1_relu[0][
conv4_block24_concat (Concatenate)	(None, 8, 8, 1024)	0	conv4_block23_concat[0][ conv4_block24_2_conv[0][
conv4_block25_0_bn (BatchNormalization)	(None, 8, 8, 1024)	4,096	conv4_block24_concat[0][
conv4_block25_0_relu (Activation)	(None, 8, 8, 1024)	0	conv4_block25_0_bn[0][0]
conv4_block25_1_conv (Conv2D)	(None, 8, 8, 128)	131,072	conv4_block25_0_relu[0][
conv4_block25_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block25_1_conv[0][
conv4_block25_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block25_1_bn[0][0]
conv4_block25_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block25_1_relu[0][
conv4_block25_concat (Concatenate)	(None, 8, 8, 1056)	0	conv4_block24_concat[0][ conv4_block25_2_conv[0][
conv4_block26_0_bn (BatchNormalization)	(None, 8, 8, 1056)	4,224	conv4_block25_concat[0][
conv4_block26_0_relu (Activation)	(None, 8, 8, 1056)	0	conv4_block26_0_bn[0][0]
conv4_block26_1_conv (Conv2D)	(None, 8, 8, 128)	135,168	conv4_block26_0_relu[0][
conv4_block26_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block26_1_conv[0][
conv4_block26_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block26_1_bn[0][0]
conv4_block26_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block26_1_relu[0][
conv4_block26_concat (Concatenate)	(None, 8, 8, 1088)	0	conv4_block25_concat[0][ conv4_block26_2_conv[0][
conv4_block27_0_bn (BatchNormalization)	(None, 8, 8, 1088)	4,352	conv4_block26_concat[0][
conv4_block27_0_relu (Activation)	(None, 8, 8, 1088)	0	conv4_block27_0_bn[0][0]
conv4_block27_1_conv (Conv2D)	(None, 8, 8, 128)	139,264	conv4_block27_0_relu[0][
conv4_block27_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block27_1_conv[0][
conv4_block27_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block27_1_bn[0][0]
conv4_block27_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block27_1_relu[0][
conv4_block27_concat (Concatenate)	(None, 8, 8, 1120)	0	conv4_block26_concat[0][ conv4_block27_2_conv[0][
conv4_block28_0_bn (BatchNormalization)	(None, 8, 8, 1120)	4,480	conv4_block27_concat[0][
conv4_block28_0_relu (Activation)	(None, 8, 8, 1120)	0	conv4_block28_0_bn[0][0]
conv4_block28_1_conv (Conv2D)	(None, 8, 8, 128)	143,360	conv4_block28_0_relu[0][



conv4_block28_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block28_1_conv[0][
conv4_block28_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block28_1_bn[0][0]
conv4_block28_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block28_1_relu[0][
conv4_block28_concat (Concatenate)	(None, 8, 8, 1152)	0	conv4_block27_concat[0][ conv4_block28_2_conv[0][
conv4_block29_0_bn (BatchNormalization)	(None, 8, 8, 1152)	4,608	conv4_block28_concat[0][
conv4_block29_0_relu (Activation)	(None, 8, 8, 1152)	0	conv4_block29_0_bn[0][0]
conv4_block29_1_conv (Conv2D)	(None, 8, 8, 128)	147,456	conv4_block29_0_relu[0][
conv4_block29_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block29_1_conv[0][
conv4_block29_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block29_1_bn[0][0]
conv4_block29_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block29_1_relu[0][
conv4_block29_concat (Concatenate)	(None, 8, 8, 1184)	0	conv4_block28_concat[0][ conv4_block29_2_conv[0][
conv4_block30_0_bn (BatchNormalization)	(None, 8, 8, 1184)	4,736	conv4_block29_concat[0][
conv4_block30_0_relu (Activation)	(None, 8, 8, 1184)	0	conv4_block30_0_bn[0][0]
conv4_block30_1_conv (Conv2D)	(None, 8, 8, 128)	151,552	conv4_block30_0_relu[0][
conv4_block30_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block30_1_conv[0][
conv4_block30_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block30_1_bn[0][0]
conv4_block30_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block30_1_relu[0][
conv4_block30_concat (Concatenate)	(None, 8, 8, 1216)	0	conv4_block29_concat[0][ conv4_block30_2_conv[0][
conv4_block31_0_bn (BatchNormalization)	(None, 8, 8, 1216)	4,864	conv4_block30_concat[0][
conv4_block31_0_relu (Activation)	(None, 8, 8, 1216)	0	conv4_block31_0_bn[0][0]
conv4_block31_1_conv (Conv2D)	(None, 8, 8, 128)	155,648	conv4_block31_0_relu[0][
conv4_block31_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block31_1_conv[0][
conv4_block31_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block31_1_bn[0][0]
conv4_block31_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block31_1_relu[0][
conv4_block31_concat (Concatenate)	(None, 8, 8, 1248)	0	conv4_block30_concat[0][ conv4_block31_2_conv[0][
conv4_block32_0_bn (BatchNormalization)	(None, 8, 8, 1248)	4,992	conv4_block31_concat[0][
conv4_block32_0_relu (Activation)	(None, 8, 8, 1248)	0	conv4_block32_0_bn[0][0]
conv4_block32_1_conv (Conv2D)	(None, 8, 8, 128)	159,744	conv4_block32_0_relu[0][
conv4_block32_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block32_1_conv[0][
conv4_block32_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block32_1_bn[0][0]

conv4_block32_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block32_1_relu[0][
conv4_block32_concat (Concatenate)	(None, 8, 8, 1280)	0	conv4_block31_concat[0][ conv4_block32_2_conv[0][
conv4_block33_0_bn (BatchNormalization)	(None, 8, 8, 1280)	5,120	conv4_block32_concat[0][
conv4_block33_0_relu (Activation)	(None, 8, 8, 1280)	0	conv4_block33_0_bn[0][0]
conv4_block33_1_conv (Conv2D)	(None, 8, 8, 128)	163,840	conv4_block33_0_relu[0][
conv4_block33_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block33_1_conv[0][
conv4_block33_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block33_1_bn[0][0]
conv4_block33_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block33_1_relu[0][
conv4_block33_concat (Concatenate)	(None, 8, 8, 1312)	0	conv4_block32_concat[0][ conv4_block33_2_conv[0][
conv4_block34_0_bn (BatchNormalization)	(None, 8, 8, 1312)	5,248	conv4_block33_concat[0][
conv4_block34_0_relu (Activation)	(None, 8, 8, 1312)	0	conv4_block34_0_bn[0][0]
conv4_block34_1_conv (Conv2D)	(None, 8, 8, 128)	167,936	conv4_block34_0_relu[0][
conv4_block34_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block34_1_conv[0][
conv4_block34_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block34_1_bn[0][0]
conv4_block34_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block34_1_relu[0][
conv4_block34_concat (Concatenate)	(None, 8, 8, 1344)	0	conv4_block33_concat[0][ conv4_block34_2_conv[0][
conv4_block35_0_bn (BatchNormalization)	(None, 8, 8, 1344)	5,376	conv4_block34_concat[0][
conv4_block35_0_relu (Activation)	(None, 8, 8, 1344)	0	conv4_block35_0_bn[0][0]
conv4_block35_1_conv (Conv2D)	(None, 8, 8, 128)	172,032	conv4_block35_0_relu[0][
conv4_block35_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block35_1_conv[0][
conv4_block35_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block35_1_bn[0][0]
conv4_block35_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block35_1_relu[0][
conv4_block35_concat (Concatenate)	(None, 8, 8, 1376)	0	conv4_block34_concat[0][ conv4_block35_2_conv[0][
conv4_block36_0_bn (BatchNormalization)	(None, 8, 8, 1376)	5,504	conv4_block35_concat[0][
conv4_block36_0_relu (Activation)	(None, 8, 8, 1376)	0	conv4_block36_0_bn[0][0]
conv4_block36_1_conv (Conv2D)	(None, 8, 8, 128)	176,128	conv4_block36_0_relu[0][
conv4_block36_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block36_1_conv[0][
conv4_block36_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block36_1_bn[0][0]
conv4_block36_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block36_1_relu[0][
conv4_block36_concat (Concatenate)	(None, 8, 8, 1408)	0	conv4_block35_concat[0][ conv4_block36_2_conv[0][
conv4_block37_0_bn (BatchNormalization)	(None, 8, 8, 1408)	5,632	conv4_block36_concat[0][

conv4_block37_0_relu (Activation)	(None, 8, 8, 1408)	0	conv4_block37_0_bn[0][0]
conv4_block37_1_conv (Conv2D)	(None, 8, 8, 128)	180,224	conv4_block37_0_relu[0][
conv4_block37_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block37_1_conv[0][
conv4_block37_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block37_1_bn[0][0]
conv4_block37_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block37_1_relu[0][
conv4_block37_concat (Concatenate)	(None, 8, 8, 1440)	0	conv4_block36_concat[0][ conv4_block37_2_conv[0][
conv4_block38_0_bn (BatchNormalization)	(None, 8, 8, 1440)	5,760	conv4_block37_concat[0][
conv4_block38_0_relu (Activation)	(None, 8, 8, 1440)	0	conv4_block38_0_bn[0][0]
conv4_block38_1_conv (Conv2D)	(None, 8, 8, 128)	184,320	conv4_block38_0_relu[0][
conv4_block38_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block38_1_conv[0][
conv4_block38_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block38_1_bn[0][0]
conv4_block38_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block38_1_relu[0][
conv4_block38_concat (Concatenate)	(None, 8, 8, 1472)	0	conv4_block37_concat[0][ conv4_block38_2_conv[0][
conv4_block39_0_bn (BatchNormalization)	(None, 8, 8, 1472)	5,888	conv4_block38_concat[0][
conv4_block39_0_relu (Activation)	(None, 8, 8, 1472)	0	conv4_block39_0_bn[0][0]
conv4_block39_1_conv (Conv2D)	(None, 8, 8, 128)	188,416	conv4_block39_0_relu[0][
conv4_block39_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block39_1_conv[0][
conv4_block39_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block39_1_bn[0][0]
conv4_block39_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block39_1_relu[0][
conv4_block39_concat (Concatenate)	(None, 8, 8, 1504)	0	conv4_block38_concat[0][ conv4_block39_2_conv[0][
conv4_block40_0_bn (BatchNormalization)	(None, 8, 8, 1504)	6,016	conv4_block39_concat[0][
conv4_block40_0_relu (Activation)	(None, 8, 8, 1504)	0	conv4_block40_0_bn[0][0]
conv4_block40_1_conv (Conv2D)	(None, 8, 8, 128)	192,512	conv4_block40_0_relu[0][
conv4_block40_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block40_1_conv[0][
conv4_block40_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block40_1_bn[0][0]
conv4_block40_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block40_1_relu[0][
conv4_block40_concat (Concatenate)	(None, 8, 8, 1536)	0	conv4_block39_concat[0][ conv4_block40_2_conv[0][
conv4_block41_0_bn (BatchNormalization)	(None, 8, 8, 1536)	6,144	conv4_block40_concat[0][
conv4_block41_0_relu (Activation)	(None, 8, 8, 1536)	0	conv4_block41_0_bn[0][0]
conv4_block41_1_conv (Conv2D)	(None, 8, 8, 128)	196,608	conv4_block41_0_relu[0][
conv4_block41_1_bn	(None, 8, 8, 128)	512	conv4_block41_1_conv[0][

(BatchNormalization)			
conv4_block41_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block41_1_bn[0][0]
conv4_block41_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block41_1_relu[0][
conv4_block41_concat (Concatenate)	(None, 8, 8, 1568)	0	conv4_block40_concat[0][ conv4_block41_2_conv[0][
conv4_block42_0_bn (BatchNormalization)	(None, 8, 8, 1568)	6,272	conv4_block41_concat[0][
conv4_block42_0_relu (Activation)	(None, 8, 8, 1568)	0	conv4_block42_0_bn[0][0]
conv4_block42_1_conv (Conv2D)	(None, 8, 8, 128)	200,704	conv4_block42_0_relu[0][
conv4_block42_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block42_1_conv[0][
conv4_block42_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block42_1_bn[0][0]
conv4_block42_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block42_1_relu[0][
conv4_block42_concat (Concatenate)	(None, 8, 8, 1600)	0	conv4_block41_concat[0][ conv4_block42_2_conv[0][
conv4_block43_0_bn (BatchNormalization)	(None, 8, 8, 1600)	6,400	conv4_block42_concat[0][
conv4_block43_0_relu (Activation)	(None, 8, 8, 1600)	0	conv4_block43_0_bn[0][0]
conv4_block43_1_conv (Conv2D)	(None, 8, 8, 128)	204,800	conv4_block43_0_relu[0][
conv4_block43_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block43_1_conv[0][
conv4_block43_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block43_1_bn[0][0]
conv4_block43_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block43_1_relu[0][
conv4_block43_concat (Concatenate)	(None, 8, 8, 1632)	0	conv4_block42_concat[0][ conv4_block43_2_conv[0][
conv4_block44_0_bn (BatchNormalization)	(None, 8, 8, 1632)	6,528	conv4_block43_concat[0][
conv4_block44_0_relu (Activation)	(None, 8, 8, 1632)	0	conv4_block44_0_bn[0][0]
conv4_block44_1_conv (Conv2D)	(None, 8, 8, 128)	208,896	conv4_block44_0_relu[0][
conv4_block44_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block44_1_conv[0][
conv4_block44_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block44_1_bn[0][0]
conv4_block44_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block44_1_relu[0][
conv4_block44_concat (Concatenate)	(None, 8, 8, 1664)	0	conv4_block43_concat[0][ conv4_block44_2_conv[0][
conv4_block45_0_bn (BatchNormalization)	(None, 8, 8, 1664)	6,656	conv4_block44_concat[0][
conv4_block45_0_relu (Activation)	(None, 8, 8, 1664)	0	conv4_block45_0_bn[0][0]
conv4_block45_1_conv (Conv2D)	(None, 8, 8, 128)	212,992	conv4_block45_0_relu[0][
conv4_block45_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block45_1_conv[0][
conv4_block45_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block45_1_bn[0][0]
conv4_block45_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block45_1_relu[0][

conv4_block45_concat (Concatenate)	(None, 8, 8, 1696)	0	conv4_block44_concat[0] conv4_block45_2_conv[0]
conv4_block46_0_bn (BatchNormalization)	(None, 8, 8, 1696)	6,784	conv4_block45_concat[0]
conv4_block46_0_relu (Activation)	(None, 8, 8, 1696)	0	conv4_block46_0_bn[0][0]
conv4_block46_1_conv (Conv2D)	(None, 8, 8, 128)	217,088	conv4_block46_0_relu[0]
conv4_block46_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block46_1_conv[0]
conv4_block46_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block46_1_bn[0][0]
conv4_block46_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block46_1_relu[0]
conv4_block46_concat (Concatenate)	(None, 8, 8, 1728)	0	conv4_block45_concat[0] conv4_block46_2_conv[0]
conv4_block47_0_bn (BatchNormalization)	(None, 8, 8, 1728)	6,912	conv4_block46_concat[0]
conv4_block47_0_relu (Activation)	(None, 8, 8, 1728)	0	conv4_block47_0_bn[0][0]
conv4_block47_1_conv (Conv2D)	(None, 8, 8, 128)	221,184	conv4_block47_0_relu[0]
conv4_block47_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block47_1_conv[0]
conv4_block47_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block47_1_bn[0][0]
conv4_block47_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block47_1_relu[0]
conv4_block47_concat (Concatenate)	(None, 8, 8, 1760)	0	conv4_block46_concat[0] conv4_block47_2_conv[0]
conv4_block48_0_bn (BatchNormalization)	(None, 8, 8, 1760)	7,040	conv4_block47_concat[0]
conv4_block48_0_relu (Activation)	(None, 8, 8, 1760)	0	conv4_block48_0_bn[0][0]
conv4_block48_1_conv (Conv2D)	(None, 8, 8, 128)	225,280	conv4_block48_0_relu[0]
conv4_block48_1_bn (BatchNormalization)	(None, 8, 8, 128)	512	conv4_block48_1_conv[0]
conv4_block48_1_relu (Activation)	(None, 8, 8, 128)	0	conv4_block48_1_bn[0][0]
conv4_block48_2_conv (Conv2D)	(None, 8, 8, 32)	36,864	conv4_block48_1_relu[0]
conv4_block48_concat (Concatenate)	(None, 8, 8, 1792)	0	conv4_block47_concat[0] conv4_block48_2_conv[0]
pool4_bn (BatchNormalization)	(None, 8, 8, 1792)	7,168	conv4_block48_concat[0]
pool4_relu (Activation)	(None, 8, 8, 1792)	0	pool4_bn[0][0]
pool4_conv (Conv2D)	(None, 8, 8, 896)	1,605,632	pool4_relu[0][0]
pool4_pool (AveragePooling2D)	(None, 4, 4, 896)	0	pool4_conv[0][0]
conv5_block1_0_bn (BatchNormalization)	(None, 4, 4, 896)	3,584	pool4_pool[0][0]
conv5_block1_0_relu (Activation)	(None, 4, 4, 896)	0	conv5_block1_0_bn[0][0]
conv5_block1_1_conv (Conv2D)	(None, 4, 4, 128)	114,688	conv5_block1_0_relu[0][0]
conv5_block1_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block1_1_conv[0][0]
conv5_block1_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block1_1_bn[0][0]
conv5_block1_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block1_1_relu[0][0]

conv5_block1_concat (Concatenate)	(None, 4, 4, 928)	0	pool4_pool[0][0], conv5_block1_2_conv[0][0]
conv5_block2_0_bn (BatchNormalization)	(None, 4, 4, 928)	3,712	conv5_block1_concat[0][0]
conv5_block2_0_relu (Activation)	(None, 4, 4, 928)	0	conv5_block2_0_bn[0][0]
conv5_block2_1_conv (Conv2D)	(None, 4, 4, 128)	118,784	conv5_block2_0_relu[0][0]
conv5_block2_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block2_1_conv[0][0]
conv5_block2_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block2_1_bn[0][0]
conv5_block2_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block2_1_relu[0][0]
conv5_block2_concat (Concatenate)	(None, 4, 4, 960)	0	conv5_block1_concat[0][0] conv5_block2_2_conv[0][0]
conv5_block3_0_bn (BatchNormalization)	(None, 4, 4, 960)	3,840	conv5_block2_concat[0][0]
conv5_block3_0_relu (Activation)	(None, 4, 4, 960)	0	conv5_block3_0_bn[0][0]
conv5_block3_1_conv (Conv2D)	(None, 4, 4, 128)	122,880	conv5_block3_0_relu[0][0]
conv5_block3_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block3_1_conv[0][0]
conv5_block3_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block3_1_bn[0][0]
conv5_block3_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block3_1_relu[0][0]
conv5_block3_concat (Concatenate)	(None, 4, 4, 992)	0	conv5_block2_concat[0][0] conv5_block3_2_conv[0][0]
conv5_block4_0_bn (BatchNormalization)	(None, 4, 4, 992)	3,968	conv5_block3_concat[0][0]
conv5_block4_0_relu (Activation)	(None, 4, 4, 992)	0	conv5_block4_0_bn[0][0]
conv5_block4_1_conv (Conv2D)	(None, 4, 4, 128)	126,976	conv5_block4_0_relu[0][0]
conv5_block4_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block4_1_conv[0][0]
conv5_block4_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block4_1_bn[0][0]
conv5_block4_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block4_1_relu[0][0]
conv5_block4_concat (Concatenate)	(None, 4, 4, 1024)	0	conv5_block3_concat[0][0] conv5_block4_2_conv[0][0]
conv5_block5_0_bn (BatchNormalization)	(None, 4, 4, 1024)	4,096	conv5_block4_concat[0][0]
conv5_block5_0_relu (Activation)	(None, 4, 4, 1024)	0	conv5_block5_0_bn[0][0]
conv5_block5_1_conv (Conv2D)	(None, 4, 4, 128)	131,072	conv5_block5_0_relu[0][0]
conv5_block5_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block5_1_conv[0][0]
conv5_block5_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block5_1_bn[0][0]
conv5_block5_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block5_1_relu[0][0]
conv5_block5_concat (Concatenate)	(None, 4, 4, 1056)	0	conv5_block4_concat[0][0] conv5_block5_2_conv[0][0]
conv5_block6_0_bn (BatchNormalization)	(None, 4, 4, 1056)	4,224	conv5_block5_concat[0][0]



conv5_block6_0_relu (Activation)	(None, 4, 4, 1056)	0	conv5_block6_0_bn[0][0]
conv5_block6_1_conv (Conv2D)	(None, 4, 4, 128)	135,168	conv5_block6_0_relu[0][0]
conv5_block6_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block6_1_conv[0][0]
conv5_block6_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block6_1_bn[0][0]
conv5_block6_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block6_1_relu[0][0]
conv5_block6_concat (Concatenate)	(None, 4, 4, 1088)	0	conv5_block5_concat[0][0] conv5_block6_2_conv[0][0]
conv5_block7_0_bn (BatchNormalization)	(None, 4, 4, 1088)	4,352	conv5_block6_concat[0][0]
conv5_block7_0_relu (Activation)	(None, 4, 4, 1088)	0	conv5_block7_0_bn[0][0]
conv5_block7_1_conv (Conv2D)	(None, 4, 4, 128)	139,264	conv5_block7_0_relu[0][0]
conv5_block7_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block7_1_conv[0][0]
conv5_block7_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block7_1_bn[0][0]
conv5_block7_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block7_1_relu[0][0]
conv5_block7_concat (Concatenate)	(None, 4, 4, 1120)	0	conv5_block6_concat[0][0] conv5_block7_2_conv[0][0]
conv5_block8_0_bn (BatchNormalization)	(None, 4, 4, 1120)	4,480	conv5_block7_concat[0][0]
conv5_block8_0_relu (Activation)	(None, 4, 4, 1120)	0	conv5_block8_0_bn[0][0]
conv5_block8_1_conv (Conv2D)	(None, 4, 4, 128)	143,360	conv5_block8_0_relu[0][0]
conv5_block8_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block8_1_conv[0][0]
conv5_block8_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block8_1_bn[0][0]
conv5_block8_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block8_1_relu[0][0]
conv5_block8_concat (Concatenate)	(None, 4, 4, 1152)	0	conv5_block7_concat[0][0] conv5_block8_2_conv[0][0]
conv5_block9_0_bn (BatchNormalization)	(None, 4, 4, 1152)	4,608	conv5_block8_concat[0][0]
conv5_block9_0_relu (Activation)	(None, 4, 4, 1152)	0	conv5_block9_0_bn[0][0]
conv5_block9_1_conv (Conv2D)	(None, 4, 4, 128)	147,456	conv5_block9_0_relu[0][0]
conv5_block9_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block9_1_conv[0][0]
conv5_block9_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block9_1_bn[0][0]
conv5_block9_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block9_1_relu[0][0]
conv5_block9_concat (Concatenate)	(None, 4, 4, 1184)	0	conv5_block8_concat[0][0] conv5_block9_2_conv[0][0]
conv5_block10_0_bn (BatchNormalization)	(None, 4, 4, 1184)	4,736	conv5_block9_concat[0][0]
conv5_block10_0_relu (Activation)	(None, 4, 4, 1184)	0	conv5_block10_0_bn[0][0]
conv5_block10_1_conv (Conv2D)	(None, 4, 4, 128)	151,552	conv5_block10_0_relu[0][0]
conv5_block10_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block10_1_conv[0][0]

conv5_block10_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block10_1_bn[0][0]
conv5_block10_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block10_1_relu[0][
conv5_block10_concat (Concatenate)	(None, 4, 4, 1216)	0	conv5_block9_concat[0][0 conv5_block10_2_conv[0][
conv5_block11_0_bn (BatchNormalization)	(None, 4, 4, 1216)	4,864	conv5_block10_concat[0][
conv5_block11_0_relu (Activation)	(None, 4, 4, 1216)	0	conv5_block11_0_bn[0][0]
conv5_block11_1_conv (Conv2D)	(None, 4, 4, 128)	155,648	conv5_block11_0_relu[0][
conv5_block11_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block11_1_conv[0][
conv5_block11_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block11_1_bn[0][0]
conv5_block11_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block11_1_relu[0][
conv5_block11_concat (Concatenate)	(None, 4, 4, 1248)	0	conv5_block10_concat[0][ conv5_block11_2_conv[0][
conv5_block12_0_bn (BatchNormalization)	(None, 4, 4, 1248)	4,992	conv5_block11_concat[0][
conv5_block12_0_relu (Activation)	(None, 4, 4, 1248)	0	conv5_block12_0_bn[0][0]
conv5_block12_1_conv (Conv2D)	(None, 4, 4, 128)	159,744	conv5_block12_0_relu[0][
conv5_block12_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block12_1_conv[0][
conv5_block12_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block12_1_bn[0][0]
conv5_block12_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block12_1_relu[0][
conv5_block12_concat (Concatenate)	(None, 4, 4, 1280)	0	conv5_block11_concat[0][ conv5_block12_2_conv[0][
conv5_block13_0_bn (BatchNormalization)	(None, 4, 4, 1280)	5,120	conv5_block12_concat[0][
conv5_block13_0_relu (Activation)	(None, 4, 4, 1280)	0	conv5_block13_0_bn[0][0]
conv5_block13_1_conv (Conv2D)	(None, 4, 4, 128)	163,840	conv5_block13_0_relu[0][
conv5_block13_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block13_1_conv[0][
conv5_block13_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block13_1_bn[0][0]
conv5_block13_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block13_1_relu[0][
conv5_block13_concat (Concatenate)	(None, 4, 4, 1312)	0	conv5_block12_concat[0][ conv5_block13_2_conv[0][
conv5_block14_0_bn (BatchNormalization)	(None, 4, 4, 1312)	5,248	conv5_block13_concat[0][
conv5_block14_0_relu (Activation)	(None, 4, 4, 1312)	0	conv5_block14_0_bn[0][0]
conv5_block14_1_conv (Conv2D)	(None, 4, 4, 128)	167,936	conv5_block14_0_relu[0][
conv5_block14_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block14_1_conv[0][
conv5_block14_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block14_1_bn[0][0]
conv5_block14_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block14_1_relu[0][
conv5_block14_concat	(None, 4, 4, 1344)	0	conv5_block13_concat[0][

(Concatenate)			conv5_block14_2_conv[0][
conv5_block15_0_bn (BatchNormalization)	(None, 4, 4, 1344)	5,376	conv5_block14_concat[0][
conv5_block15_0_relu (Activation)	(None, 4, 4, 1344)	0	conv5_block15_0_bn[0][0]
conv5_block15_1_conv (Conv2D)	(None, 4, 4, 128)	172,032	conv5_block15_0_relu[0][
conv5_block15_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block15_1_conv[0][
conv5_block15_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block15_1_bn[0][0]
conv5_block15_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block15_1_relu[0][
conv5_block15_concat (Concatenate)	(None, 4, 4, 1376)	0	conv5_block14_concat[0][ conv5_block15_2_conv[0][
conv5_block16_0_bn (BatchNormalization)	(None, 4, 4, 1376)	5,504	conv5_block15_concat[0][
conv5_block16_0_relu (Activation)	(None, 4, 4, 1376)	0	conv5_block16_0_bn[0][0]
conv5_block16_1_conv (Conv2D)	(None, 4, 4, 128)	176,128	conv5_block16_0_relu[0][
conv5_block16_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block16_1_conv[0][
conv5_block16_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block16_1_bn[0][0]
conv5_block16_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block16_1_relu[0][
conv5_block16_concat (Concatenate)	(None, 4, 4, 1408)	0	conv5_block15_concat[0][ conv5_block16_2_conv[0][
conv5_block17_0_bn (BatchNormalization)	(None, 4, 4, 1408)	5,632	conv5_block16_concat[0][
conv5_block17_0_relu (Activation)	(None, 4, 4, 1408)	0	conv5_block17_0_bn[0][0]
conv5_block17_1_conv (Conv2D)	(None, 4, 4, 128)	180,224	conv5_block17_0_relu[0][
conv5_block17_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block17_1_conv[0][
conv5_block17_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block17_1_bn[0][0]
conv5_block17_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block17_1_relu[0][
conv5_block17_concat (Concatenate)	(None, 4, 4, 1440)	0	conv5_block16_concat[0][ conv5_block17_2_conv[0][
conv5_block18_0_bn (BatchNormalization)	(None, 4, 4, 1440)	5,760	conv5_block17_concat[0][
conv5_block18_0_relu (Activation)	(None, 4, 4, 1440)	0	conv5_block18_0_bn[0][0]
conv5_block18_1_conv (Conv2D)	(None, 4, 4, 128)	184,320	conv5_block18_0_relu[0][
conv5_block18_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block18_1_conv[0][
conv5_block18_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block18_1_bn[0][0]
conv5_block18_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block18_1_relu[0][
conv5_block18_concat (Concatenate)	(None, 4, 4, 1472)	0	conv5_block17_concat[0][ conv5_block18_2_conv[0][
conv5_block19_0_bn (BatchNormalization)	(None, 4, 4, 1472)	5,888	conv5_block18_concat[0][
conv5_block19_0_relu (Activation)	(None, 4, 4, 1472)	0	conv5_block19_0_bn[0][0]

conv5_block19_1_conv (Conv2D)	(None, 4, 4, 128)	188,416	conv5_block19_0_relu[0][
conv5_block19_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block19_1_conv[0][
conv5_block19_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block19_1_bn[0][0]
conv5_block19_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block19_1_relu[0][
conv5_block19_concat (Concatenate)	(None, 4, 4, 1504)	0	conv5_block18_concat[0][ conv5_block19_2_conv[0][
conv5_block20_0_bn (BatchNormalization)	(None, 4, 4, 1504)	6,016	conv5_block19_concat[0][
conv5_block20_0_relu (Activation)	(None, 4, 4, 1504)	0	conv5_block20_0_bn[0][0]
conv5_block20_1_conv (Conv2D)	(None, 4, 4, 128)	192,512	conv5_block20_0_relu[0][
conv5_block20_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block20_1_conv[0][
conv5_block20_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block20_1_bn[0][0]
conv5_block20_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block20_1_relu[0][
conv5_block20_concat (Concatenate)	(None, 4, 4, 1536)	0	conv5_block19_concat[0][ conv5_block20_2_conv[0][
conv5_block21_0_bn (BatchNormalization)	(None, 4, 4, 1536)	6,144	conv5_block20_concat[0][
conv5_block21_0_relu (Activation)	(None, 4, 4, 1536)	0	conv5_block21_0_bn[0][0]
conv5_block21_1_conv (Conv2D)	(None, 4, 4, 128)	196,608	conv5_block21_0_relu[0][
conv5_block21_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block21_1_conv[0][
conv5_block21_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block21_1_bn[0][0]
conv5_block21_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block21_1_relu[0][
conv5_block21_concat (Concatenate)	(None, 4, 4, 1568)	0	conv5_block20_concat[0][ conv5_block21_2_conv[0][
conv5_block22_0_bn (BatchNormalization)	(None, 4, 4, 1568)	6,272	conv5_block21_concat[0][
conv5_block22_0_relu (Activation)	(None, 4, 4, 1568)	0	conv5_block22_0_bn[0][0]
conv5_block22_1_conv (Conv2D)	(None, 4, 4, 128)	200,704	conv5_block22_0_relu[0][
conv5_block22_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block22_1_conv[0][
conv5_block22_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block22_1_bn[0][0]
conv5_block22_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block22_1_relu[0][
conv5_block22_concat (Concatenate)	(None, 4, 4, 1600)	0	conv5_block21_concat[0][ conv5_block22_2_conv[0][
conv5_block23_0_bn (BatchNormalization)	(None, 4, 4, 1600)	6,400	conv5_block22_concat[0][
conv5_block23_0_relu (Activation)	(None, 4, 4, 1600)	0	conv5_block23_0_bn[0][0]
conv5_block23_1_conv (Conv2D)	(None, 4, 4, 128)	204,800	conv5_block23_0_relu[0][
conv5_block23_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block23_1_conv[0][
conv5_block23_1_relu	(None, 4, 4, 128)	0	conv5_block23_1_bn[0][0]

(Activation)			
conv5_block23_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block23_1_relu[0][
conv5_block23_concat (Concatenate)	(None, 4, 4, 1632)	0	conv5_block22_concat[0][ conv5_block23_2_conv[0][
conv5_block24_0_bn (BatchNormalization)	(None, 4, 4, 1632)	6,528	conv5_block23_concat[0][
conv5_block24_0_relu (Activation)	(None, 4, 4, 1632)	0	conv5_block24_0_bn[0][0]
conv5_block24_1_conv (Conv2D)	(None, 4, 4, 128)	208,896	conv5_block24_0_relu[0][
conv5_block24_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block24_1_conv[0][
conv5_block24_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block24_1_bn[0][0]
conv5_block24_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block24_1_relu[0][
conv5_block24_concat (Concatenate)	(None, 4, 4, 1664)	0	conv5_block23_concat[0][ conv5_block24_2_conv[0][
conv5_block25_0_bn (BatchNormalization)	(None, 4, 4, 1664)	6,656	conv5_block24_concat[0][
conv5_block25_0_relu (Activation)	(None, 4, 4, 1664)	0	conv5_block25_0_bn[0][0]
conv5_block25_1_conv (Conv2D)	(None, 4, 4, 128)	212,992	conv5_block25_0_relu[0][
conv5_block25_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block25_1_conv[0][
conv5_block25_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block25_1_bn[0][0]
conv5_block25_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block25_1_relu[0][
conv5_block25_concat (Concatenate)	(None, 4, 4, 1696)	0	conv5_block24_concat[0][ conv5_block25_2_conv[0][
conv5_block26_0_bn (BatchNormalization)	(None, 4, 4, 1696)	6,784	conv5_block25_concat[0][
conv5_block26_0_relu (Activation)	(None, 4, 4, 1696)	0	conv5_block26_0_bn[0][0]
conv5_block26_1_conv (Conv2D)	(None, 4, 4, 128)	217,088	conv5_block26_0_relu[0][
conv5_block26_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block26_1_conv[0][
conv5_block26_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block26_1_bn[0][0]
conv5_block26_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block26_1_relu[0][
conv5_block26_concat (Concatenate)	(None, 4, 4, 1728)	0	conv5_block25_concat[0][ conv5_block26_2_conv[0][
conv5_block27_0_bn (BatchNormalization)	(None, 4, 4, 1728)	6,912	conv5_block26_concat[0][
conv5_block27_0_relu (Activation)	(None, 4, 4, 1728)	0	conv5_block27_0_bn[0][0]
conv5_block27_1_conv (Conv2D)	(None, 4, 4, 128)	221,184	conv5_block27_0_relu[0][
conv5_block27_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block27_1_conv[0][
conv5_block27_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block27_1_bn[0][0]
conv5_block27_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block27_1_relu[0][
conv5_block27_concat (Concatenate)	(None, 4, 4, 1760)	0	conv5_block26_concat[0][ conv5_block27_2_conv[0][

conv5_block28_0_bn (BatchNormalization)	(None, 4, 4, 1760)	7,040	conv5_block27_concat[0][
conv5_block28_0_relu (Activation)	(None, 4, 4, 1760)	0	conv5_block28_0_bn[0][0]
conv5_block28_1_conv (Conv2D)	(None, 4, 4, 128)	225,280	conv5_block28_0_relu[0][
conv5_block28_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block28_1_conv[0][
conv5_block28_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block28_1_bn[0][0]
conv5_block28_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block28_1_relu[0][
conv5_block28_concat (Concatenate)	(None, 4, 4, 1792)	0	conv5_block27_concat[0][ conv5_block28_2_conv[0][
conv5_block29_0_bn (BatchNormalization)	(None, 4, 4, 1792)	7,168	conv5_block28_concat[0][
conv5_block29_0_relu (Activation)	(None, 4, 4, 1792)	0	conv5_block29_0_bn[0][0]
conv5_block29_1_conv (Conv2D)	(None, 4, 4, 128)	229,376	conv5_block29_0_relu[0][
conv5_block29_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block29_1_conv[0][
conv5_block29_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block29_1_bn[0][0]
conv5_block29_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block29_1_relu[0][
conv5_block29_concat (Concatenate)	(None, 4, 4, 1824)	0	conv5_block28_concat[0][ conv5_block29_2_conv[0][
conv5_block30_0_bn (BatchNormalization)	(None, 4, 4, 1824)	7,296	conv5_block29_concat[0][
conv5_block30_0_relu (Activation)	(None, 4, 4, 1824)	0	conv5_block30_0_bn[0][0]
conv5_block30_1_conv (Conv2D)	(None, 4, 4, 128)	233,472	conv5_block30_0_relu[0][
conv5_block30_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block30_1_conv[0][
conv5_block30_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block30_1_bn[0][0]
conv5_block30_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block30_1_relu[0][
conv5_block30_concat (Concatenate)	(None, 4, 4, 1856)	0	conv5_block29_concat[0][ conv5_block30_2_conv[0][
conv5_block31_0_bn (BatchNormalization)	(None, 4, 4, 1856)	7,424	conv5_block30_concat[0][
conv5_block31_0_relu (Activation)	(None, 4, 4, 1856)	0	conv5_block31_0_bn[0][0]
conv5_block31_1_conv (Conv2D)	(None, 4, 4, 128)	237,568	conv5_block31_0_relu[0][
conv5_block31_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block31_1_conv[0][
conv5_block31_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block31_1_bn[0][0]
conv5_block31_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block31_1_relu[0][
conv5_block31_concat (Concatenate)	(None, 4, 4, 1888)	0	conv5_block30_concat[0][ conv5_block31_2_conv[0][
conv5_block32_0_bn (BatchNormalization)	(None, 4, 4, 1888)	7,552	conv5_block31_concat[0][
conv5_block32_0_relu (Activation)	(None, 4, 4, 1888)	0	conv5_block32_0_bn[0][0]
conv5_block32_1_conv (Conv2D)	(None, 4, 4, 128)	241,664	conv5_block32_0_relu[0][



conv5_block32_1_bn (BatchNormalization)	(None, 4, 4, 128)	512	conv5_block32_1_conv[0][
conv5_block32_1_relu (Activation)	(None, 4, 4, 128)	0	conv5_block32_1_bn[0][0]
conv5_block32_2_conv (Conv2D)	(None, 4, 4, 32)	36,864	conv5_block32_1_relu[0][
conv5_block32_concat (Concatenate)	(None, 4, 4, 1920)	0	conv5_block31_concat[0][ conv5_block32_2_conv[0][
bn (BatchNormalization)	(None, 4, 4, 1920)	7,680	conv5_block32_concat[0][
relu (Activation)	(None, 4, 4, 1920)	0	bn[0][0]
max_pool (GlobalMaxPooling2D)	(None, 1920)	0	relu[0][0]
dense (Dense)	(None, 512)	983,552	max_pool[0][0]
dense_1 (Dense)	(None, 2)	1,026	dense[0][0]

**Total params:** 19,306,562 (73.65 MB)

**Trainable params:** 984,578 (3.76 MB)

**Non-trainable params:** 18,321,984 (69.89 MB)

```
In [14]: history = dense_model.fit(X_train,y_train,batch_size=16,validation_data=(X_test,y_test),epochs=10)
```

```
Epoch 1/10
117/117 ————— 172s 1s/step - accuracy: 0.7566 - loss: 1.9553 - val_accuracy: 0.9312 - val_loss: 0.1680
Epoch 2/10
117/117 ————— 142s 1s/step - accuracy: 0.9181 - loss: 0.1781 - val_accuracy: 0.9333 - val_loss: 0.1631
Epoch 3/10
117/117 ————— 138s 1s/step - accuracy: 0.9576 - loss: 0.1126 - val_accuracy: 0.9398 - val_loss: 0.1716
Epoch 4/10
117/117 ————— 139s 1s/step - accuracy: 0.9632 - loss: 0.0888 - val_accuracy: 0.9269 - val_loss: 0.2037
Epoch 5/10
117/117 ————— 136s 1s/step - accuracy: 0.9633 - loss: 0.0789 - val_accuracy: 0.9290 - val_loss: 0.1603
Epoch 6/10
117/117 ————— 136s 1s/step - accuracy: 0.9751 - loss: 0.0648 - val_accuracy: 0.8946 - val_loss: 0.2853
Epoch 7/10
117/117 ————— 136s 1s/step - accuracy: 0.9359 - loss: 0.1584 - val_accuracy: 0.9269 - val_loss: 0.1696
Epoch 8/10
117/117 ————— 136s 1s/step - accuracy: 0.9838 - loss: 0.0525 - val_accuracy: 0.9355 - val_loss: 0.2543
Epoch 9/10
117/117 ————— 138s 1s/step - accuracy: 0.9800 - loss: 0.0569 - val_accuracy: 0.9011 - val_loss: 0.3238
Epoch 10/10
117/117 ————— 144s 1s/step - accuracy: 0.9681 - loss: 0.0820 - val_accuracy: 0.9226 - val_loss: 0.1945
```

```
In [15]: history.history['accuracy']
history.history['val_accuracy']
```

```
Out[15]: [0.9311828017234802,
0.9333333373069763,
0.9397849440574646,
0.926881730556488,
0.9290322661399841,
0.8946236371994019,
0.926881730556488,
0.9354838728904724,
0.9010752439498901,
0.9225806593894958]
```

```
In [16]: print("Training Accuracy: ", history.history['accuracy'][-1])
print("Validation Accuracy: ", history.history['val_accuracy'][-1])
```

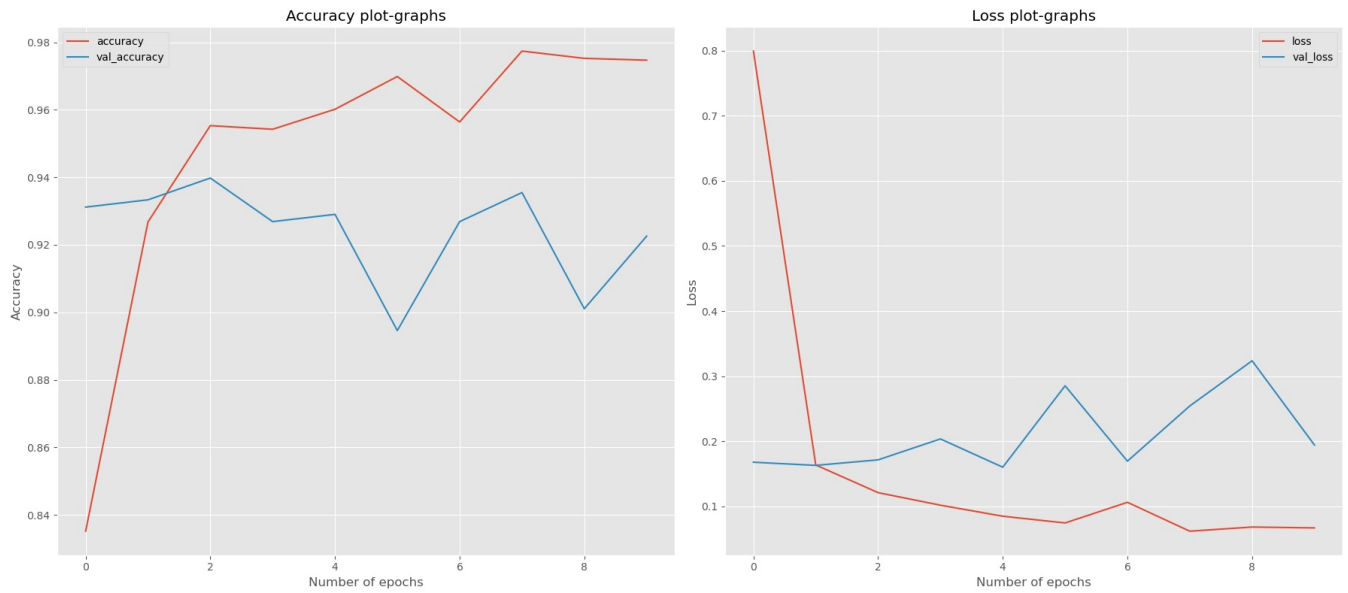
```
Training Accuracy: 0.9746903777122498
Validation Accuracy: 0.9225806593894958
```

```
In [17]: with plt.style.context (style='ggplot'):
fig, axes=plt.subplots(nrows=1, ncols=2, figsize=(18,8))
axes[0].plot(history.history["accuracy"],label="accuracy")
axes[0].plot(history.history["val_accuracy"],label="val_accuracy")
axes[0].set_title(label='Accuracy plot-graphs')
axes[0].set_xlabel(xlabel='Number of epochs')
```

```

axes[0].set_ylabel(ylabel='Accuracy')
axes[0].legend()
axes[1].plot(history.history["loss"], label="loss")
axes[1].plot(history.history["val_loss"], label="val_loss")
axes[1].set_title(label='Loss plot-graphs')
axes[1].set_xlabel(xlabel='Number of epochs')
axes[1].set_ylabel(ylabel='Loss')
axes[1].legend()
fig.tight_layout()
plt.show()

```



In [18]: dense\_model\_prediction=dense\_model.predict(X\_test,batch\_size=32,verbose=1)

15/15 ————— 41s 2s/step

In [19]: print(dense\_model\_prediction)

```

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```

## Classification Report

```
In [28]: from sklearn.metrics import classification_report
import numpy as np

# Assuming true_labels is already in single-label format (1D array)
# Convert predictions to single-label format if needed
dense_model_pred_classes = np.argmax(dense_model_pred, axis=1) # Assuming dense_model_pred is the output of mo

# Now generate the classification report
print(classification_report(y_true=true_labels, y_pred=dense_model_pred_classes, target_names=class_labels))
```

	precision	recall	f1-score	support
Apple_Bad	0.97	0.89	0.93	272
Apple_Good	0.87	0.96	0.91	193
accuracy			0.92	465
macro avg	0.92	0.93	0.92	465
weighted avg	0.93	0.92	0.92	465

```
In [30]: import numpy as np
import seaborn as sns
```

```

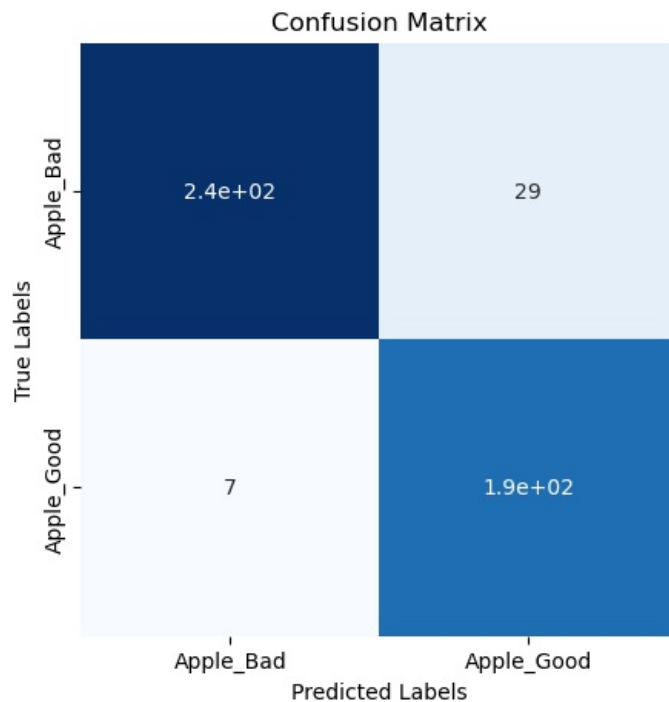
import matplotlib.pyplot as plt
from sklearn.metrics import confusion_matrix

# Convert predictions to class labels
dense_model_pred_classes = np.argmax(dense_model_pred, axis=1)

# Calculate the confusion matrix
conf_matrix = confusion_matrix(y_true=true_labels, y_pred=dense_model_pred_classes)

# Plotting the confusion matrix heatmap
plt.figure(figsize=(5,5))
sns.heatmap(data=conf_matrix,
            annot=True,
            cbar=False,
            cmap=plt.cm.Blues,
            xticklabels=class_labels,
            yticklabels=class_labels)
plt.title('Confusion Matrix')
plt.xlabel('Predicted Labels')
plt.ylabel('True Labels')
plt.show()

```



```
In [31]: dense_model.save("Fruits_DenseNet201_model.keras")
```

```
In [32]: from IPython.display import Image, display
#import tensorflow as tf
from tensorflow.keras.models import load_model
```

```
In [33]: model=load_model(filepath='Fruits_DenseNet201_model.keras', compile=False)
model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
```

```
In [34]: class_labels=['Apple_Bad', 'Apple_Good']
```

```
In [35]: image_path='Fruits/Apple_Good/goodone.jpg'
print(image_path)
```

Fruits/Apple\_Good/goodone.jpg

```
In [36]: image=cv2.imread(image_path)

image=cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
image=cv2.resize(image, (128,128))
plt.imshow(image)
plt.title(label='Input Image')
plt.axis('off')
plt.show()
```

Input Image



```
In [37]: image=np.array(image)
image=image/255.0
image=np.expand_dims(image,axis=0)
print(image.shape)
```

(1, 128, 128, 3)

```
In [38]: model_prediction=model.predict(image)
model_class=np.argmax(model_prediction[0])
model_label=class_labels[model_class]
fruit_name=model_label.split(" ")[0]
fruit_quality=model_label.split("_")[1]
print(f"Fruit classified as -> {fruit_name}")
print(f"Quality assessed as -> {fruit_quality}")
```

1/1 ————— 22s 22s/step

Fruit classified as -> Apple

Quality assessed as -> Good

In [ ]:

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