In [1]:
```
import tensorflow as tf
from tensorflow.keras import models, layers, applications
import matplotlib.pyplot as plt
from keras.models import Sequential
import numpy as np

import pandas as pd
```

In [2]:
```
mname="EfficientNetV2S"
path=f'/home/deepak/weights/{mname}'
print(path)
import os
os.chdir(path)
weightlist=os.listdir(path)


weightlist.sort()
print(weightlist[0])
weightlist
```

```
/home/deepak/weights/EfficientNetV2S
0.163_32EfficientNetV2Sadam.h5
```

Out[2]:
```
['0.163_32EfficientNetV2Sadam.h5',
 '0.165_32EfficientNetV2Sadam.h5',
 '0.169_32EfficientNetV2Sadam.h5',
 '0.172_32EfficientNetV2Sadam.h5',
 '0.174_32EfficientNetV2Sadam.h5',
 '0.176_32EfficientNetV2Sadam.h5',
 '0.177_32EfficientNetV2Sadam.h5',
 '0.181_32EfficientNetV2Sadam.h5',
 '0.184_32EfficientNetV2Sadam.h5',
 '0.185_32EfficientNetV2Sadam.h5',
 '0.188_32EfficientNetV2Sadam.h5',
 '0.189_32EfficientNetV2Sadam.h5',
 '0.192_32EfficientNetV2Sadam.h5',
 '0.193_32EfficientNetV2Sadam.h5',
 '0.194_32EfficientNetV2Sadam.h5',
 '0.199_32EfficientNetV2Sadam.h5',
 '0.201_32EfficientNetV2Sadam.h5',
 '0.202_32EfficientNetV2Sadam.h5',
 '0.212_32EfficientNetV2Sadam.h5',
 '0.213_32EfficientNetV2Sadam.h5',
 '0.214_32EfficientNetV2Sadam.h5',
 '0.216_32EfficientNetV2Sadam.h5',
 '0.217_32EfficientNetV2Sadam.h5',
 '0.220_32EfficientNetV2Sadam.h5',
 '0.221_32EfficientNetV2Sadam.h5',
 '0.223_32EfficientNetV2Sadam.h5',
 '0.225_32EfficientNetV2Sadam.h5',
 '0.231_32EfficientNetV2Sadam.h5',
 '0.235_32EfficientNetV2Sadam.h5',
 '0.236_32EfficientNetV2Sadam.h5',
 '0.245_32EfficientNetV2Sadam.h5',
 '0.247_32EfficientNetV2Sadam.h5',
 '0.248_32EfficientNetV2Sadam.h5',
 '0.251_32EfficientNetV2Sadam.h5',
 '0.255_32EfficientNetV2Sadam.h5',
 '0.257_32EfficientNetV2Sadam.h5',
 '0.259_32EfficientNetV2Sadam.h5',
 '0.269_32EfficientNetV2Sadam.h5',
 '0.274_32EfficientNetV2Sadam.h5',
 '0.282_32EfficientNetV2Sadam.h5',
 '0.288_32EfficientNetV2Sadam.h5',
 '0.294_32EfficientNetV2Sadam.h5',
```

```
'0.296_32EfficientNetV2Sadam.h5',
'0.326_32EfficientNetV2Sadam.h5',
'0.351_32EfficientNetV2Sadam.h5',
'0.355_32EfficientNetV2Sadam.h5',
'0.388_32EfficientNetV2Sadam.h5',
'0.421_32EfficientNetV2Sadam.h5',
'0.425_32EfficientNetV2Sadam.h5',
'0.582_32EfficientNetV2Sadam.h5',
'1.639_32EfficientNetV2Sadam.h5',
'logs']
```

In [3]:

```
IMAGE_SIZE = 384
EPOCHS=32
shuffle_size=1000
BATCH_SIZE = 32
weights=f'home/deepak/weights/{mname}/'+weightlist[0]
optimizer =tf.keras.optimizers.Adam(learning_rate=0.1)
opt="adam"
los=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=False)
CHANNELS=3
nclasses=2
input_shape=(IMAGE_SIZE,IMAGE_SIZE,CHANNELS)
weights
```

Out[3]:

```
'home/deepak/weights/EfficientNetV2S/0.163_32EfficientNetV2Sadam.h5'
```

In [4]:

```
dataset = tf.keras.preprocessing.image_dataset_from_directory(
    "/home/deepak/isic19_20_hair_removal",
    seed=123,
    shuffle=True,
    image_size=(IMAGE_SIZE,IMAGE_SIZE),
    batch_size=BATCH_SIZE
)
```

```
Found 11449 files belonging to 2 classes.
2022-05-18 18:57:41.709208: I tensorflow/core/platform/cpu_feature_guard.cc:151] Thi
s TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to
use the following CPU instructions in performance-critical operations:  AVX2 AVX512F
FMA
To enable them in other operations, rebuild TensorFlow with the appropriate compiler
flags.
2022-05-18 18:57:42.948520: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1525]
Created device /job:localhost/replica:0/task:0/device:GPU:0 with 30987 MB memory:  -
> device: 0, name: Tesla V100-PCIE-32GB, pci bus id: 0000:3b:00.0, compute capabilit
y: 7.0
```

In [5]:

```
class_names =dataset.class_names
print(class_names)
nclasses=len(class_names)
print(nclasses)
```

```
['mel', 'nevus']
2
```

In [6]:

```
import os
os.chdir(path)
```

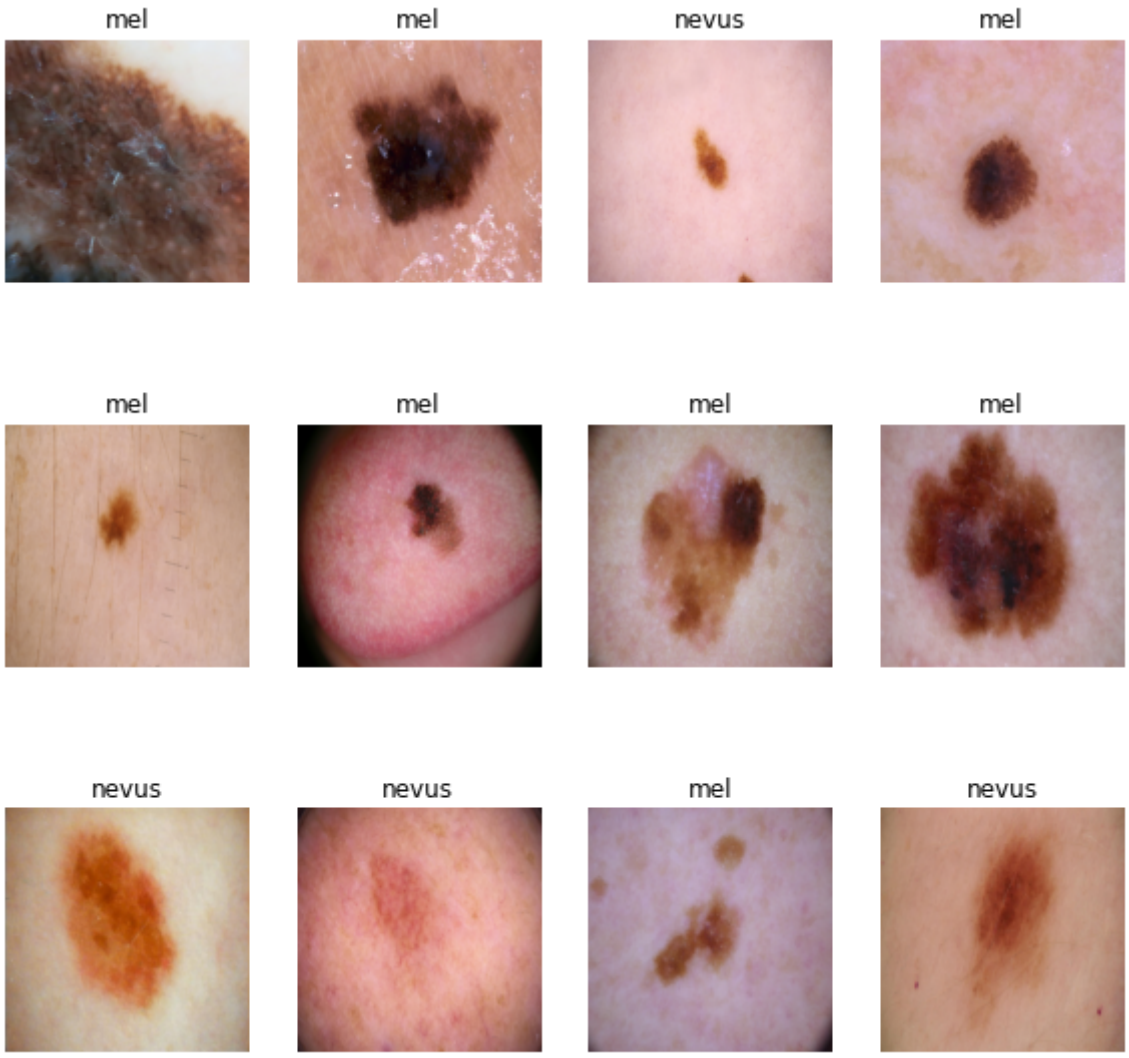
In [7]:

```
import tensorflow as tf

model=tf.keras.applications.EfficientNetV2S(
    include_top=True,
```

```
    weights=weightlist[0],
    input_tensor=None,
    input_shape=None,
    pooling="avg",
    classes=2,
    classifier_activation="softmax"
)
```

In [8]:
```
#model=load_model('32efficientv2S91%.h5')
```

In [9]:
```
plt.figure(figsize=(10,10))
for image_batch, label_batch in dataset.take(1):
    for i in range(12):
      ax = plt.subplot(3,4,i+1)
      plt.imshow(image_batch[i].numpy().astype("uint8"))
      plt.title(class_names[label_batch[i]])
      plt.axis('off')
```



In [10]:
```
ld=len(dataset)
ld
```

Out[10]: 358

In [11]:
```
train_size = 0.8
tsize=round(ld*train_size)
```

```
tsize
```

Out[11]: 286

In [12]:
```
train_ds = dataset.take(tsize)
len(train_ds)
```

Out[12]: 286

In [13]:
```
if(ld==len(dataset)):
  test_ds=dataset.skip(tsize)
else:
  test_size = 0.1
  t1size=round(ld*test_size)
  t1size
  test_ds=dataset.take(t1size)
```

In [14]:
```
len(test_ds)
```

Out[14]: 72

In [15]:
```
val_size = 0.1
vsize=round(ld*val_size)
vsize
```

Out[15]: 36

In [16]:
```
val_ds = test_ds.take(vsize)
print(len(val_ds))
```

```
36
```

In [17]:
```
if(ld==len(dataset)):
    test_ds = test_ds.skip(vsize)
```

In [18]:
```
len(test_ds)
```

Out[18]: 36

In [19]:
```
def get_dataset_partitions_tf(ds, train_split=0.8, val_split=0.1, test_split=0.1, sh
    assert (train_split + test_split + val_split) == 1

    ds_size = len(ds)

    if shuffle:
        ds = ds.shuffle(shuffle_size, seed=12)

    train_size = int(train_split * ds_size)
    val_size = int(val_split * ds_size)

    train_ds = ds.take(train_size)
    val_ds = ds.skip(train_size).take(val_size)
    test_ds = ds.skip(train_size).skip(val_size)
```

```
    return train_ds, val_ds, test_ds
```

In [20]:
```
if(ld==len(dataset)):
    train_ds, val_ds, test_ds = get_dataset_partitions_tf(dataset)
    print("checked")
```

```
checked
```

In [21]:
```
train_ds = train_ds.cache().shuffle(1000).prefetch(buffer_size=tf.data.AUTOTUNE)
val_ds = val_ds.cache().shuffle(1000).prefetch(buffer_size=tf.data.AUTOTUNE)
test_ds = test_ds.cache().shuffle(1000).prefetch(buffer_size=tf.data.AUTOTUNE)
```

In [ ]:
```

```

In [22]:
```
data_augmentation = tf.keras.Sequential([
    layers.experimental.preprocessing.RandomFlip("horizontal_and_vertical"),
    layers.experimental.preprocessing.RandomRotation(0.2),
])
```

In [23]:
```
train_ds = train_ds.map(lambda x, y: (data_augmentation(x, training=True), y)).prefe
#train_ds = train_ds.map(lambda x, y: (smart_resize(, size)))
```

```
WARNING:tensorflow:AutoGraph could not transform <function <lambda> at 0x7f0db00bca7
0> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
WARNING: AutoGraph could not transform <function <lambda> at 0x7f0db00bca70> and wil
l run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
```

In [24]:
```
model.summary()
```

```
Model: "efficientnetv2-s"
_________________________________________________________________________________
 Layer (type)                Output Shape              Param #   Connected to
=================================================================================
 input_1 (InputLayer)        [(None, 384, 384, 3)]     0         []

 rescaling (Rescaling)       (None, 384, 384, 3)       0         ['input_1[0][0]']

 stem_conv (Conv2D)          (None, 192, 192, 24)      648       ['rescaling[0][0]']

 stem_bn (BatchNormalization)  (None, 192, 192, 24)    96        ['stem_conv[0][0]']

 stem_activation (Activation)  (None, 192, 192, 24)    0         ['stem_bn[0][0]']
```

```
 block1a_project_conv (Conv2D)  (None, 192, 192, 24  5184        ['stem_activation
[0][0]']
                                )

 block1a_project_bn (BatchNorma  (None, 192, 192, 24  96         ['block1a_project_c
onv[0][0]']
 lization)                      )

 block1a_project_activation (Ac  (None, 192, 192, 24  0          ['block1a_project_b
n[0][0]']
 tivation)                      )

 block1a_add (Add)              (None, 192, 192, 24  0           ['block1a_project_a
ctivation[0][0
                                )                                ]',
                                                                  'stem_activation
[0][0]']

 block1b_project_conv (Conv2D)  (None, 192, 192, 24  5184        ['block1a_add[0]
[0]']
                                )

 block1b_project_bn (BatchNorma  (None, 192, 192, 24  96         ['block1b_project_c
onv[0][0]']
 lization)                      )

 block1b_project_activation (Ac  (None, 192, 192, 24  0          ['block1b_project_b
n[0][0]']
 tivation)                      )

 block1b_add (Add)              (None, 192, 192, 24  0           ['block1b_project_a
ctivation[0][0
                                )                                ]',
                                                                  'block1a_add[0]
[0]']

 block2a_expand_conv (Conv2D)   (None, 96, 96, 96)   20736       ['block1b_add[0]
[0]']

 block2a_expand_bn (BatchNormal  (None, 96, 96, 96)  384         ['block2a_expand_co
nv[0][0]']
 ization)

 block2a_expand_activation (Act  (None, 96, 96, 96)  0           ['block2a_expand_bn
[0][0]']
 ivation)

 block2a_project_conv (Conv2D)  (None, 96, 96, 48)   4608        ['block2a_expand_ac
tivation[0][0]
                                                                  ']

 block2a_project_bn (BatchNorma  (None, 96, 96, 48)  192         ['block2a_project_c
onv[0][0]']
 lization)

 block2b_expand_conv (Conv2D)   (None, 96, 96, 192)  82944       ['block2a_project_b
n[0][0]']

 block2b_expand_bn (BatchNormal  (None, 96, 96, 192)  768        ['block2b_expand_co
nv[0][0]']
 ization)

 block2b_expand_activation (Act  (None, 96, 96, 192)  0          ['block2b_expand_bn
[0][0]']
 ivation)

 block2b_project_conv (Conv2D)  (None, 96, 96, 48)   9216        ['block2b_expand_ac
tivation[0][0]
                                                                  ']
```

```
 block2b_project_bn (BatchNorma  (None, 96, 96, 48)  192         ['block2b_project_c
onv[0][0]']
 lization)

 block2b_add (Add)              (None, 96, 96, 48)   0           ['block2b_project_b
n[0][0]',
                                                                  'block2a_project_b
n[0][0]']

 block2c_expand_conv (Conv2D)   (None, 96, 96, 192)  82944       ['block2b_add[0]
[0]']

 block2c_expand_bn (BatchNormal  (None, 96, 96, 192)  768        ['block2c_expand_co
nv[0][0]']
 ization)

 block2c_expand_activation (Act  (None, 96, 96, 192)  0          ['block2c_expand_bn
[0][0]']
 ivation)

 block2c_project_conv (Conv2D)  (None, 96, 96, 48)   9216        ['block2c_expand_ac
tivation[0][0]
                                                                  ']

 block2c_project_bn (BatchNorma  (None, 96, 96, 48)  192         ['block2c_project_c
onv[0][0]']
 lization)

 block2c_add (Add)              (None, 96, 96, 48)   0           ['block2c_project_b
n[0][0]',
                                                                  'block2b_add[0]
[0]']

 block2d_expand_conv (Conv2D)   (None, 96, 96, 192)  82944       ['block2c_add[0]
[0]']

 block2d_expand_bn (BatchNormal  (None, 96, 96, 192)  768        ['block2d_expand_co
nv[0][0]']
 ization)

 block2d_expand_activation (Act  (None, 96, 96, 192)  0          ['block2d_expand_bn
[0][0]']
 ivation)

 block2d_project_conv (Conv2D)  (None, 96, 96, 48)   9216        ['block2d_expand_ac
tivation[0][0]
                                                                  ']

 block2d_project_bn (BatchNorma  (None, 96, 96, 48)  192         ['block2d_project_c
onv[0][0]']
 lization)

 block2d_add (Add)              (None, 96, 96, 48)   0           ['block2d_project_b
n[0][0]',
                                                                  'block2c_add[0]
[0]']

 block3a_expand_conv (Conv2D)   (None, 48, 48, 192)  82944       ['block2d_add[0]
[0]']

 block3a_expand_bn (BatchNormal  (None, 48, 48, 192)  768        ['block3a_expand_co
nv[0][0]']
 ization)

 block3a_expand_activation (Act  (None, 48, 48, 192)  0          ['block3a_expand_bn
[0][0]']
 ivation)
```

```
 block3a_project_conv (Conv2D)  (None, 48, 48, 64)   12288       ['block3a_expand_ac
tivation[0][0]
                                                                 ']

 block3a_project_bn (BatchNorma  (None, 48, 48, 64)  256         ['block3a_project_c
onv[0][0]']
 lization)

 block3b_expand_conv (Conv2D)   (None, 48, 48, 256)  147456      ['block3a_project_b
n[0][0]']

 block3b_expand_bn (BatchNormal  (None, 48, 48, 256)  1024       ['block3b_expand_co
nv[0][0]']
 ization)

 block3b_expand_activation (Act  (None, 48, 48, 256)  0          ['block3b_expand_bn
[0][0]']
 ivation)

 block3b_project_conv (Conv2D)  (None, 48, 48, 64)   16384       ['block3b_expand_ac
tivation[0][0]
                                                                 ']

 block3b_project_bn (BatchNorma  (None, 48, 48, 64)  256         ['block3b_project_c
onv[0][0]']
 lization)

 block3b_add (Add)              (None, 48, 48, 64)   0           ['block3b_project_b
n[0][0]',
                                                                  'block3a_project_b
n[0][0]']

 block3c_expand_conv (Conv2D)   (None, 48, 48, 256)  147456      ['block3b_add[0]
[0]']

 block3c_expand_bn (BatchNormal  (None, 48, 48, 256)  1024       ['block3c_expand_co
nv[0][0]']
 ization)

 block3c_expand_activation (Act  (None, 48, 48, 256)  0          ['block3c_expand_bn
[0][0]']
 ivation)

 block3c_project_conv (Conv2D)  (None, 48, 48, 64)   16384       ['block3c_expand_ac
tivation[0][0]
                                                                 ']

 block3c_project_bn (BatchNorma  (None, 48, 48, 64)  256         ['block3c_project_c
onv[0][0]']
 lization)

 block3c_add (Add)              (None, 48, 48, 64)   0           ['block3c_project_b
n[0][0]',
                                                                  'block3b_add[0]
[0]']

 block3d_expand_conv (Conv2D)   (None, 48, 48, 256)  147456      ['block3c_add[0]
[0]']

 block3d_expand_bn (BatchNormal  (None, 48, 48, 256)  1024       ['block3d_expand_co
nv[0][0]']
 ization)

 block3d_expand_activation (Act  (None, 48, 48, 256)  0          ['block3d_expand_bn
[0][0]']
 ivation)

 block3d_project_conv (Conv2D)  (None, 48, 48, 64)   16384       ['block3d_expand_ac
tivation[0][0]
```

```
                                                                  ']

 block3d_project_bn (BatchNorma  (None, 48, 48, 64)  256         ['block3d_project_c
onv[0][0]']
 lization)

 block3d_add (Add)              (None, 48, 48, 64)   0           ['block3d_project_b
n[0][0]',
                                                                  'block3c_add[0]
[0]']

 block4a_expand_conv (Conv2D)   (None, 48, 48, 256)  16384       ['block3d_add[0]
[0]']

 block4a_expand_bn (BatchNormal  (None, 48, 48, 256)  1024       ['block4a_expand_co
nv[0][0]']
 ization)

 block4a_expand_activation (Act  (None, 48, 48, 256)  0          ['block4a_expand_bn
[0][0]']
 ivation)

 block4a_dwconv2 (DepthwiseConv  (None, 24, 24, 256)  2304       ['block4a_expand_ac
tivation[0][0]
 2D)                                                             ']

 block4a_bn (BatchNormalization  (None, 24, 24, 256)  1024       ['block4a_dwconv2
[0][0]']
 )

 block4a_activation (Activation  (None, 24, 24, 256)  0          ['block4a_bn[0]
[0]']
 )

 block4a_se_squeeze (GlobalAver  (None, 256)         0           ['block4a_activatio
n[0][0]']
 agePooling2D)

 block4a_se_reshape (Reshape)   (None, 1, 1, 256)    0           ['block4a_se_squeez
e[0][0]']

 block4a_se_reduce (Conv2D)     (None, 1, 1, 16)     4112        ['block4a_se_reshap
e[0][0]']

 block4a_se_expand (Conv2D)     (None, 1, 1, 256)    4352        ['block4a_se_reduce
[0][0]']

 block4a_se_excite (Multiply)   (None, 24, 24, 256)  0           ['block4a_activatio
n[0][0]',
                                                                  'block4a_se_expand
[0][0]']

 block4a_project_conv (Conv2D)  (None, 24, 24, 128)  32768       ['block4a_se_excite
[0][0]']

 block4a_project_bn (BatchNorma  (None, 24, 24, 128)  512        ['block4a_project_c
onv[0][0]']
 lization)

 block4b_expand_conv (Conv2D)   (None, 24, 24, 512)  65536       ['block4a_project_b
n[0][0]']

 block4b_expand_bn (BatchNormal  (None, 24, 24, 512)  2048       ['block4b_expand_co
nv[0][0]']
 ization)

 block4b_expand_activation (Act  (None, 24, 24, 512)  0          ['block4b_expand_bn
[0][0]']
 ivation)
```

```
 block4b_dwconv2 (DepthwiseConv  (None, 24, 24, 512)  4608       ['block4b_expand_ac
tivation[0][0]
 2D)                                                             ']

 block4b_bn (BatchNormalization  (None, 24, 24, 512)  2048       ['block4b_dwconv2
[0][0]']
 )

 block4b_activation (Activation  (None, 24, 24, 512)  0          ['block4b_bn[0]
[0]']
 )

 block4b_se_squeeze (GlobalAver  (None, 512)         0           ['block4b_activatio
n[0][0]']
 agePooling2D)

 block4b_se_reshape (Reshape)   (None, 1, 1, 512)    0          ['block4b_se_squeez
e[0][0]']

 block4b_se_reduce (Conv2D)     (None, 1, 1, 32)     16416      ['block4b_se_reshap
e[0][0]']

 block4b_se_expand (Conv2D)     (None, 1, 1, 512)    16896      ['block4b_se_reduce
[0][0]']

 block4b_se_excite (Multiply)   (None, 24, 24, 512)  0          ['block4b_activatio
n[0][0]',
                                                                 'block4b_se_expand
[0][0]']

 block4b_project_conv (Conv2D)  (None, 24, 24, 128)  65536      ['block4b_se_excite
[0][0]']

 block4b_project_bn (BatchNorma  (None, 24, 24, 128)  512       ['block4b_project_c
onv[0][0]']
 lization)

 block4b_add (Add)              (None, 24, 24, 128)  0          ['block4b_project_b
n[0][0]',
                                                                 'block4a_project_b
n[0][0]']

 block4c_expand_conv (Conv2D)   (None, 24, 24, 512)  65536      ['block4b_add[0]
[0]']

 block4c_expand_bn (BatchNormal  (None, 24, 24, 512)  2048       ['block4c_expand_co
nv[0][0]']
 ization)

 block4c_expand_activation (Act  (None, 24, 24, 512)  0          ['block4c_expand_bn
[0][0]']
 ivation)

 block4c_dwconv2 (DepthwiseConv  (None, 24, 24, 512)  4608       ['block4c_expand_ac
tivation[0][0]
 2D)                                                             ']

 block4c_bn (BatchNormalization  (None, 24, 24, 512)  2048       ['block4c_dwconv2
[0][0]']
 )

 block4c_activation (Activation  (None, 24, 24, 512)  0          ['block4c_bn[0]
[0]']
 )

 block4c_se_squeeze (GlobalAver  (None, 512)         0           ['block4c_activatio
n[0][0]']
 agePooling2D)
```

```
 block4c_se_reshape (Reshape)   (None, 1, 1, 512)    0           ['block4c_se_squeez
e[0][0]']

 block4c_se_reduce (Conv2D)     (None, 1, 1, 32)     16416       ['block4c_se_reshap
e[0][0]']

 block4c_se_expand (Conv2D)     (None, 1, 1, 512)    16896       ['block4c_se_reduce
[0][0]']

 block4c_se_excite (Multiply)   (None, 24, 24, 512)  0           ['block4c_activatio
n[0][0]',
                                                                  'block4c_se_expand
[0][0]']

 block4c_project_conv (Conv2D)  (None, 24, 24, 128)  65536       ['block4c_se_excite
[0][0]']

 block4c_project_bn (BatchNorma  (None, 24, 24, 128)  512        ['block4c_project_c
onv[0][0]']
 lization)

 block4c_add (Add)              (None, 24, 24, 128)  0           ['block4c_project_b
n[0][0]',
                                                                  'block4b_add[0]
[0]']

 block4d_expand_conv (Conv2D)   (None, 24, 24, 512)  65536       ['block4c_add[0]
[0]']

 block4d_expand_bn (BatchNormal  (None, 24, 24, 512)  2048       ['block4d_expand_co
nv[0][0]']
 ization)

 block4d_expand_activation (Act  (None, 24, 24, 512)  0          ['block4d_expand_bn
[0][0]']
 ivation)

 block4d_dwconv2 (DepthwiseConv  (None, 24, 24, 512)  4608       ['block4d_expand_ac
tivation[0][0]
 2D)                                                             ']

 block4d_bn (BatchNormalization  (None, 24, 24, 512)  2048       ['block4d_dwconv2
[0][0]']
 )

 block4d_activation (Activation  (None, 24, 24, 512)  0          ['block4d_bn[0]
[0]']
 )

 block4d_se_squeeze (GlobalAver  (None, 512)         0           ['block4d_activatio
n[0][0]']
 agePooling2D)

 block4d_se_reshape (Reshape)   (None, 1, 1, 512)    0           ['block4d_se_squeez
e[0][0]']

 block4d_se_reduce (Conv2D)     (None, 1, 1, 32)     16416       ['block4d_se_reshap
e[0][0]']

 block4d_se_expand (Conv2D)     (None, 1, 1, 512)    16896       ['block4d_se_reduce
[0][0]']

 block4d_se_excite (Multiply)   (None, 24, 24, 512)  0           ['block4d_activatio
n[0][0]',
                                                                  'block4d_se_expand
[0][0]']

 block4d_project_conv (Conv2D)  (None, 24, 24, 128)  65536       ['block4d_se_excite
```

```
[0][0]']

 block4d_project_bn (BatchNorma  (None, 24, 24, 128)  512        ['block4d_project_c
onv[0][0]']
 lization)

 block4d_add (Add)              (None, 24, 24, 128)  0          ['block4d_project_b
n[0][0]',
                                                                 'block4c_add[0]
[0]']

 block4e_expand_conv (Conv2D)   (None, 24, 24, 512)  65536      ['block4d_add[0]
[0]']

 block4e_expand_bn (BatchNormal  (None, 24, 24, 512)  2048      ['block4e_expand_co
nv[0][0]']
 ization)

 block4e_expand_activation (Act  (None, 24, 24, 512)  0         ['block4e_expand_bn
[0][0]']
 ivation)

 block4e_dwconv2 (DepthwiseConv  (None, 24, 24, 512)  4608      ['block4e_expand_ac
tivation[0][0]
 2D)                                                             ']

 block4e_bn (BatchNormalization  (None, 24, 24, 512)  2048      ['block4e_dwconv2
[0][0]']
 )

 block4e_activation (Activation  (None, 24, 24, 512)  0         ['block4e_bn[0]
[0]']
 )

 block4e_se_squeeze (GlobalAver  (None, 512)         0          ['block4e_activatio
n[0][0]']
 agePooling2D)

 block4e_se_reshape (Reshape)   (None, 1, 1, 512)    0          ['block4e_se_squeez
e[0][0]']

 block4e_se_reduce (Conv2D)     (None, 1, 1, 32)     16416      ['block4e_se_reshap
e[0][0]']

 block4e_se_expand (Conv2D)     (None, 1, 1, 512)    16896      ['block4e_se_reduce
[0][0]']

 block4e_se_excite (Multiply)   (None, 24, 24, 512)  0          ['block4e_activatio
n[0][0]',
                                                                 'block4e_se_expand
[0][0]']

 block4e_project_conv (Conv2D)  (None, 24, 24, 128)  65536      ['block4e_se_excite
[0][0]']

 block4e_project_bn (BatchNorma  (None, 24, 24, 128)  512       ['block4e_project_c
onv[0][0]']
 lization)

 block4e_add (Add)              (None, 24, 24, 128)  0          ['block4e_project_b
n[0][0]',
                                                                 'block4d_add[0]
[0]']

 block4f_expand_conv (Conv2D)   (None, 24, 24, 512)  65536      ['block4e_add[0]
[0]']

 block4f_expand_bn (BatchNormal  (None, 24, 24, 512)  2048      ['block4f_expand_co
nv[0][0]']
```

```
 ization)

 block4f_expand_activation (Act  (None, 24, 24, 512)  0          ['block4f_expand_bn
[0][0]']
 ivation)

 block4f_dwconv2 (DepthwiseConv  (None, 24, 24, 512)  4608       ['block4f_expand_ac
tivation[0][0]
 2D)                                                             ']

 block4f_bn (BatchNormalization  (None, 24, 24, 512)  2048       ['block4f_dwconv2
[0][0]']
 )

 block4f_activation (Activation  (None, 24, 24, 512)  0          ['block4f_bn[0]
[0]']
 )

 block4f_se_squeeze (GlobalAver  (None, 512)         0          ['block4f_activatio
n[0][0]']
 agePooling2D)

 block4f_se_reshape (Reshape)   (None, 1, 1, 512)    0          ['block4f_se_squeez
e[0][0]']

 block4f_se_reduce (Conv2D)     (None, 1, 1, 32)     16416      ['block4f_se_reshap
e[0][0]']

 block4f_se_expand (Conv2D)     (None, 1, 1, 512)    16896      ['block4f_se_reduce
[0][0]']

 block4f_se_excite (Multiply)   (None, 24, 24, 512)  0          ['block4f_activatio
n[0][0]',
                                                                 'block4f_se_expand
[0][0]']

 block4f_project_conv (Conv2D)  (None, 24, 24, 128)  65536      ['block4f_se_excite
[0][0]']

 block4f_project_bn (BatchNorma  (None, 24, 24, 128)  512       ['block4f_project_c
onv[0][0]']
 lization)

 block4f_add (Add)              (None, 24, 24, 128)  0          ['block4f_project_b
n[0][0]',
                                                                 'block4e_add[0]
[0]']

 block5a_expand_conv (Conv2D)   (None, 24, 24, 768)  98304      ['block4f_add[0]
[0]']

 block5a_expand_bn (BatchNormal  (None, 24, 24, 768)  3072       ['block5a_expand_co
nv[0][0]']
 ization)

 block5a_expand_activation (Act  (None, 24, 24, 768)  0          ['block5a_expand_bn
[0][0]']
 ivation)

 block5a_dwconv2 (DepthwiseConv  (None, 24, 24, 768)  6912       ['block5a_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5a_bn (BatchNormalization  (None, 24, 24, 768)  3072       ['block5a_dwconv2
[0][0]']
 )

 block5a_activation (Activation  (None, 24, 24, 768)  0          ['block5a_bn[0]
[0]']
```

```
 )

 block5a_se_squeeze (GlobalAver  (None, 768)         0           ['block5a_activatio
 agePooling2D)                                                   n[0][0]']

 block5a_se_reshape (Reshape)   (None, 1, 1, 768)    0           ['block5a_se_squeez
                                                                 e[0][0]']

 block5a_se_reduce (Conv2D)     (None, 1, 1, 32)     24608       ['block5a_se_reshap
                                                                 e[0][0]']

 block5a_se_expand (Conv2D)     (None, 1, 1, 768)    25344       ['block5a_se_reduce
                                                                 [0][0]']

 block5a_se_excite (Multiply)   (None, 24, 24, 768)  0           ['block5a_activatio
                                                                 n[0][0]',
                                                                  'block5a_se_expand
                                                                 [0][0]']

 block5a_project_conv (Conv2D)  (None, 24, 24, 160)  122880      ['block5a_se_excite
                                                                 [0][0]']

 block5a_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5a_project_c
 lization)                                                       onv[0][0]']

 block5b_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5a_project_b
                                                                 n[0][0]']

 block5b_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5b_expand_co
 ization)                                                        nv[0][0]']

 block5b_expand_activation (Act  (None, 24, 24, 960)  0          ['block5b_expand_bn
 ivation)                                                        [0][0]']

 block5b_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5b_expand_ac
 2D)                                                             tivation[0][0]
                                                                 ']

 block5b_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5b_dwconv2
 )                                                               [0][0]']

 block5b_activation (Activation  (None, 24, 24, 960)  0          ['block5b_bn[0]
 )                                                               [0]']

 block5b_se_squeeze (GlobalAver  (None, 960)         0           ['block5b_activatio
 agePooling2D)                                                   n[0][0]']

 block5b_se_reshape (Reshape)   (None, 1, 1, 960)    0           ['block5b_se_squeez
                                                                 e[0][0]']

 block5b_se_reduce (Conv2D)     (None, 1, 1, 40)     38440       ['block5b_se_reshap
                                                                 e[0][0]']

 block5b_se_expand (Conv2D)     (None, 1, 1, 960)    39360       ['block5b_se_reduce
                                                                 [0][0]']

 block5b_se_excite (Multiply)   (None, 24, 24, 960)  0           ['block5b_activatio
                                                                 n[0][0]',
                                                                  'block5b_se_expand
                                                                 [0][0]']

 block5b_project_conv (Conv2D)  (None, 24, 24, 160)  153600      ['block5b_se_excite
```

```
[0][0]']

 block5b_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5b_project_c
onv[0][0]']
 lization)

 block5b_add (Add)              (None, 24, 24, 160)  0           ['block5b_project_b
n[0][0]',
                                                                  'block5a_project_b
n[0][0]']

 block5c_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5b_add[0]
[0]']

 block5c_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5c_expand_co
nv[0][0]']
 ization)

 block5c_expand_activation (Act  (None, 24, 24, 960)  0          ['block5c_expand_bn
[0][0]']
 ivation)

 block5c_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5c_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5c_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5c_dwconv2
[0][0]']
 )

 block5c_activation (Activation  (None, 24, 24, 960)  0          ['block5c_bn[0]
[0]']
 )

 block5c_se_squeeze (GlobalAver  (None, 960)         0           ['block5c_activatio
n[0][0]']
 agePooling2D)

 block5c_se_reshape (Reshape)   (None, 1, 1, 960)    0           ['block5c_se_squeez
e[0][0]']

 block5c_se_reduce (Conv2D)     (None, 1, 1, 40)     38440       ['block5c_se_reshap
e[0][0]']

 block5c_se_expand (Conv2D)     (None, 1, 1, 960)    39360       ['block5c_se_reduce
[0][0]']

 block5c_se_excite (Multiply)   (None, 24, 24, 960)  0           ['block5c_activatio
n[0][0]',
                                                                  'block5c_se_expand
[0][0]']

 block5c_project_conv (Conv2D)  (None, 24, 24, 160)  153600      ['block5c_se_excite
[0][0]']

 block5c_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5c_project_c
onv[0][0]']
 lization)

 block5c_add (Add)              (None, 24, 24, 160)  0           ['block5c_project_b
n[0][0]',
                                                                  'block5b_add[0]
[0]']

 block5d_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5c_add[0]
[0]']

 block5d_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5d_expand_co
nv[0][0]']
```

```
 ization)

 block5d_expand_activation (Act  (None, 24, 24, 960)  0          ['block5d_expand_bn
[0][0]']
 ivation)

 block5d_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5d_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5d_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5d_dwconv2
[0][0]']
 )

 block5d_activation (Activation  (None, 24, 24, 960)  0          ['block5d_bn[0]
[0]']
 )

 block5d_se_squeeze (GlobalAver  (None, 960)         0          ['block5d_activatio
n[0][0]']
 agePooling2D)

 block5d_se_reshape (Reshape)   (None, 1, 1, 960)    0          ['block5d_se_squeez
e[0][0]']

 block5d_se_reduce (Conv2D)     (None, 1, 1, 40)     38440      ['block5d_se_reshap
e[0][0]']

 block5d_se_expand (Conv2D)     (None, 1, 1, 960)    39360      ['block5d_se_reduce
[0][0]']

 block5d_se_excite (Multiply)   (None, 24, 24, 960)  0          ['block5d_activatio
n[0][0]',
                                                                 'block5d_se_expand
[0][0]']

 block5d_project_conv (Conv2D)  (None, 24, 24, 160)  153600     ['block5d_se_excite
[0][0]']

 block5d_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5d_project_c
onv[0][0]']
 lization)

 block5d_add (Add)              (None, 24, 24, 160)  0          ['block5d_project_b
n[0][0]',
                                                                 'block5c_add[0]
[0]']

 block5e_expand_conv (Conv2D)   (None, 24, 24, 960)  153600     ['block5d_add[0]
[0]']

 block5e_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5e_expand_co
nv[0][0]']
 ization)

 block5e_expand_activation (Act  (None, 24, 24, 960)  0          ['block5e_expand_bn
[0][0]']
 ivation)

 block5e_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5e_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5e_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5e_dwconv2
[0][0]']
 )

 block5e_activation (Activation  (None, 24, 24, 960)  0          ['block5e_bn[0]
[0]']
```

```
 )

 block5e_se_squeeze (GlobalAver  (None, 960)         0           ['block5e_activatio
n[0][0]']
 agePooling2D)

 block5e_se_reshape (Reshape)   (None, 1, 1, 960)    0           ['block5e_se_squeez
e[0][0]']

 block5e_se_reduce (Conv2D)     (None, 1, 1, 40)     38440       ['block5e_se_reshap
e[0][0]']

 block5e_se_expand (Conv2D)     (None, 1, 1, 960)    39360       ['block5e_se_reduce
[0][0]']

 block5e_se_excite (Multiply)   (None, 24, 24, 960)  0           ['block5e_activatio
n[0][0]',
                                                                  'block5e_se_expand
[0][0]']

 block5e_project_conv (Conv2D)  (None, 24, 24, 160)  153600      ['block5e_se_excite
[0][0]']

 block5e_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5e_project_c
onv[0][0]']
 lization)

 block5e_add (Add)              (None, 24, 24, 160)  0           ['block5e_project_b
n[0][0]',
                                                                  'block5d_add[0]
[0]']

 block5f_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5e_add[0]
[0]']

 block5f_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5f_expand_co
nv[0][0]']
 ization)

 block5f_expand_activation (Act  (None, 24, 24, 960)  0          ['block5f_expand_bn
[0][0]']
 ivation)

 block5f_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5f_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5f_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5f_dwconv2
[0][0]']
 )

 block5f_activation (Activation  (None, 24, 24, 960)  0          ['block5f_bn[0]
[0]']
 )

 block5f_se_squeeze (GlobalAver  (None, 960)         0           ['block5f_activatio
n[0][0]']
 agePooling2D)

 block5f_se_reshape (Reshape)   (None, 1, 1, 960)    0           ['block5f_se_squeez
e[0][0]']

 block5f_se_reduce (Conv2D)     (None, 1, 1, 40)     38440       ['block5f_se_reshap
e[0][0]']

 block5f_se_expand (Conv2D)     (None, 1, 1, 960)    39360       ['block5f_se_reduce
[0][0]']

 block5f_se_excite (Multiply)   (None, 24, 24, 960)  0           ['block5f_activatio
```

```
n[0][0]',
                                                                 'block5f_se_expand
[0][0]']

 block5f_project_conv (Conv2D)  (None, 24, 24, 160)  153600      ['block5f_se_excite
[0][0]']

 block5f_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5f_project_c
onv[0][0]']
 lization)

 block5f_add (Add)              (None, 24, 24, 160)  0          ['block5f_project_b
n[0][0]',
                                                                 'block5e_add[0]
[0]']

 block5g_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5f_add[0]
[0]']

 block5g_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5g_expand_co
nv[0][0]']
 ization)

 block5g_expand_activation (Act  (None, 24, 24, 960)  0          ['block5g_expand_bn
[0][0]']
 ivation)

 block5g_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5g_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5g_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5g_dwconv2
[0][0]']
 )

 block5g_activation (Activation  (None, 24, 24, 960)  0          ['block5g_bn[0]
[0]']
 )

 block5g_se_squeeze (GlobalAver  (None, 960)         0          ['block5g_activatio
n[0][0]']
 agePooling2D)

 block5g_se_reshape (Reshape)   (None, 1, 1, 960)    0          ['block5g_se_squeez
e[0][0]']

 block5g_se_reduce (Conv2D)     (None, 1, 1, 40)     38440      ['block5g_se_reshap
e[0][0]']

 block5g_se_expand (Conv2D)     (None, 1, 1, 960)    39360      ['block5g_se_reduce
[0][0]']

 block5g_se_excite (Multiply)   (None, 24, 24, 960)  0          ['block5g_activatio
n[0][0]',
                                                                 'block5g_se_expand
[0][0]']

 block5g_project_conv (Conv2D)  (None, 24, 24, 160)  153600      ['block5g_se_excite
[0][0]']

 block5g_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5g_project_c
onv[0][0]']
 lization)

 block5g_add (Add)              (None, 24, 24, 160)  0          ['block5g_project_b
n[0][0]',
                                                                 'block5f_add[0]
[0]']
```

```
 block5h_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5g_add[0]
[0]']

 block5h_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5h_expand_co
nv[0][0]']
 ization)

 block5h_expand_activation (Act  (None, 24, 24, 960)  0          ['block5h_expand_bn
[0][0]']
 ivation)

 block5h_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5h_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5h_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5h_dwconv2
[0][0]']
 )

 block5h_activation (Activation  (None, 24, 24, 960)  0          ['block5h_bn[0]
[0]']
 )

 block5h_se_squeeze (GlobalAver  (None, 960)         0          ['block5h_activatio
n[0][0]']
 agePooling2D)

 block5h_se_reshape (Reshape)   (None, 1, 1, 960)    0          ['block5h_se_squeez
e[0][0]']

 block5h_se_reduce (Conv2D)     (None, 1, 1, 40)     38440      ['block5h_se_reshap
e[0][0]']

 block5h_se_expand (Conv2D)     (None, 1, 1, 960)    39360      ['block5h_se_reduce
[0][0]']

 block5h_se_excite (Multiply)   (None, 24, 24, 960)  0          ['block5h_activatio
n[0][0]',
                                                                 'block5h_se_expand
[0][0]']

 block5h_project_conv (Conv2D)  (None, 24, 24, 160)  153600     ['block5h_se_excite
[0][0]']

 block5h_project_bn (BatchNorma  (None, 24, 24, 160)  640        ['block5h_project_c
onv[0][0]']
 lization)

 block5h_add (Add)              (None, 24, 24, 160)  0          ['block5h_project_b
n[0][0]',
                                                                 'block5g_add[0]
[0]']

 block5i_expand_conv (Conv2D)   (None, 24, 24, 960)  153600      ['block5h_add[0]
[0]']

 block5i_expand_bn (BatchNormal  (None, 24, 24, 960)  3840       ['block5i_expand_co
nv[0][0]']
 ization)

 block5i_expand_activation (Act  (None, 24, 24, 960)  0          ['block5i_expand_bn
[0][0]']
 ivation)

 block5i_dwconv2 (DepthwiseConv  (None, 24, 24, 960)  8640       ['block5i_expand_ac
tivation[0][0]
 2D)                                                             ']

 block5i_bn (BatchNormalization  (None, 24, 24, 960)  3840       ['block5i_dwconv2
```

```
[0][0]']
 )

 block5i_activation (Activation  (None, 24, 24, 960)  0          ['block5i_bn[0]
[0]']
 )

 block5i_se_squeeze (GlobalAver  (None, 960)         0          ['block5i_activatio
n[0][0]']
 agePooling2D)

 block5i_se_reshape (Reshape)   (None, 1, 1, 960)    0          ['block5i_se_squeez
e[0][0]']

 block5i_se_reduce (Conv2D)     (None, 1, 1, 40)     38440      ['block5i_se_reshap
e[0][0]']

 block5i_se_expand (Conv2D)     (None, 1, 1, 960)    39360      ['block5i_se_reduce
[0][0]']

 block5i_se_excite (Multiply)   (None, 24, 24, 960)  0          ['block5i_activatio
n[0][0]',
                                                                 'block5i_se_expand
[0][0]']

 block5i_project_conv (Conv2D)  (None, 24, 24, 160)  153600     ['block5i_se_excite
[0][0]']

 block5i_project_bn (BatchNorma  (None, 24, 24, 160)  640       ['block5i_project_c
onv[0][0]']
 lization)

 block5i_add (Add)              (None, 24, 24, 160)  0          ['block5i_project_b
n[0][0]',
                                                                 'block5h_add[0]
[0]']

 block6a_expand_conv (Conv2D)   (None, 24, 24, 960)  153600     ['block5i_add[0]
[0]']

 block6a_expand_bn (BatchNormal  (None, 24, 24, 960)  3840      ['block6a_expand_co
nv[0][0]']
 ization)

 block6a_expand_activation (Act  (None, 24, 24, 960)  0         ['block6a_expand_bn
[0][0]']
 ivation)

 block6a_dwconv2 (DepthwiseConv  (None, 12, 12, 960)  8640      ['block6a_expand_ac
tivation[0][0]
 2D)                                                            ']

 block6a_bn (BatchNormalization  (None, 12, 12, 960)  3840      ['block6a_dwconv2
[0][0]']
 )

 block6a_activation (Activation  (None, 12, 12, 960)  0         ['block6a_bn[0]
[0]']
 )

 block6a_se_squeeze (GlobalAver  (None, 960)         0          ['block6a_activatio
n[0][0]']
 agePooling2D)

 block6a_se_reshape (Reshape)   (None, 1, 1, 960)    0          ['block6a_se_squeez
e[0][0]']

 block6a_se_reduce (Conv2D)     (None, 1, 1, 40)     38440      ['block6a_se_reshap
e[0][0]']
```

```
 block6a_se_expand (Conv2D)     (None, 1, 1, 960)    39360       ['block6a_se_reduce
[0][0]']

 block6a_se_excite (Multiply)   (None, 12, 12, 960)  0           ['block6a_activatio
n[0][0]',
                                                                  'block6a_se_expand
[0][0]']

 block6a_project_conv (Conv2D)  (None, 12, 12, 256)  245760      ['block6a_se_excite
[0][0]']

 block6a_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6a_project_c
onv[0][0]']
 lization)

 block6b_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6a_project_b
n[0][0]']
                                )

 block6b_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6b_expand_co
nv[0][0]']
 ization)                       )

 block6b_expand_activation (Act  (None, 12, 12, 1536  0          ['block6b_expand_bn
[0][0]']
 ivation)                       )

 block6b_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6b_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6b_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6b_dwconv2
[0][0]']
 )                              )

 block6b_activation (Activation  (None, 12, 12, 1536  0          ['block6b_bn[0]
[0]']
 )                              )

 block6b_se_squeeze (GlobalAver  (None, 1536)        0           ['block6b_activatio
n[0][0]']
 agePooling2D)

 block6b_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6b_se_squeez
e[0][0]']

 block6b_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6b_se_reshap
e[0][0]']

 block6b_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6b_se_reduce
[0][0]']

 block6b_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6b_activatio
n[0][0]',
                                )                                 'block6b_se_expand
[0][0]']

 block6b_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6b_se_excite
[0][0]']

 block6b_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6b_project_c
onv[0][0]']
 lization)

 block6b_add (Add)              (None, 12, 12, 256)  0           ['block6b_project_b
n[0][0]',
                                                                  'block6a_project_b
n[0][0]']
```

```
 block6c_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6b_add[0]
[0]']
                                )

 block6c_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6c_expand_co
nv[0][0]']
 ization)                       )

 block6c_expand_activation (Act  (None, 12, 12, 1536  0          ['block6c_expand_bn
[0][0]']
 ivation)                       )

 block6c_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6c_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6c_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6c_dwconv2
[0][0]']
 )                              )

 block6c_activation (Activation  (None, 12, 12, 1536  0          ['block6c_bn[0]
[0]']
 )                              )

 block6c_se_squeeze (GlobalAver  (None, 1536)        0           ['block6c_activatio
n[0][0]']
 agePooling2D)

 block6c_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6c_se_squeez
e[0][0]']

 block6c_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6c_se_reshap
e[0][0]']

 block6c_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6c_se_reduce
[0][0]']

 block6c_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6c_activatio
n[0][0]',
                                )                                'block6c_se_expand
[0][0]']

 block6c_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6c_se_excite
[0][0]']

 block6c_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6c_project_c
onv[0][0]']
 lization)

 block6c_add (Add)              (None, 12, 12, 256)  0           ['block6c_project_b
n[0][0]',
                                                                 'block6b_add[0]
[0]']

 block6d_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6c_add[0]
[0]']
                                )

 block6d_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6d_expand_co
nv[0][0]']
 ization)                       )

 block6d_expand_activation (Act  (None, 12, 12, 1536  0          ['block6d_expand_bn
[0][0]']
 ivation)                       )

 block6d_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6d_expand_ac
tivation[0][0]
```

```
 2D)                            )                                   ']

 block6d_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6d_dwconv2
[0][0]']
 )                              )

 block6d_activation (Activation  (None, 12, 12, 1536  0          ['block6d_bn[0]
[0]']
 )                              )

 block6d_se_squeeze (GlobalAver  (None, 1536)        0          ['block6d_activatio
n[0][0]']
 agePooling2D)

 block6d_se_reshape (Reshape)   (None, 1, 1, 1536)   0          ['block6d_se_squeez
e[0][0]']

 block6d_se_reduce (Conv2D)     (None, 1, 1, 64)     98368      ['block6d_se_reshap
e[0][0]']

 block6d_se_expand (Conv2D)     (None, 1, 1, 1536)   99840      ['block6d_se_reduce
[0][0]']

 block6d_se_excite (Multiply)   (None, 12, 12, 1536  0          ['block6d_activatio
n[0][0]',
                                )                                   'block6d_se_expand
[0][0]']

 block6d_project_conv (Conv2D)  (None, 12, 12, 256)  393216     ['block6d_se_excite
[0][0]']

 block6d_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6d_project_c
onv[0][0]']
 lization)

 block6d_add (Add)              (None, 12, 12, 256)  0          ['block6d_project_b
n[0][0]',
                                                                    'block6c_add[0]
[0]']

 block6e_expand_conv (Conv2D)   (None, 12, 12, 1536  393216     ['block6d_add[0]
[0]']
                                )

 block6e_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6e_expand_co
nv[0][0]']
 ization)                       )

 block6e_expand_activation (Act  (None, 12, 12, 1536  0          ['block6e_expand_bn
[0][0]']
 ivation)                       )

 block6e_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6e_expand_ac
tivation[0][0]
 2D)                            )                                   ']

 block6e_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6e_dwconv2
[0][0]']
 )                              )

 block6e_activation (Activation  (None, 12, 12, 1536  0          ['block6e_bn[0]
[0]']
 )                              )

 block6e_se_squeeze (GlobalAver  (None, 1536)        0          ['block6e_activatio
n[0][0]']
 agePooling2D)

 block6e_se_reshape (Reshape)   (None, 1, 1, 1536)   0          ['block6e_se_squeez
```

```
e[0][0]']

 block6e_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6e_se_reshap
e[0][0]']

 block6e_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6e_se_reduce
[0][0]']

 block6e_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6e_activatio
n[0][0]',
                                )                                 'block6e_se_expand
[0][0]']

 block6e_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6e_se_excite
[0][0]']

 block6e_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6e_project_c
onv[0][0]']
 lization)

 block6e_add (Add)              (None, 12, 12, 256)  0           ['block6e_project_b
n[0][0]',
                                                                  'block6d_add[0]
[0]']

 block6f_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6e_add[0]
[0]']
                                )

 block6f_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6f_expand_co
nv[0][0]']
 ization)                       )

 block6f_expand_activation (Act  (None, 12, 12, 1536  0          ['block6f_expand_bn
[0][0]']
 ivation)                       )

 block6f_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6f_expand_ac
tivation[0][0]
 2D)                            )                                 ']

 block6f_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6f_dwconv2
[0][0]']
 )                              )

 block6f_activation (Activation  (None, 12, 12, 1536  0          ['block6f_bn[0]
[0]']
 )                              )

 block6f_se_squeeze (GlobalAver  (None, 1536)        0           ['block6f_activatio
n[0][0]']
 agePooling2D)

 block6f_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6f_se_squeez
e[0][0]']

 block6f_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6f_se_reshap
e[0][0]']

 block6f_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6f_se_reduce
[0][0]']

 block6f_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6f_activatio
n[0][0]',
                                )                                 'block6f_se_expand
[0][0]']

 block6f_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6f_se_excite
[0][0]']
```

```
 block6f_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6f_project_c
onv[0][0]']
 lization)

 block6f_add (Add)              (None, 12, 12, 256)  0          ['block6f_project_b
n[0][0]',
                                                                  'block6e_add[0]
[0]']

 block6g_expand_conv (Conv2D)   (None, 12, 12, 1536  393216     ['block6f_add[0]
[0]']
                                )

 block6g_expand_bn (BatchNormal  (None, 12, 12, 1536  6144      ['block6g_expand_co
nv[0][0]']
 ization)                       )

 block6g_expand_activation (Act  (None, 12, 12, 1536  0         ['block6g_expand_bn
[0][0]']
 ivation)                       )

 block6g_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824     ['block6g_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6g_bn (BatchNormalization  (None, 12, 12, 1536  6144      ['block6g_dwconv2
[0][0]']
 )                              )

 block6g_activation (Activation  (None, 12, 12, 1536  0         ['block6g_bn[0]
[0]']
 )                              )

 block6g_se_squeeze (GlobalAver  (None, 1536)        0          ['block6g_activatio
n[0][0]']
 agePooling2D)

 block6g_se_reshape (Reshape)   (None, 1, 1, 1536)   0          ['block6g_se_squeez
e[0][0]']

 block6g_se_reduce (Conv2D)     (None, 1, 1, 64)     98368      ['block6g_se_reshap
e[0][0]']

 block6g_se_expand (Conv2D)     (None, 1, 1, 1536)   99840      ['block6g_se_reduce
[0][0]']

 block6g_se_excite (Multiply)   (None, 12, 12, 1536  0          ['block6g_activatio
n[0][0]',
                                )                                 'block6g_se_expand
[0][0]']

 block6g_project_conv (Conv2D)  (None, 12, 12, 256)  393216     ['block6g_se_excite
[0][0]']

 block6g_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6g_project_c
onv[0][0]']
 lization)

 block6g_add (Add)              (None, 12, 12, 256)  0          ['block6g_project_b
n[0][0]',
                                                                  'block6f_add[0]
[0]']

 block6h_expand_conv (Conv2D)   (None, 12, 12, 1536  393216     ['block6g_add[0]
[0]']
                                )

 block6h_expand_bn (BatchNormal  (None, 12, 12, 1536  6144      ['block6h_expand_co
```

```
nv[0][0]']
 ization)                       )

 block6h_expand_activation (Act  (None, 12, 12, 1536  0          ['block6h_expand_bn
[0][0]']
 ivation)                       )

 block6h_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6h_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6h_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6h_dwconv2
[0][0]']
 )                              )

 block6h_activation (Activation  (None, 12, 12, 1536  0          ['block6h_bn[0]
[0]']
 )                              )

 block6h_se_squeeze (GlobalAver  (None, 1536)        0           ['block6h_activatio
n[0][0]']
 agePooling2D)

 block6h_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6h_se_squeez
e[0][0]']

 block6h_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6h_se_reshap
e[0][0]']

 block6h_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6h_se_reduce
[0][0]']

 block6h_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6h_activatio
n[0][0]',
                                )                                 'block6h_se_expand
[0][0]']

 block6h_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6h_se_excite
[0][0]']

 block6h_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6h_project_c
onv[0][0]']
 lization)

 block6h_add (Add)              (None, 12, 12, 256)  0           ['block6h_project_b
n[0][0]',
                                                                  'block6g_add[0]
[0]']

 block6i_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6h_add[0]
[0]']
                                )

 block6i_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6i_expand_co
nv[0][0]']
 ization)                       )

 block6i_expand_activation (Act  (None, 12, 12, 1536  0          ['block6i_expand_bn
[0][0]']
 ivation)                       )

 block6i_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6i_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6i_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6i_dwconv2
[0][0]']
 )                              )
```

```
 block6i_activation (Activation  (None, 12, 12, 1536  0          ['block6i_bn[0]
[0]']
 )                              )

 block6i_se_squeeze (GlobalAver  (None, 1536)        0          ['block6i_activatio
n[0][0]']
 agePooling2D)

 block6i_se_reshape (Reshape)   (None, 1, 1, 1536)   0          ['block6i_se_squeez
e[0][0]']

 block6i_se_reduce (Conv2D)     (None, 1, 1, 64)     98368      ['block6i_se_reshap
e[0][0]']

 block6i_se_expand (Conv2D)     (None, 1, 1, 1536)   99840      ['block6i_se_reduce
[0][0]']

 block6i_se_excite (Multiply)   (None, 12, 12, 1536  0          ['block6i_activatio
n[0][0]',
                                )                                 'block6i_se_expand
[0][0]']

 block6i_project_conv (Conv2D)  (None, 12, 12, 256)  393216     ['block6i_se_excite
[0][0]']

 block6i_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6i_project_c
onv[0][0]']
 lization)

 block6i_add (Add)              (None, 12, 12, 256)  0          ['block6i_project_b
n[0][0]',
                                                                  'block6h_add[0]
[0]']

 block6j_expand_conv (Conv2D)   (None, 12, 12, 1536  393216     ['block6i_add[0]
[0]']
                                )

 block6j_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6j_expand_co
nv[0][0]']
 ization)                       )

 block6j_expand_activation (Act  (None, 12, 12, 1536  0          ['block6j_expand_bn
[0][0]']
 ivation)                       )

 block6j_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6j_expand_ac
tivation[0][0]
 2D)                            )                                 ']

 block6j_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6j_dwconv2
[0][0]']
 )                              )

 block6j_activation (Activation  (None, 12, 12, 1536  0          ['block6j_bn[0]
[0]']
 )                              )

 block6j_se_squeeze (GlobalAver  (None, 1536)        0          ['block6j_activatio
n[0][0]']
 agePooling2D)

 block6j_se_reshape (Reshape)   (None, 1, 1, 1536)   0          ['block6j_se_squeez
e[0][0]']

 block6j_se_reduce (Conv2D)     (None, 1, 1, 64)     98368      ['block6j_se_reshap
e[0][0]']

 block6j_se_expand (Conv2D)     (None, 1, 1, 1536)   99840      ['block6j_se_reduce
```

```
[0][0]']

 block6j_se_excite (Multiply)   (None, 12, 12, 1536  0          ['block6j_activatio
n[0][0]',
                                )                                 'block6j_se_expand
[0][0]']

 block6j_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6j_se_excite
[0][0]']

 block6j_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6j_project_c
onv[0][0]']
 lization)

 block6j_add (Add)              (None, 12, 12, 256)  0          ['block6j_project_b
n[0][0]',
                                                                  'block6i_add[0]
[0]']

 block6k_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6j_add[0]
[0]']
                                )

 block6k_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6k_expand_co
nv[0][0]']
 ization)                       )

 block6k_expand_activation (Act  (None, 12, 12, 1536  0          ['block6k_expand_bn
[0][0]']
 ivation)                       )

 block6k_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6k_expand_ac
tivation[0][0]
 2D)                            )                                 ']

 block6k_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6k_dwconv2
[0][0]']
 )                              )

 block6k_activation (Activation  (None, 12, 12, 1536  0          ['block6k_bn[0]
[0]']
 )                              )

 block6k_se_squeeze (GlobalAver  (None, 1536)        0          ['block6k_activatio
n[0][0]']
 agePooling2D)

 block6k_se_reshape (Reshape)   (None, 1, 1, 1536)   0          ['block6k_se_squeez
e[0][0]']

 block6k_se_reduce (Conv2D)     (None, 1, 1, 64)     98368      ['block6k_se_reshap
e[0][0]']

 block6k_se_expand (Conv2D)     (None, 1, 1, 1536)   99840      ['block6k_se_reduce
[0][0]']

 block6k_se_excite (Multiply)   (None, 12, 12, 1536  0          ['block6k_activatio
n[0][0]',
                                )                                 'block6k_se_expand
[0][0]']

 block6k_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6k_se_excite
[0][0]']

 block6k_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6k_project_c
onv[0][0]']
 lization)

 block6k_add (Add)              (None, 12, 12, 256)  0          ['block6k_project_b
```

```
n[0][0]',                                                                                                  'block6j_add[0]
[0]']

 block6l_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6k_add[0]
[0]']
                                )

 block6l_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6l_expand_co
nv[0][0]']
 ization)                       )

 block6l_expand_activation (Act  (None, 12, 12, 1536  0          ['block6l_expand_bn
[0][0]']
 ivation)                       )

 block6l_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6l_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6l_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6l_dwconv2
[0][0]']
 )                              )

 block6l_activation (Activation  (None, 12, 12, 1536  0          ['block6l_bn[0]
[0]']
 )                              )

 block6l_se_squeeze (GlobalAver  (None, 1536)        0           ['block6l_activatio
n[0][0]']
 agePooling2D)

 block6l_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6l_se_squeez
e[0][0]']

 block6l_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6l_se_reshap
e[0][0]']

 block6l_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6l_se_reduce
[0][0]']

 block6l_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6l_activatio
n[0][0]',
                                )                                 'block6l_se_expand
[0][0]']

 block6l_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6l_se_excite
[0][0]']

 block6l_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6l_project_c
onv[0][0]']
 lization)

 block6l_add (Add)              (None, 12, 12, 256)  0           ['block6l_project_b
n[0][0]',
                                                                  'block6k_add[0]
[0]']

 block6m_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6l_add[0]
[0]']
                                )

 block6m_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6m_expand_co
nv[0][0]']
 ization)                       )

 block6m_expand_activation (Act  (None, 12, 12, 1536  0          ['block6m_expand_bn
[0][0]']
 ivation)                       )
```

```
 block6m_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6m_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6m_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6m_dwconv2
[0][0]']
 )                              )

 block6m_activation (Activation  (None, 12, 12, 1536  0          ['block6m_bn[0]
[0]']
 )                              )

 block6m_se_squeeze (GlobalAver  (None, 1536)        0           ['block6m_activatio
n[0][0]']
 agePooling2D)

 block6m_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6m_se_squeez
e[0][0]']

 block6m_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6m_se_reshap
e[0][0]']

 block6m_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6m_se_reduce
[0][0]']

 block6m_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6m_activatio
n[0][0]',
                                )                                 'block6m_se_expand
[0][0]']

 block6m_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6m_se_excite
[0][0]']

 block6m_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6m_project_c
onv[0][0]']
 lization)

 block6m_add (Add)              (None, 12, 12, 256)  0           ['block6m_project_b
n[0][0]',
                                                                  'block6l_add[0]
[0]']

 block6n_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6m_add[0]
[0]']
                                )

 block6n_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6n_expand_co
nv[0][0]']
 ization)                       )

 block6n_expand_activation (Act  (None, 12, 12, 1536  0          ['block6n_expand_bn
[0][0]']
 ivation)                       )

 block6n_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6n_expand_ac
tivation[0][0]
 2D)                            )                                ']

 block6n_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6n_dwconv2
[0][0]']
 )                              )

 block6n_activation (Activation  (None, 12, 12, 1536  0          ['block6n_bn[0]
[0]']
 )                              )

 block6n_se_squeeze (GlobalAver  (None, 1536)        0           ['block6n_activatio
n[0][0]']
```

```
 agePooling2D)

 block6n_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6n_se_squeez
e[0][0]']

 block6n_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6n_se_reshap
e[0][0]']

 block6n_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6n_se_reduce
[0][0]']

 block6n_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6n_activatio
n[0][0]',
                                )                                 'block6n_se_expand
[0][0]']

 block6n_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6n_se_excite
[0][0]']

 block6n_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6n_project_c
onv[0][0]']
 lization)

 block6n_add (Add)              (None, 12, 12, 256)  0           ['block6n_project_b
n[0][0]',
                                                                  'block6m_add[0]
[0]']

 block6o_expand_conv (Conv2D)   (None, 12, 12, 1536  393216      ['block6n_add[0]
[0]']
                                )

 block6o_expand_bn (BatchNormal  (None, 12, 12, 1536  6144       ['block6o_expand_co
nv[0][0]']
 ization)                       )

 block6o_expand_activation (Act  (None, 12, 12, 1536  0          ['block6o_expand_bn
[0][0]']
 ivation)                       )

 block6o_dwconv2 (DepthwiseConv  (None, 12, 12, 1536  13824      ['block6o_expand_ac
tivation[0][0]
 2D)                            )                                 ']

 block6o_bn (BatchNormalization  (None, 12, 12, 1536  6144       ['block6o_dwconv2
[0][0]']
 )                              )

 block6o_activation (Activation  (None, 12, 12, 1536  0          ['block6o_bn[0]
[0]']
 )                              )

 block6o_se_squeeze (GlobalAver  (None, 1536)        0           ['block6o_activatio
n[0][0]']
 agePooling2D)

 block6o_se_reshape (Reshape)   (None, 1, 1, 1536)   0           ['block6o_se_squeez
e[0][0]']

 block6o_se_reduce (Conv2D)     (None, 1, 1, 64)     98368       ['block6o_se_reshap
e[0][0]']

 block6o_se_expand (Conv2D)     (None, 1, 1, 1536)   99840       ['block6o_se_reduce
[0][0]']

 block6o_se_excite (Multiply)   (None, 12, 12, 1536  0           ['block6o_activatio
n[0][0]',
                                )                                 'block6o_se_expand
[0][0]']
```

```
 block6o_project_conv (Conv2D)  (None, 12, 12, 256)  393216      ['block6o_se_excite
[0][0]']

 block6o_project_bn (BatchNorma  (None, 12, 12, 256)  1024       ['block6o_project_c
onv[0][0]']
 lization)

 block6o_add (Add)              (None, 12, 12, 256)  0           ['block6o_project_b
n[0][0]',
                                                                  'block6n_add[0]
[0]']

 top_conv (Conv2D)              (None, 12, 12, 1280  327680      ['block6o_add[0]
[0]']
                                )

 top_bn (BatchNormalization)    (None, 12, 12, 1280  5120        ['top_conv[0][0]']
                                )

 top_activation (Activation)    (None, 12, 12, 1280  0           ['top_bn[0][0]']
                                )

 avg_pool (GlobalAveragePooling  (None, 1280)        0           ['top_activation[0]
[0]']
 2D)

 top_dropout (Dropout)          (None, 1280)         0           ['avg_pool[0][0]']

 predictions (Dense)            (None, 2)            2562        ['top_dropout[0]
[0]']

==================================================================================
==============
Total params: 20,333,922
Trainable params: 20,180,050
Non-trainable params: 153,872
__________________________________________________________________________________
______________
```

In [ ]:

In [25]:

```
import psutil

# Getting % usage of virtual_memory ( 3rd field)
print('RAM memory % used:', psutil.virtual_memory()[2])
```

```
RAM memory % used: 52.4
```

In [26]:

```
print("Num GPUs Available: ", len(tf.config.list_physical_devices('GPU')))
```

```
Num GPUs Available:  1
```

In [27]:

```
import os
path = "/home/deepak/weights/"
try:
    os.stat(path)
except:
    os.mkdir(path)
path = "/home/deepak/weights/"+f"{mname}"
import os
try:
    os.stat(path)
```

```
except:
    os.mkdir(path)
os.chdir(path)
```

In [28]:
```
model_name = f"_{BATCH_SIZE}"+mname+f"{opt}"
tensorboard = tf.keras.callbacks.TensorBoard(log_dir=os.path.join("logs", model_name
# saves model checkpoint whenever we reach better weights
modelcheckpoint = tf.keras.callbacks.ModelCheckpoint("{val_loss:.3f}"+model_name+".h
model_name
```

Out[28]:
```
'_32EfficientNetV2Sadam'
```

In [29]:
```
model.compile(loss=los,
              optimizer=optimizer,
              metrics=['accuracy'])
```

In [30]:
```
history = model.fit(
    train_ds,
    batch_size=BATCH_SIZE,
    validation_data=val_ds,
    verbose=1,
    epochs=EPOCHS,
    callbacks=[tensorboard, modelcheckpoint]
)
```

```
Epoch 1/32
WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_functio
n.<locals>.train_function at 0x7f0e6e6e7710> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.
train_function at 0x7f0e6e6e7710> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
2022-05-18 18:58:50.206600: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 34 of 1000
2022-05-18 18:59:00.503454: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 78 of 1000
2022-05-18 18:59:10.398110: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 125 of 1000
2022-05-18 18:59:20.253766: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 168 of 1000
2022-05-18 18:59:30.254390: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 214 of 1000
2022-05-18 18:59:40.269489: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 253 of 1000
2022-05-18 18:59:50.379849: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 299 of 1000
2022-05-18 19:00:00.274237: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 333 of 1000
2022-05-18 19:00:05.386526: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:41
5] Shuffle buffer filled.
2022-05-18 19:00:05.387092: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 1 of 1000
2022-05-18 19:00:05.387192: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 2 of 1000
```

```
2022-05-18 19:00:05.387203: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 3 of 1000
2022-05-18 19:00:05.387212: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 4 of 1000
2022-05-18 19:00:05.387223: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 5 of 1000
2022-05-18 19:00:05.387232: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 6 of 1000
2022-05-18 19:00:05.387241: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 7 of 1000
2022-05-18 19:00:05.387253: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 8 of 1000
2022-05-18 19:00:06.276526: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:41
5] Shuffle buffer filled.
2022-05-18 19:00:09.012868: I tensorflow/stream_executor/cuda/cuda_dnn.cc:368] Loade
d cuDNN version 8400
2022-05-18 19:00:10.727726: I tensorflow/core/platform/default/subprocess.cc:304] St
art cannot spawn child process: No such file or directory
286/286 [==============================] - ETA: 0s - loss: 0.2071 - accuracy: 0.9225
WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.
<locals>.test_function at 0x7f0d3045b320> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.t
est_function at 0x7f0d3045b320> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
2022-05-18 19:06:58.429696: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 15 of 1000
2022-05-18 19:07:08.121881: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 37 of 1000
2022-05-18 19:07:18.171260: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 66 of 1000
2022-05-18 19:07:28.013066: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 91 of 1000
2022-05-18 19:07:38.085389: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 115 of 1000
2022-05-18 19:07:48.167655: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 145 of 1000
2022-05-18 19:07:58.232953: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 169 of 1000
2022-05-18 19:08:08.550613: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 197 of 1000
2022-05-18 19:08:18.111518: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 219 of 1000
2022-05-18 19:08:28.165536: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 249 of 1000
2022-05-18 19:08:38.134648: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 289 of 1000
2022-05-18 19:08:48.177521: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 328 of 1000
2022-05-18 19:08:54.891291: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:41
5] Shuffle buffer filled.
2022-05-18 19:08:58.366590: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 1 of 1000
2022-05-18 19:08:58.366801: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 2 of 1000
2022-05-18 19:08:58.366817: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 3 of 1000
2022-05-18 19:08:58.366830: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 4 of 1000
2022-05-18 19:08:58.366842: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 5 of 1000
```

```
2022-05-18 19:08:58.366857: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 6 of 1000
2022-05-18 19:08:58.366870: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 7 of 1000
2022-05-18 19:08:58.366883: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 8 of 1000
2022-05-18 19:08:58.366898: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 9 of 1000
2022-05-18 19:08:58.366909: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 10 of 1000
2022-05-18 19:08:58.366921: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 11 of 1000
2022-05-18 19:08:58.366933: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 12 of 1000
2022-05-18 19:08:58.366949: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 13 of 1000
2022-05-18 19:08:58.935042: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:41
5] Shuffle buffer filled.
Epoch 1: val_loss improved from inf to 0.18852, saving model to 0.189_32EfficientNet
V2Sadam.h5
286/286 [==============================] - 673s 2s/step - loss: 0.2071 - accuracy:
0.9225 - val_loss: 0.1885 - val_accuracy: 0.9348
Epoch 2/32
286/286 [==============================] - ETA: 0s - loss: 0.2067 - accuracy: 0.9232
Epoch 2: val_loss improved from 0.18852 to 0.18694, saving model to 0.187_32Efficien
tNetV2Sadam.h5
286/286 [==============================] - 365s 1s/step - loss: 0.2067 - accuracy:
0.9232 - val_loss: 0.1869 - val_accuracy: 0.9330
Epoch 3/32
286/286 [==============================] - ETA: 0s - loss: 0.2142 - accuracy: 0.9208
Epoch 3: val_loss did not improve from 0.18694
286/286 [==============================] - 384s 1s/step - loss: 0.2142 - accuracy:
0.9208 - val_loss: 0.2483 - val_accuracy: 0.9054
Epoch 4/32
286/286 [==============================] - ETA: 0s - loss: 0.2119 - accuracy: 0.9205
Epoch 4: val_loss did not improve from 0.18694
286/286 [==============================] - 395s 1s/step - loss: 0.2119 - accuracy:
0.9205 - val_loss: 0.1905 - val_accuracy: 0.9312
Epoch 5/32
286/286 [==============================] - ETA: 0s - loss: 0.2075 - accuracy: 0.9235
Epoch 5: val_loss improved from 0.18694 to 0.17627, saving model to 0.176_32Efficien
tNetV2Sadam.h5
286/286 [==============================] - 399s 1s/step - loss: 0.2075 - accuracy:
0.9235 - val_loss: 0.1763 - val_accuracy: 0.9420
Epoch 6/32
286/286 [==============================] - ETA: 0s - loss: 0.2070 - accuracy: 0.9223
Epoch 6: val_loss did not improve from 0.17627
286/286 [==============================] - 383s 1s/step - loss: 0.2070 - accuracy:
0.9223 - val_loss: 0.1954 - val_accuracy: 0.9339
Epoch 7/32
286/286 [==============================] - ETA: 0s - loss: 0.2027 - accuracy: 0.9227
Epoch 7: val_loss did not improve from 0.17627
286/286 [==============================] - 395s 1s/step - loss: 0.2027 - accuracy:
0.9227 - val_loss: 0.2564 - val_accuracy: 0.9036
Epoch 8/32
286/286 [==============================] - ETA: 0s - loss: 0.2001 - accuracy: 0.9245
Epoch 8: val_loss did not improve from 0.17627
286/286 [==============================] - 401s 1s/step - loss: 0.2001 - accuracy:
0.9245 - val_loss: 0.2182 - val_accuracy: 0.9152
Epoch 9/32
286/286 [==============================] - ETA: 0s - loss: 0.2079 - accuracy: 0.9214
Epoch 9: val_loss improved from 0.17627 to 0.16709, saving model to 0.167_32Efficien
tNetV2Sadam.h5
286/286 [==============================] - 399s 1s/step - loss: 0.2079 - accuracy:
0.9214 - val_loss: 0.1671 - val_accuracy: 0.9464
Epoch 10/32
286/286 [==============================] - ETA: 0s - loss: 0.2034 - accuracy: 0.9236
Epoch 10: val_loss did not improve from 0.16709
286/286 [==============================] - 399s 1s/step - loss: 0.2034 - accuracy:
```

```
0.9236 - val_loss: 0.1814 - val_accuracy: 0.9366
Epoch 11/32
286/286 [==============================] - ETA: 0s - loss: 0.2066 - accuracy: 0.9230
Epoch 11: val_loss did not improve from 0.16709
286/286 [==============================] - 401s 1s/step - loss: 0.2066 - accuracy:
0.9230 - val_loss: 0.1693 - val_accuracy: 0.9393
Epoch 12/32
286/286 [==============================] - ETA: 0s - loss: 0.2087 - accuracy: 0.9207
Epoch 12: val_loss did not improve from 0.16709
286/286 [==============================] - 386s 1s/step - loss: 0.2087 - accuracy:
0.9207 - val_loss: 0.2640 - val_accuracy: 0.9000
Epoch 13/32
286/286 [==============================] - ETA: 0s - loss: 0.2059 - accuracy: 0.9229
Epoch 13: val_loss did not improve from 0.16709
286/286 [==============================] - 401s 1s/step - loss: 0.2059 - accuracy:
0.9229 - val_loss: 0.2392 - val_accuracy: 0.9027
Epoch 14/32
286/286 [==============================] - ETA: 0s - loss: 0.2072 - accuracy: 0.9210
Epoch 14: val_loss did not improve from 0.16709
286/286 [==============================] - 396s 1s/step - loss: 0.2072 - accuracy:
0.9210 - val_loss: 0.1881 - val_accuracy: 0.9348
Epoch 15/32
286/286 [==============================] - ETA: 0s - loss: 0.2022 - accuracy: 0.9251
Epoch 15: val_loss did not improve from 0.16709
286/286 [==============================] - 395s 1s/step - loss: 0.2022 - accuracy:
0.9251 - val_loss: 0.1790 - val_accuracy: 0.9357
Epoch 16/32
286/286 [==============================] - ETA: 0s - loss: 0.2023 - accuracy: 0.9237
Epoch 16: val_loss did not improve from 0.16709
286/286 [==============================] - 394s 1s/step - loss: 0.2023 - accuracy:
0.9237 - val_loss: 0.2049 - val_accuracy: 0.9295
Epoch 17/32
286/286 [==============================] - ETA: 0s - loss: 0.2033 - accuracy: 0.9259
Epoch 17: val_loss did not improve from 0.16709
286/286 [==============================] - 385s 1s/step - loss: 0.2033 - accuracy:
0.9259 - val_loss: 0.1971 - val_accuracy: 0.9259
Epoch 18/32
286/286 [==============================] - ETA: 0s - loss: 0.2100 - accuracy: 0.9224
Epoch 18: val_loss did not improve from 0.16709
286/286 [==============================] - 390s 1s/step - loss: 0.2100 - accuracy:
0.9224 - val_loss: 0.1933 - val_accuracy: 0.9232
Epoch 19/32
286/286 [==============================] - ETA: 0s - loss: 0.2016 - accuracy: 0.9245
Epoch 19: val_loss did not improve from 0.16709
286/286 [==============================] - 384s 1s/step - loss: 0.2016 - accuracy:
0.9245 - val_loss: 0.1849 - val_accuracy: 0.9339
Epoch 20/32
286/286 [==============================] - ETA: 0s - loss: 0.2011 - accuracy: 0.9243
Epoch 20: val_loss did not improve from 0.16709
286/286 [==============================] - 394s 1s/step - loss: 0.2011 - accuracy:
0.9243 - val_loss: 0.2012 - val_accuracy: 0.9170
Epoch 21/32
286/286 [==============================] - ETA: 0s - loss: 0.2021 - accuracy: 0.9244
Epoch 21: val_loss did not improve from 0.16709
286/286 [==============================] - 387s 1s/step - loss: 0.2021 - accuracy:
0.9244 - val_loss: 0.1703 - val_accuracy: 0.9464
Epoch 22/32
286/286 [==============================] - ETA: 0s - loss: 0.1965 - accuracy: 0.9254
Epoch 22: val_loss did not improve from 0.16709
286/286 [==============================] - 387s 1s/step - loss: 0.1965 - accuracy:
0.9254 - val_loss: 0.1928 - val_accuracy: 0.9357
Epoch 23/32
286/286 [==============================] - ETA: 0s - loss: 0.1993 - accuracy: 0.9266
Epoch 23: val_loss improved from 0.16709 to 0.16002, saving model to 0.160_32Efficie
ntNetV2Sadam.h5
286/286 [==============================] - 372s 1s/step - loss: 0.1993 - accuracy:
0.9266 - val_loss: 0.1600 - val_accuracy: 0.9429
Epoch 24/32
286/286 [==============================] - ETA: 0s - loss: 0.1988 - accuracy: 0.9274
```

```
Epoch 24: val_loss did not improve from 0.16002
286/286 [==============================] - 387s 1s/step - loss: 0.1988 - accuracy:
0.9274 - val_loss: 0.1968 - val_accuracy: 0.9214
Epoch 25/32
286/286 [==============================] - ETA: 0s - loss: 0.1984 - accuracy: 0.9271
Epoch 25: val_loss did not improve from 0.16002
286/286 [==============================] - 381s 1s/step - loss: 0.1984 - accuracy:
0.9271 - val_loss: 5.0918 - val_accuracy: 0.9116
Epoch 26/32
286/286 [==============================] - ETA: 0s - loss: 0.1948 - accuracy: 0.9258
Epoch 26: val_loss did not improve from 0.16002
286/286 [==============================] - 385s 1s/step - loss: 0.1948 - accuracy:
0.9258 - val_loss: 0.1739 - val_accuracy: 0.9393
Epoch 27/32
286/286 [==============================] - ETA: 0s - loss: 0.2006 - accuracy: 0.9241
Epoch 27: val_loss did not improve from 0.16002
286/286 [==============================] - 384s 1s/step - loss: 0.2006 - accuracy:
0.9241 - val_loss: 0.2048 - val_accuracy: 0.9232
Epoch 28/32
286/286 [==============================] - ETA: 0s - loss: 0.2002 - accuracy: 0.9254
Epoch 28: val_loss did not improve from 0.16002
286/286 [==============================] - 384s 1s/step - loss: 0.2002 - accuracy:
0.9254 - val_loss: 0.2685 - val_accuracy: 0.9089
Epoch 29/32
286/286 [==============================] - ETA: 0s - loss: 0.1943 - accuracy: 0.9283
Epoch 29: val_loss did not improve from 0.16002
286/286 [==============================] - 374s 1s/step - loss: 0.1943 - accuracy:
0.9283 - val_loss: 0.2273 - val_accuracy: 0.9116
Epoch 30/32
286/286 [==============================] - ETA: 0s - loss: 0.2054 - accuracy: 0.9212
Epoch 30: val_loss did not improve from 0.16002
286/286 [==============================] - 376s 1s/step - loss: 0.2054 - accuracy:
0.9212 - val_loss: 0.2058 - val_accuracy: 0.9277
Epoch 31/32
286/286 [==============================] - ETA: 0s - loss: 0.1997 - accuracy: 0.9253
Epoch 31: val_loss did not improve from 0.16002
286/286 [==============================] - 380s 1s/step - loss: 0.1997 - accuracy:
0.9253 - val_loss: 31722108.0000 - val_accuracy: 0.8429
Epoch 32/32
286/286 [==============================] - ETA: 0s - loss: 0.1946 - accuracy: 0.9258
Epoch 32: val_loss did not improve from 0.16002
286/286 [==============================] - 372s 1s/step - loss: 0.1946 - accuracy:
0.9258 - val_loss: 0.1684 - val_accuracy: 0.9393
```

In [31]:

```
scores = model.evaluate(test_ds)
```

```
2022-05-18 22:39:00.138399: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 16 of 1000
2022-05-18 22:39:10.513669: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 45 of 1000
2022-05-18 22:39:20.043568: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 65 of 1000
2022-05-18 22:39:30.448786: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 91 of 1000
2022-05-18 22:39:40.129703: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 113 of 1000
2022-05-18 22:39:50.566238: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 137 of 1000
2022-05-18 22:40:00.128007: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 162 of 1000
2022-05-18 22:40:10.047011: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 191 of 1000
2022-05-18 22:40:19.970271: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 222 of 1000
2022-05-18 22:40:30.047074: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 250 of 1000
2022-05-18 22:40:40.076550: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 278 of 1000
```

```
2022-05-18 22:40:50.410053: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 304 of 1000
2022-05-18 22:41:00.661554: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 331 of 1000
2022-05-18 22:41:07.499817: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:41
5] Shuffle buffer filled.
 1/37 [..............................] - ETA: 1:25:22 - loss: 0.1282 - accuracy: 0.9
062
2022-05-18 22:41:11.988730: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 1 of 1000
2022-05-18 22:41:11.988824: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 2 of 1000
2022-05-18 22:41:11.988836: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 3 of 1000
2022-05-18 22:41:11.988844: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 4 of 1000
2022-05-18 22:41:11.988853: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 5 of 1000
2022-05-18 22:41:11.988859: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 6 of 1000
2022-05-18 22:41:11.988867: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 7 of 1000
2022-05-18 22:41:11.988875: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 8 of 1000
2022-05-18 22:41:11.988884: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 9 of 1000
2022-05-18 22:41:11.988890: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 10 of 1000
2022-05-18 22:41:11.988896: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 11 of 1000
2022-05-18 22:41:11.988904: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 12 of 1000
2022-05-18 22:41:11.988912: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 13 of 1000
2022-05-18 22:41:11.988921: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:39
0] Filling up shuffle buffer (this may take a while): 14 of 1000
2022-05-18 22:41:11.989060: I tensorflow/core/kernels/data/shuffle_dataset_op.cc:41
5] Shuffle buffer filled.
37/37 [==============================] - 150s 221ms/step - loss: 0.1816 - accuracy:
0.9324
```

In [32]:
```
scores
```

Out[32]:
```
[0.1815919727087021, 0.9324324131011963]
```

In [33]:
```
history.params
```

Out[33]:
```
{'verbose': 1, 'epochs': 32, 'steps': 286}
```

In [34]:
```
history.history.keys()
```

Out[34]:
```
dict_keys(['loss', 'accuracy', 'val_loss', 'val_accuracy'])
```

In [35]:
```
type(history.history['loss'])
```

Out[35]:
```
list
```

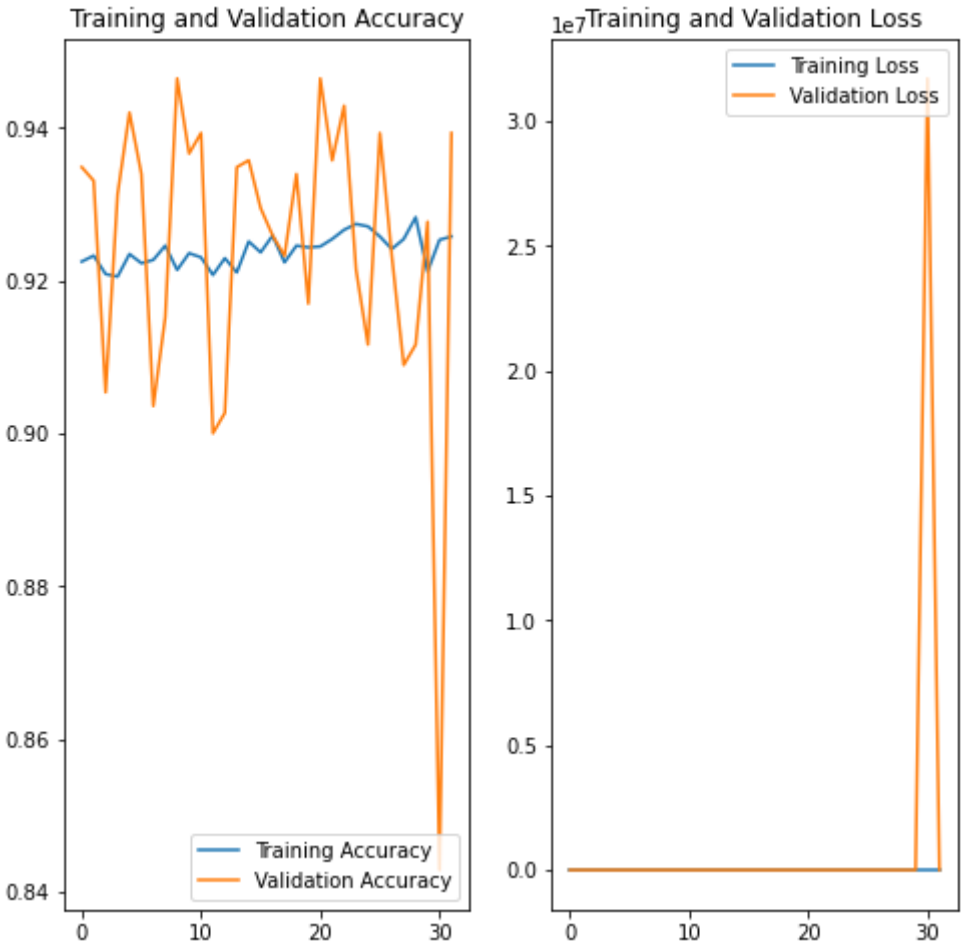
In [36]:
```
len(history.history['loss'])
```

Out[36]:
```
32
```

In [37]:
```
acc = history.history['accuracy']
val_acc = history.history['val_accuracy']

loss = history.history['loss']
val_loss = history.history['val_loss']
```

In [ ]:
```
```

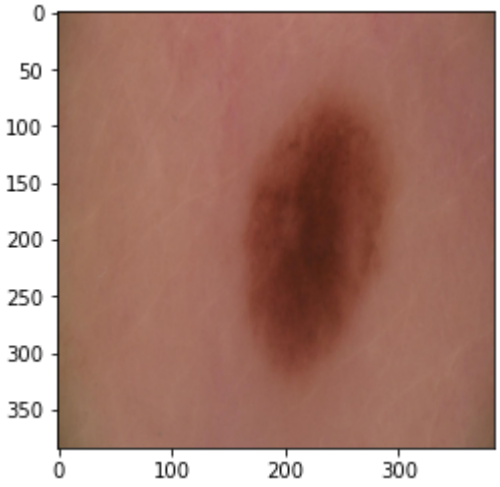
In [38]:
```
plt.figure(figsize=(8, 8))
plt.subplot(1, 2, 1)
plt.plot(range(EPOCHS), acc, label='Training Accuracy')
plt.plot(range(EPOCHS), val_acc, label='Validation Accuracy')
plt.legend(loc='lower right')
plt.title('Training and Validation Accuracy')

plt.subplot(1, 2, 2)
plt.plot(range(EPOCHS), loss, label='Training Loss')
plt.plot(range(EPOCHS), val_loss, label='Validation Loss')
plt.legend(loc='upper right')
plt.title('Training and Validation Loss')
plt.show()
```



In [39]:
```
import numpy as np
for images_batch, labels_batch in test_ds.take(1):

    first_image = images_batch[0].numpy().astype('uint8')
    first_label = labels_batch[0].numpy()
```

```
    print("first image to predict")
    plt.imshow(first_image)
    print("actual label:",class_names[first_label])

    batch_prediction = model.predict(images_batch)
    print("predicted label:",class_names[np.argmax(batch_prediction[0])])
```

```
first image to predict
actual label: nevus
WARNING:tensorflow:AutoGraph could not transform <function Model.make_predict_functi
on.<locals>.predict_function at 0x7f0c64101950> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
WARNING: AutoGraph could not transform <function Model.make_predict_function.<locals
>.predict_function at 0x7f0c64101950> and will run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the verbosity to
10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with @tf.autograph.experimental.do_no
t_convert
predicted label: nevus
```



In [40]:

```
tempb=batch_prediction
print(len(tempb[0]))
tempb0=tempb[0]
tempb0.sort()
#print(tempb0)
print(tempb0[-1])
```

```
2
0.9759519
```

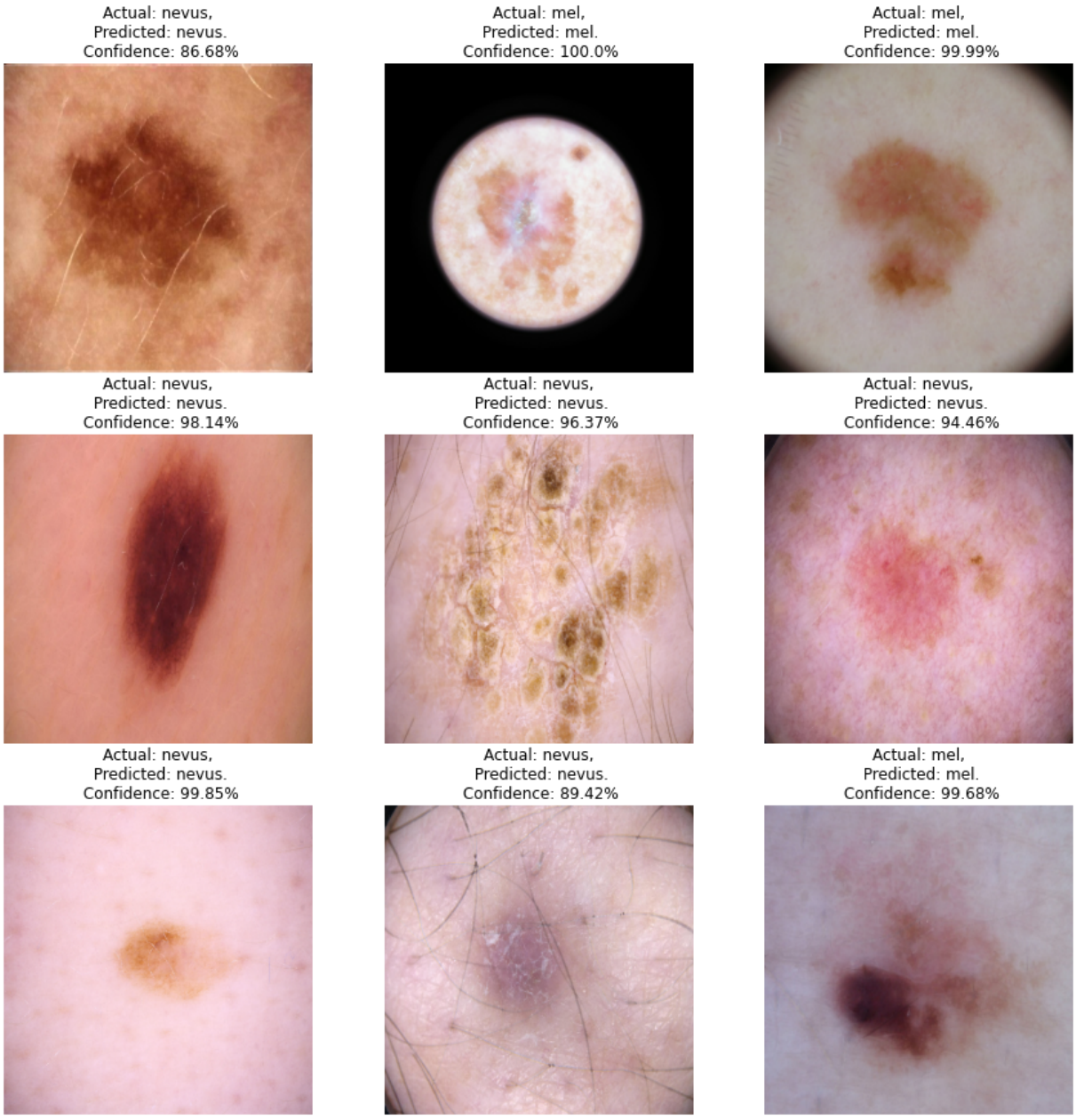
In [41]:

```
def predict(model, img):
    img_array = tf.keras.preprocessing.image.img_to_array(images[i].numpy())
    img_array = tf.expand_dims(img_array, 0)

    predictions = model.predict(img_array)

    predicted_class = class_names[np.argmax(predictions[0])]
    confidence = round(100 * (np.max(predictions[0])), 2)
    return predicted_class, confidence
```

In [42]:

```
truth=[]
pred=[]
```

```
plt.figure(figsize=(15, 15))
for images, labels in test_ds.take(1):
    for i in range(9):
        ax = plt.subplot(3, 3, i + 1)
        plt.imshow(images[i].numpy().astype("uint8"))

        predicted_class, confidence = predict(model, images[i].numpy())
        actual_class = class_names[labels[i]]
        truth.append(actual_class)
        pred.append(predicted_class)
        plt.title(f"Actual: {actual_class},\n Predicted: {predicted_class}.\n Confid

        plt.axis("off")
```



In [43]:

```
path=f'/home/deepak/weights/{mname}'
print(path)
import os
os.chdir(path)
weightlist=os.listdir()
```

```
/home/deepak/weights/EfficientNetV2S
```

In [44]:

```
weightlist
```

Out[44]:
```
['0.221_32EfficientNetV2Sadam.h5',
 '0.216_32EfficientNetV2Sadam.h5',
 '0.294_32EfficientNetV2Sadam.h5',
 '0.274_32EfficientNetV2Sadam.h5',
 'logs',
 '0.247_32EfficientNetV2Sadam.h5',
 '0.388_32EfficientNetV2Sadam.h5',
 '0.176_32EfficientNetV2Sadam.h5',
 '0.167_32EfficientNetV2Sadam.h5',
 '0.217_32EfficientNetV2Sadam.h5',
 '0.245_32EfficientNetV2Sadam.h5',
 '0.213_32EfficientNetV2Sadam.h5',
 '0.181_32EfficientNetV2Sadam.h5',
 '0.165_32EfficientNetV2Sadam.h5',
 '0.282_32EfficientNetV2Sadam.h5',
 '0.194_32EfficientNetV2Sadam.h5',
 '0.251_32EfficientNetV2Sadam.h5',
 '0.193_32EfficientNetV2Sadam.h5',
 '0.192_32EfficientNetV2Sadam.h5',
 '0.259_32EfficientNetV2Sadam.h5',
 '0.187_32EfficientNetV2Sadam.h5',
 '0.355_32EfficientNetV2Sadam.h5',
 '0.255_32EfficientNetV2Sadam.h5',
 '0.421_32EfficientNetV2Sadam.h5',
 '0.257_32EfficientNetV2Sadam.h5',
 '0.212_32EfficientNetV2Sadam.h5',
 '0.248_32EfficientNetV2Sadam.h5',
 '0.177_32EfficientNetV2Sadam.h5',
 '0.269_32EfficientNetV2Sadam.h5',
 '0.225_32EfficientNetV2Sadam.h5',
 '1.639_32EfficientNetV2Sadam.h5',
 '0.174_32EfficientNetV2Sadam.h5',
 '0.425_32EfficientNetV2Sadam.h5',
 '0.235_32EfficientNetV2Sadam.h5',
 '0.220_32EfficientNetV2Sadam.h5',
 '0.184_32EfficientNetV2Sadam.h5',
 '0.199_32EfficientNetV2Sadam.h5',
 '0.351_32EfficientNetV2Sadam.h5',
 '0.326_32EfficientNetV2Sadam.h5',
 '0.201_32EfficientNetV2Sadam.h5',
 '0.202_32EfficientNetV2Sadam.h5',
 '0.582_32EfficientNetV2Sadam.h5',
 '0.185_32EfficientNetV2Sadam.h5',
 '0.189_32EfficientNetV2Sadam.h5',
 '0.163_32EfficientNetV2Sadam.h5',
 '0.214_32EfficientNetV2Sadam.h5',
 '0.172_32EfficientNetV2Sadam.h5',
 '0.231_32EfficientNetV2Sadam.h5',
 '0.169_32EfficientNetV2Sadam.h5',
 '0.236_32EfficientNetV2Sadam.h5',
 '0.188_32EfficientNetV2Sadam.h5',
 '0.160_32EfficientNetV2Sadam.h5',
 '0.288_32EfficientNetV2Sadam.h5',
 '0.296_32EfficientNetV2Sadam.h5',
 '0.223_32EfficientNetV2Sadam.h5']
```

In [45]:
```
weightlist.sort()
weightlist
```

Out[45]:
```
['0.160_32EfficientNetV2Sadam.h5',
 '0.163_32EfficientNetV2Sadam.h5',
 '0.165_32EfficientNetV2Sadam.h5',
 '0.167_32EfficientNetV2Sadam.h5',
 '0.169_32EfficientNetV2Sadam.h5',
 '0.172_32EfficientNetV2Sadam.h5',
```

```
'0.174_32EfficientNetV2Sadam.h5',
'0.176_32EfficientNetV2Sadam.h5',
'0.177_32EfficientNetV2Sadam.h5',
'0.181_32EfficientNetV2Sadam.h5',
'0.184_32EfficientNetV2Sadam.h5',
'0.185_32EfficientNetV2Sadam.h5',
'0.187_32EfficientNetV2Sadam.h5',
'0.188_32EfficientNetV2Sadam.h5',
'0.189_32EfficientNetV2Sadam.h5',
'0.192_32EfficientNetV2Sadam.h5',
'0.193_32EfficientNetV2Sadam.h5',
'0.194_32EfficientNetV2Sadam.h5',
'0.199_32EfficientNetV2Sadam.h5',
'0.201_32EfficientNetV2Sadam.h5',
'0.202_32EfficientNetV2Sadam.h5',
'0.212_32EfficientNetV2Sadam.h5',
'0.213_32EfficientNetV2Sadam.h5',
'0.214_32EfficientNetV2Sadam.h5',
'0.216_32EfficientNetV2Sadam.h5',
'0.217_32EfficientNetV2Sadam.h5',
'0.220_32EfficientNetV2Sadam.h5',
'0.221_32EfficientNetV2Sadam.h5',
'0.223_32EfficientNetV2Sadam.h5',
'0.225_32EfficientNetV2Sadam.h5',
'0.231_32EfficientNetV2Sadam.h5',
'0.235_32EfficientNetV2Sadam.h5',
'0.236_32EfficientNetV2Sadam.h5',
'0.245_32EfficientNetV2Sadam.h5',
'0.247_32EfficientNetV2Sadam.h5',
'0.248_32EfficientNetV2Sadam.h5',
'0.251_32EfficientNetV2Sadam.h5',
'0.255_32EfficientNetV2Sadam.h5',
'0.257_32EfficientNetV2Sadam.h5',
'0.259_32EfficientNetV2Sadam.h5',
'0.269_32EfficientNetV2Sadam.h5',
'0.274_32EfficientNetV2Sadam.h5',
'0.282_32EfficientNetV2Sadam.h5',
'0.288_32EfficientNetV2Sadam.h5',
'0.294_32EfficientNetV2Sadam.h5',
'0.296_32EfficientNetV2Sadam.h5',
'0.326_32EfficientNetV2Sadam.h5',
'0.351_32EfficientNetV2Sadam.h5',
'0.355_32EfficientNetV2Sadam.h5',
'0.388_32EfficientNetV2Sadam.h5',
'0.421_32EfficientNetV2Sadam.h5',
'0.425_32EfficientNetV2Sadam.h5',
'0.582_32EfficientNetV2Sadam.h5',
'1.639_32EfficientNetV2Sadam.h5',
'logs']
```

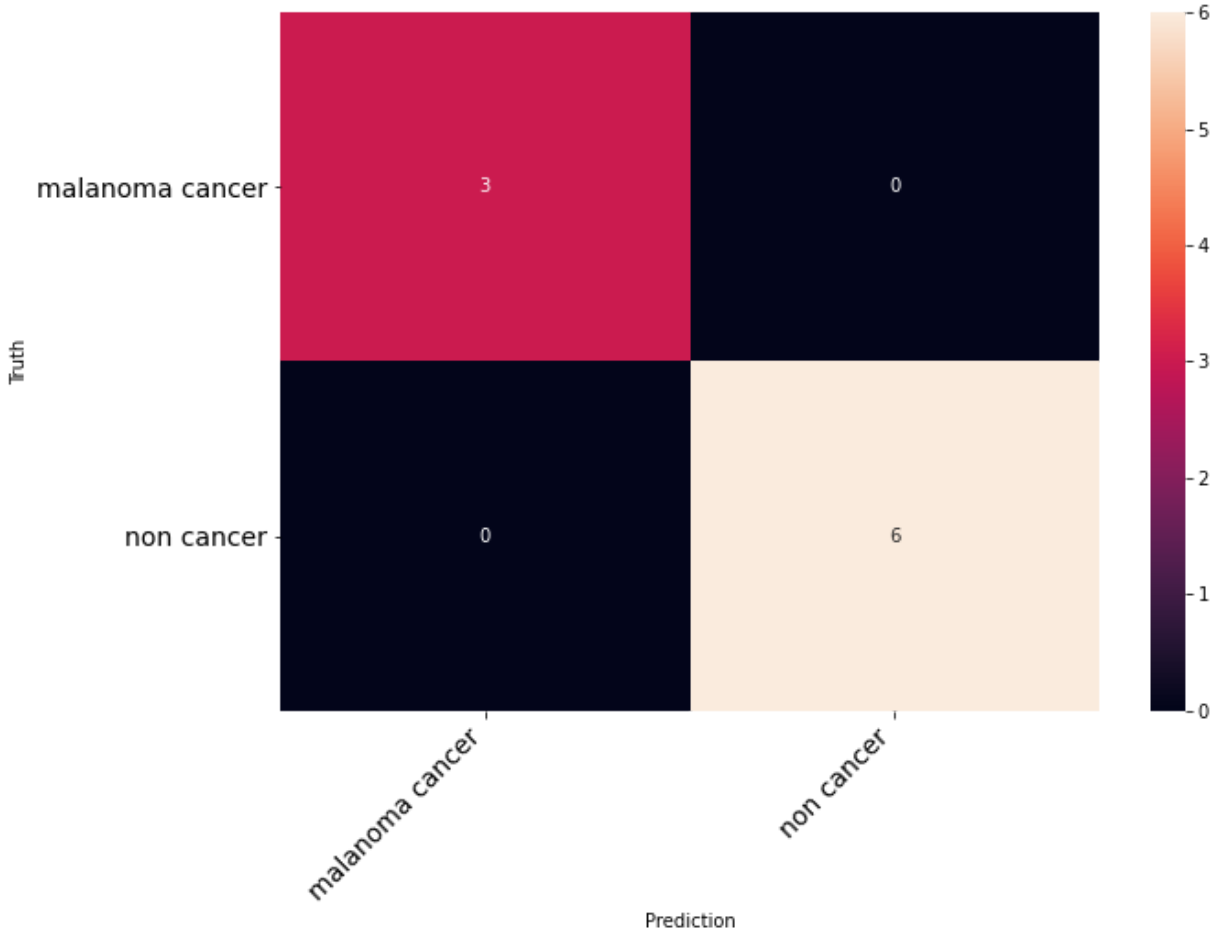
In [46]:

```
from matplotlib import pyplot as plt
from sklearn.metrics import confusion_matrix , classification_report
import pandas as pd


def print_confusion_matrix(confusion_matrix, class_names, figsize = (10,7), fontsize

    df_cm = pd.DataFrame(
        confusion_matrix, index=class_names, columns=class_names,
    )
    fig = plt.figure(figsize=figsize)
    try:
        heatmap = sns.heatmap(df_cm, annot=True, fmt="d")
    except ValueError:
        raise ValueError("Confusion matrix values must be integers.")
    heatmap.yaxis.set_ticklabels(heatmap.yaxis.get_ticklabels(), rotation=0, ha='rig
    heatmap.xaxis.set_ticklabels(heatmap.xaxis.get_ticklabels(), rotation=45, ha='ri
```

```
    plt.ylabel('Truth')
    plt.xlabel('Prediction')
```

In [47]:

```
import seaborn as sns
cm = confusion_matrix(truth,pred)
print_confusion_matrix(cm,["malanoma cancer","non cancer"])
```



In [48]:

```
print(classification_report(truth, pred))
```

```
              precision    recall  f1-score   support

         mel       1.00      1.00      1.00         3
       nevus       1.00      1.00      1.00         6

    accuracy                           1.00         9
   macro avg       1.00      1.00      1.00         9
weighted avg       1.00      1.00      1.00         9
```

In [49]:

```
import os
os.chdir("/home/deepak")
#model.save("32efficientv2S91%.h5")
```