

In [6]:

```
%matplotlib inline  
  
import pandas as pd  
import matplotlib  
import matplotlib.pyplot as plt  
import numpy as np  
from numpy import genfromtxt
```

In [2]:

```
#define parameters  
steps = 20  
epochs = 25  
batch_size = 8
```

In [4]:

```
!python ../keras-retinanet/keras_retinanet/bin/train.py --steps 40 --epochs 25 --snapsh  
ot-path ../keras-retinanet/snapshots \N  
--weights ../keras-retinanet/snapshots/resnet50_coco_best_v2.1.0.h5 \  
--no-resize --batch-size 4 \  
--compute-val-loss\  
--freeze-backbone\  
csv train_set_03-03.csv classes.csv \  
--val-annotations val_set_03-03.csv
```

Using TensorFlow backend.

2020-03-03 02:55:37.257622: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libnvinfer.so.6

2020-03-03 02:55:37.259090: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libnvinfer_plugin.so.6

Creating model, this may take a second...

2020-03-03 02:55:38.106269: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcuda.so.1

2020-03-03 02:55:38.134582: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 02:55:38.135646: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1555] Found device 0 with properties:

pciBusID: 0000:00:05.0 name: Quadro P5000 computeCapability: 6.1

coreClock: 1.7335GHz coreCount: 20 deviceMemorySize: 15.90GiB deviceMemoryBandwidth: 269.00GiB/s

2020-03-03 02:55:38.135704: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcudart.so.10.1

2020-03-03 02:55:38.135764: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcublas.so.10

2020-03-03 02:55:38.137550: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcufft.so.10

2020-03-03 02:55:38.137861: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcurand.so.10

2020-03-03 02:55:38.139631: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcusolver.so.10

2020-03-03 02:55:38.140689: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcusparsesolver.so.10

2020-03-03 02:55:38.140750: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcudnn.so.7

2020-03-03 02:55:38.140865: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 02:55:38.142081: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 02:55:38.142985: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1697] Adding visible gpu devices: 0

2020-03-03 02:55:38.143363: I tensorflow/core/platform/cpu_feature_guard.cc:142] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2 FMA

2020-03-03 02:55:38.150818: I tensorflow/core/platform/profile_utils/cpu_utils.cc:94] CPU Frequency: 2600000000 Hz

2020-03-03 02:55:38.151532: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x5704e60 initialized for platform Host (this does not guarantee that XLA will be used). Devices:

2020-03-03 02:55:38.151580: I tensorflow/compiler/xla/service/service.cc:176] StreamExecutor device (0): Host, Default Version

2020-03-03 02:55:38.238655: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 02:55:38.239842: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x5727f70 initialized for platform CUDA (this does not guarantee that XLA will be used). Devices:

2020-03-03 02:55:38.239900: I tensorflow/compiler/xla/service/service.cc:176] StreamExecutor device (0): Quadro P5000, Compute Capability 6.1

2020-03-03 02:55:38.240204: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 02:55:38.241168: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1115] Successfully initialized device 0.

```

e.cc:1555] Found device 0 with properties:
pciBusID: 0000:00:05.0 name: Quadro P5000 computeCapability: 6.1
coreClock: 1.7335GHz coreCount: 20 deviceMemorySize: 15.90GiB deviceMemory
Bandwidth: 269.00GiB/s
2020-03-03 02:55:38.241225: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcudart.so.10.1
2020-03-03 02:55:38.241246: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcublas.so.10
2020-03-03 02:55:38.241294: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcufft.so.10
2020-03-03 02:55:38.241318: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcurand.so.10
2020-03-03 02:55:38.241342: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcusolver.so.10
2020-03-03 02:55:38.241365: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcusparsesolver.so.10
2020-03-03 02:55:38.241383: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcudnn.so.7
2020-03-03 02:55:38.241431: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 02:55:38.242250: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 02:55:38.243029: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1697] Adding visible gpu devices: 0
2020-03-03 02:55:38.243071: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcudart.so.10.1
2020-03-03 02:55:38.490358: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1096] Device interconnect StreamExecutor with strength 1 edge matrix:
2020-03-03 02:55:38.490415: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1102]      0
2020-03-03 02:55:38.490423: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1115] 0:  N
2020-03-03 02:55:38.490689: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 02:55:38.491509: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 02:55:38.492349: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1241] Created TensorFlow device (/job:localhost/replica:0/task:0/devi
ce:GPU:0 with 15309 MB memory) -> physical GPU (device: 0, name: Quadro P5
000, pci bus id: 0000:00:05.0, compute capability: 6.1)
/home/paperspace/HPM/HPMenv/lib/python3.6/site-packages/keras/engine/savin
g.py:1319: UserWarning: Skipping loading of weights for layer classificati
on_submodel due to mismatch in shape ((3, 3, 256, 9) vs (720, 256, 3, 3)).
weight_values[i].shape))
/home/paperspace/HPM/HPMenv/lib/python3.6/site-packages/keras/engine/savin
g.py:1319: UserWarning: Skipping loading of weights for layer classificati
on_submodel due to mismatch in shape ((9,) vs (720,)).
weight_values[i].shape))
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -22.627417, -11.313708,  22.627417,  11.313708],
       [-28.50876 , -14.25438 ,  28.50876 ,  14.25438 ],
       [-35.918785, -17.959393,  35.918785,  17.959393],
       [-16.      , -16.      ,  16.      ,  16.      ],
       [-20.158737, -20.158737,  20.158737,  20.158737],
       [-25.398417, -25.398417,  25.398417,  25.398417],
       [-11.313708, -22.627417,  11.313708,  22.627417],
       [-14.25438 , -28.50876 ,  14.25438 ,  28.50876 ]],

```

```

    [-17.959393, -35.918785, 17.959393, 35.918785]], dtype=float32)>
anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -45.254833, -22.627417, 45.254833, 22.627417],
       [-57.01752 , -28.50876 , 57.01752 , 28.50876 ],
       [-71.83757 , -35.918785, 71.83757 , 35.918785],
       [-32.        , -32.        , 32.        , 32.        ],
       [-40.317474, -40.317474, 40.317474, 40.317474],
       [-50.796833, -50.796833, 50.796833, 50.796833],
       [-22.627417, -45.254833, 22.627417, 45.254833],
       [-28.50876 , -57.01752 , 28.50876 , 57.01752 ],
       [-35.918785, -71.83757 , 35.918785, 71.83757 ]], dtype=float32)>
anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -90.50967 , -45.254833, 90.50967 , 45.254833],
       [-114.03504 , -57.01752 , 114.03504 , 57.01752 ],
       [-143.67514 , -71.83757 , 143.67514 , 71.83757 ],
       [ -64.        , -64.        , 64.        , 64.        ],
       [ -80.63495 , -80.63495 , 80.63495 , 80.63495 ],
       [-101.593666, -101.593666, 101.593666, 101.593666],
       [ -45.254833, -90.50967 , 45.254833, 90.50967 ],
       [ -57.01752 , -114.03504 , 57.01752 , 114.03504 ],
       [ -71.83757 , -143.67514 , 71.83757 , 143.67514 ]],
       dtype=float32)> anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -181.01933, -90.50967, 181.01933, 90.50967],
       [-228.07008, -114.03504, 228.07008, 114.03504],
       [-287.35028, -143.67514, 287.35028, 143.67514],
       [-128.        , -128.        , 128.        , 128.        ],
       [-161.2699 , -161.2699 , 161.2699 , 161.2699 ],
       [-203.18733, -203.18733, 203.18733, 203.18733],
       [ -90.50967, -181.01933, 90.50967, 181.01933],
       [-114.03504, -228.07008, 114.03504, 228.07008],
       [-143.67514, -287.35028, 143.67514, 287.35028]], dtype=float32)>
anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -362.03867, -181.01933, 362.03867, 181.01933],
       [-456.14017, -228.07008, 456.14017, 228.07008],
       [-574.70056, -287.35028, 574.70056, 287.35028],
       [-256.        , -256.        , 256.        , 256.        ],
       [-322.5398 , -322.5398 , 322.5398 , 322.5398 ],
       [-406.37466, -406.37466, 406.37466, 406.37466],
       [-181.01933, -362.03867, 181.01933, 362.03867],
       [-228.07008, -456.14017, 228.07008, 456.14017],
       [-287.35028, -574.70056, 287.35028, 574.70056]], dtype=float32)>
anchors
Model: "retinanet"

```

Layer (type)	Output Shape	Param #	Connected to
=====			
input_1 (InputLayer)	(None, None, None, 3 0		
=====			
padding_conv1 (ZeroPadding2D)	(None, None, None, 3 0		input_1 [0][0]
=====			
conv1 (Conv2D)	(None, None, None, 6 9408		padding_c

onv1[0][0]

bn_conv1 (BatchNormalization)	(None, None, None, 6 256	conv1[0]
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conv1_relu (Activation)	(None, None, None, 6 0	bn_conv1
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pool1 (MaxPooling2D)	(None, None, None, 6 0	conv1_relu
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res2a_branch2a (Conv2D)	(None, None, None, 6 4096	pool1[0]
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bn2a_branch2a (BatchNormalization)	(None, None, None, 6 256	res2a_branch2a
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res2a_branch2a_relu (Activation)	(None, None, None, 6 0	bn2a_branch2a
----------------------------------	------------------------	---------------

padding2a_branch2b (ZeroPadding)	(None, None, None, 6 0	res2a_branch2a_relu
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res2a_branch2b (Conv2D)	(None, None, None, 6 36864	padding2a_branch2b
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bn2a_branch2b (BatchNormalization)	(None, None, None, 6 256	res2a_branch2b
------------------------------------	--------------------------	----------------

res2a_branch2b_relu (Activation)	(None, None, None, 6 0	bn2a_branch2b
----------------------------------	------------------------	---------------

res2a_branch2c (Conv2D)	(None, None, None, 2 16384	res2a_branch2b_relu
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res2a_branch1 (Conv2D)	(None, None, None, 2 16384	pool1[0]
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bn2a_branch2c (BatchNormalization)	(None, None, None, 2 1024	res2a_branch2c
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bn2a_branch1 (BatchNormalization)	(None, None, None, 2 1024	res2a_branch1
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res2a (Add)	(None, None, None, 2 0	bn2a_branch2c
-------------	------------------------	---------------

bn2a_bran

ch1[0][0]

res2a_relu (Activation)
[0]

(None, None, None, 2 0

res2a[0]

res2b_branch2a (Conv2D)
u[0][0]

(None, None, None, 6 16384

res2a_rel

bn2b_branch2a (BatchNormalizati
nch2a[0][0]

(None, None, None, 6 256

res2b_bra

res2b_branch2a_relu (Activation
ch2a[0][0]

(None, None, None, 6 0

bn2b_bran

padding2b_branch2b (ZeroPadding
nch2a_relu[0][0]

(None, None, None, 6 0

res2b_bra

res2b_branch2b (Conv2D)
_branch2b[0][0]

(None, None, None, 6 36864

padding2b

bn2b_branch2b (BatchNormalizati
nch2b[0][0]

(None, None, None, 6 256

res2b_bra

res2b_branch2b_relu (Activation
ch2b[0][0]

(None, None, None, 6 0

bn2b_bran

res2b_branch2c (Conv2D)
nch2b_relu[0][0]

(None, None, None, 2 16384

res2b_bra

bn2b_branch2c (BatchNormalizati
nch2c[0][0]

(None, None, None, 2 1024

res2b_bra

res2b (Add)
ch2c[0][0]

(None, None, None, 2 0

bn2b_bran

u[0][0]

res2a_rel

res2b_relu (Activation)
[0]

(None, None, None, 2 0

res2b[0]

res2c_branch2a (Conv2D)
u[0][0]

(None, None, None, 6 16384

res2b_rel

bn2c_branch2a (BatchNormalizati
nch2a[0][0]

(None, None, None, 6 256

res2c_bra

res2c_branch2a_relu (Activation)	(None, None, None, 6 0)	bn2c_branch2a[0][0]
padding2c_branch2b (ZeroPadding)	(None, None, None, 6 0)	res2c_branch2a_relu[0][0]
res2c_branch2b (Conv2D)	(None, None, None, 6 36864)	padding2c_branch2b[0][0]
bn2c_branch2b (BatchNormalization)	(None, None, None, 6 256)	res2c_branch2b[0][0]
res2c_branch2b_relu (Activation)	(None, None, None, 6 0)	bn2c_branch2b[0][0]
res2c_branch2c (Conv2D)	(None, None, None, 2 16384)	res2c_branch2b_relu[0][0]
bn2c_branch2c (BatchNormalization)	(None, None, None, 2 1024)	res2c_branch2c[0][0]
res2c (Add)	(None, None, None, 2 0)	bn2c_branch2c[0][0]
res2c_relu (Activation)	(None, None, None, 2 0)	res2b_relu[0][0]
res3a_branch2a (Conv2D)	(None, None, None, 1 32768)	res2c_relu[0]
bn3a_branch2a (BatchNormalization)	(None, None, None, 1 512)	res3a_branch2a[0][0]
res3a_branch2a_relu (Activation)	(None, None, None, 1 0)	bn3a_branch2a[0][0]
padding3a_branch2b (ZeroPadding)	(None, None, None, 1 0)	res3a_branch2a_relu[0][0]
res3a_branch2b (Conv2D)	(None, None, None, 1 147456)	padding3a_branch2b[0][0]
bn3a_branch2b (BatchNormalization)	(None, None, None, 1 512)	res3a_branch2b[0][0]

res3a_branch2b_relu (Activation)	(None, None, None, 1 0	bn3a_bran
ch2b[0][0]		
res3a_branch2c (Conv2D)	(None, None, None, 5 65536	res3a_bra
nch2b_relu[0][0]		
res3a_branch1 (Conv2D)	(None, None, None, 5 131072	res2c_rel
u[0][0]		
bn3a_branch2c (BatchNormalizati	(None, None, None, 5 2048	res3a_bra
nch2c[0][0]		
bn3a_branch1 (BatchNormalizatio	(None, None, None, 5 2048	res3a_bra
nch1[0][0]		
res3a (Add)	(None, None, None, 5 0	bn3a_bran
ch2c[0][0]		bn3a_bran
ch1[0][0]		
res3a_relu (Activation)	(None, None, None, 5 0	res3a[0]
[0]		
res3b_branch2a (Conv2D)	(None, None, None, 1 65536	res3a_rel
u[0][0]		
bn3b_branch2a (BatchNormalizati	(None, None, None, 1 512	res3b_bra
nch2a[0][0]		
res3b_branch2a_relu (Activation)	(None, None, None, 1 0	bn3b_bran
ch2a[0][0]		
padding3b_branch2b (ZeroPadding	(None, None, None, 1 0	res3b_bra
nch2a_relu[0][0]		
res3b_branch2b (Conv2D)	(None, None, None, 1 147456	padding3b
_branch2b[0][0]		
bn3b_branch2b (BatchNormalizati	(None, None, None, 1 512	res3b_bra
nch2b[0][0]		
res3b_branch2b_relu (Activation)	(None, None, None, 1 0	bn3b_bran
ch2b[0][0]		
res3b_branch2c (Conv2D)	(None, None, None, 5 65536	res3b_bra

nch2b_relu[0][0]

bn3b_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 5 2048	res3b_bra
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res3b (Add) ch2c[0][0]	(None, None, None, 5 0	bn3b_bran
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u[0][0]

res3a_rel

res3b_relu (Activation) [0]	(None, None, None, 5 0	res3b[0]
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res3c_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3b_rel
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bn3c_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 1 512	res3c_bra
---	--------------------------	-----------

res3c_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 1 0	bn3c_bran
--	------------------------	-----------

padding3c_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 1 0	res3c_bra
--	------------------------	-----------

res3c_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3c
--	-----------------------------	-----------

bn3c_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 1 512	res3c_bra
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res3c_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 1 0	bn3c_bran
--	------------------------	-----------

res3c_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3c_bra
---	----------------------------	-----------

bn3c_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 5 2048	res3c_bra
---	---------------------------	-----------

res3c (Add) ch2c[0][0]	(None, None, None, 5 0	bn3c_bran
---------------------------	------------------------	-----------

u[0][0]

res3b_rel

res3c_relu (Activation) [0]	(None, None, None, 5 0	res3c[0]
--------------------------------	------------------------	----------

res3d_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3c_re1
bn3d_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 1 512	res3d_bra
res3d_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 1 0	bn3d_bran
padding3d_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 1 0	res3d_bra
res3d_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3d
bn3d_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 1 512	res3d_bra
res3d_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 1 0	bn3d_bran
res3d_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3d_bra
bn3d_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 5 2048	res3d_bra
res3d (Add) ch2c[0][0]	(None, None, None, 5 0	bn3d_bran
		res3c_re1
res3d_relu (Activation) [0]	(None, None, None, 5 0	res3d[0]
res4a_branch2a (Conv2D) u[0][0]	(None, None, None, 2 131072	res3d_re1
bn4a_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 2 1024	res4a_bra
res4a_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 2 0	bn4a_bran
padding4a_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 2 0	res4a_bra

nch2a_relu[0][0]

res4a_branch2b (Conv2D)	(None, None, None, 2 589824	padding4a
_branch2b[0][0]		

bn4a_branch2b (BatchNormalizati	(None, None, None, 2 1024	res4a_bra
nch2b[0][0]		

res4a_branch2b_relu (Activation	(None, None, None, 2 0	bn4a_bran
ch2b[0][0]		

res4a_branch2c (Conv2D)	(None, None, None, 1 262144	res4a_bra
nch2b_relu[0][0]		

res4a_branch1 (Conv2D)	(None, None, None, 1 524288	res3d_rel
u[0][0]		

bn4a_branch2c (BatchNormalizati	(None, None, None, 1 4096	res4a_bra
nch2c[0][0]		

bn4a_branch1 (BatchNormalizatio	(None, None, None, 1 4096	res4a_bra
nch1[0][0]		

res4a (Add)	(None, None, None, 1 0	bn4a_bran
ch2c[0][0]		
ch1[0][0]		bn4a_bran

res4a_relu (Activation)	(None, None, None, 1 0	res4a[0]
[0]		

res4b_branch2a (Conv2D)	(None, None, None, 2 262144	res4a_rel
u[0][0]		

bn4b_branch2a (BatchNormalizati	(None, None, None, 2 1024	res4b_bra
nch2a[0][0]		

res4b_branch2a_relu (Activation	(None, None, None, 2 0	bn4b_bran
ch2a[0][0]		

padding4b_branch2b (ZeroPadding	(None, None, None, 2 0	res4b_bra
nch2a_relu[0][0]		

res4b_branch2b (Conv2D)	(None, None, None, 2 589824	padding4b
_branch2b[0][0]		

bn4b_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 2 1024	res4b_bra
res4b_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 2 0	bn4b_bran
res4b_branch2c (Conv2D) nch2b_relu[0][0])	(None, None, None, 1 262144	res4b_bra
bn4b_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 1 4096	res4b_bra
res4b (Add) ch2c[0][0])	(None, None, None, 1 0	bn4b_bran
u[0][0])		res4a_rel
res4b_relu (Activation) [0])	(None, None, None, 1 0	res4b[0]
res4c_branch2a (Conv2D) u[0][0])	(None, None, None, 2 262144	res4b_rel
bn4c_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 2 1024	res4c_bra
res4c_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 2 0	bn4c_bran
padding4c_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 2 0	res4c_bra
res4c_branch2b (Conv2D) _branch2b[0][0])	(None, None, None, 2 589824	padding4c
bn4c_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 2 1024	res4c_bra
res4c_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 2 0	bn4c_bran
res4c_branch2c (Conv2D) nch2b_relu[0][0])	(None, None, None, 1 262144	res4c_bra
bn4c_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 1 4096	res4c_bra

res4c (Add) ch2c[0][0]	(None, None, None, 1 0	bn4c_bran res4b_rel u[0][0]
res4c_relu (Activation) [0]	(None, None, None, 1 0	res4c[0]
res4d_branch2a (Conv2D) u[0][0]	(None, None, None, 2 262144	res4c_rel
bn4d_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 2 1024	res4d_bra
res4d_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 2 0	bn4d_bran
padding4d_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 2 0	res4d_bra
res4d_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 2 589824	padding4d
bn4d_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 2 1024	res4d_bra
res4d_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 2 0	bn4d_bran
res4d_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 1 262144	res4d_bra
bn4d_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 1 4096	res4d_bra
res4d (Add) ch2c[0][0]	(None, None, None, 1 0	bn4d_bran res4c_rel u[0][0]
res4d_relu (Activation) [0]	(None, None, None, 1 0	res4d[0]
res4e_branch2a (Conv2D) u[0][0]	(None, None, None, 2 262144	res4d_rel

bn4e_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 2 1024	res4e_bra
res4e_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 2 0	bn4e_bran
padding4e_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 2 0	res4e_bra
res4e_branch2b (Conv2D) _branch2b[0][0])	(None, None, None, 2 589824	padding4e
bn4e_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 2 1024	res4e_bra
res4e_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 2 0	bn4e_bran
res4e_branch2c (Conv2D) nch2b_relu[0][0])	(None, None, None, 1 262144	res4e_bra
bn4e_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 1 4096	res4e_bra
res4e (Add) ch2c[0][0])	(None, None, None, 1 0	bn4e_bran
u[0][0])		res4d_rel
res4e_relu (Activation) [0])	(None, None, None, 1 0	res4e[0]
res4f_branch2a (Conv2D) u[0][0])	(None, None, None, 2 262144	res4e_rel
bn4f_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 2 1024	res4f_bra
res4f_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 2 0	bn4f_bran
padding4f_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 2 0	res4f_bra
res4f_branch2b (Conv2D) _branch2b[0][0])	(None, None, None, 2 589824	padding4f

bn4f_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 2 1024	res4f_bra
res4f_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 2 0	bn4f_bran
res4f_branch2c (Conv2D) nch2b_relu[0][0])	(None, None, None, 1 262144	res4f_bra
bn4f_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 1 4096	res4f_bra
res4f (Add) ch2c[0][0])	(None, None, None, 1 0	bn4f_bran
u[0][0])		res4e_rel
res4f_relu (Activation) [0])	(None, None, None, 1 0	res4f[0]
res5a_branch2a (Conv2D) u[0][0])	(None, None, None, 5 524288	res4f_rel
bn5a_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 5 2048	res5a_bra
res5a_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 5 0	bn5a_bran
padding5a_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 5 0	res5a_bra
res5a_branch2b (Conv2D) _branch2b[0][0])	(None, None, None, 5 2359296	padding5a
bn5a_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 5 2048	res5a_bra
res5a_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 5 0	bn5a_bran
res5a_branch2c (Conv2D) nch2b_relu[0][0])	(None, None, None, 2 1048576	res5a_bra
res5a_branch1 (Conv2D) u[0][0])	(None, None, None, 2 2097152	res4f_rel

bn5a_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 2 8192	res5a_bra
bn5a_branch1 (BatchNormalizatio nch1[0][0])	(None, None, None, 2 8192	res5a_bra
res5a (Add) ch2c[0][0] ch1[0][0]	(None, None, None, 2 0	bn5a_bran bn5a_bran
res5a_relu (Activation) [0]	(None, None, None, 2 0	res5a[0]
res5b_branch2a (Conv2D) u[0][0]	(None, None, None, 5 1048576	res5a_rel
bn5b_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 5 2048	res5b_bra
res5b_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 5 0	bn5b_bran
padding5b_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 5 0	res5b_bra
res5b_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 5 2359296	padding5b
bn5b_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 5 2048	res5b_bra
res5b_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 5 0	bn5b_bran
res5b_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 1048576	res5b_bra
bn5b_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 2 8192	res5b_bra
res5b (Add) ch2c[0][0] u[0][0]	(None, None, None, 2 0	bn5b_bran res5a_rel

res5b_relu (Activation) [0]	(None, None, None, 2 0	res5b[0]
res5c_branch2a (Conv2D) u[0][0]	(None, None, None, 5 1048576	res5b_rel
bn5c_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 5 2048	res5c_bra
res5c_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 5 0	bn5c_bran
padding5c_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 5 0	res5c_bra
res5c_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 5 2359296	padding5c
bn5c_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 5 2048	res5c_bra
res5c_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 5 0	bn5c_bran
res5c_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 1048576	res5c_bra
bn5c_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 2 8192	res5c_bra
res5c (Add) ch2c[0][0]	(None, None, None, 2 0	bn5c_bran
u[0][0]		res5b_rel
res5c_relu (Activation) [0]	(None, None, None, 2 0	res5c[0]
C5_reduced (Conv2D) u[0][0]	(None, None, None, 2 524544	res5c_rel
P5_upsampled (UpsampleLike) d[0][0]	(None, None, None, 2 0	C5_reduce
u[0][0]		res4f_rel

C4_reduced (Conv2D) u[0][0]	(None, None, None, 2 262400	res4f_re1
P4_merged (Add) led[0][0]	(None, None, None, 2 0	P5_upsamp
d[0][0]		C4_reduce
P4_upsampled (UpsampleLike) [0][0]	(None, None, None, 2 0	P4_merged
u[0][0]		res3d_re1
C3_reduced (Conv2D) u[0][0]	(None, None, None, 2 131328	res3d_re1
P6 (Conv2D) u[0][0]	(None, None, None, 2 4718848	res5c_re1
P3_merged (Add) led[0][0]	(None, None, None, 2 0	P4_upsamp
d[0][0]		C3_reduce
C6_relu (Activation)	(None, None, None, 2 0	P6[0][0]
P3 (Conv2D) [0][0]	(None, None, None, 2 590080	P3_merged
P4 (Conv2D) [0][0]	(None, None, None, 2 590080	P4_merged
P5 (Conv2D) d[0][0]	(None, None, None, 2 590080	C5_reduce
P7 (Conv2D) [0][0]	(None, None, None, 2 590080	C6_relu
regression_submodel (Model)	(None, None, 4) 2443300	P3[0][0] P4[0][0] P5[0][0] P6[0][0] P7[0][0]
classification_submodel (Model)	(None, None, 1) 2381065	P3[0][0] P4[0][0] P5[0][0] P6[0][0] P7[0][0]

regression (Concatenate) n_submodel[1][0]	(None, None, 4)	0	regressio
n_submodel[2][0]			regressio
n_submodel[3][0]			regressio
n_submodel[4][0]			regressio
n_submodel[5][0]			regressio

classification (Concatenate) ation_submodel[1][0]	(None, None, 1)	0	classific
ation_submodel[2][0]			classific
ation_submodel[3][0]			classific
ation_submodel[4][0]			classific
ation_submodel[5][0]			classific

=====
 =====
 Total params: 36,382,957
 Trainable params: 12,821,805
 Non-trainable params: 23,561,152

None
 Epoch 1/25
 2020-03-03 02:55:48.231049: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcudnn.so.7
 2020-03-03 02:55:49.149295: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcublas.so.10
 40/40 [=====] - 15s 372ms/step - loss: 2.3980 - regression_loss: 1.3011 - classification_loss: 1.0969 - val_loss: 2.1145 - val_regression_loss: 0.9702 - val_classification_loss: 1.0423
 Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:05 Time: 0:00:05
 Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
 640 instances of class Brick with average precision: 0.0039
 mAP: 0.0039

Epoch 00001: saving model to ../keras-retinanet/snapshots/resnet50_csv_01.h5
 Epoch 2/25
 40/40 [=====] - 9s 219ms/step - loss: 1.9760 - regression_loss: 1.0016 - classification_loss: 0.9744 - val_loss: 1.7602 - val_regression_loss: 0.8150 - val_classification_loss: 0.7986
 Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
 Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
 640 instances of class Brick with average precision: 0.2090
 mAP: 0.2090

Epoch 00002: saving model to ../keras-retinanet/snapshots/resnet50_csv_02.

h5

Epoch 3/25

40/40 [=====] - 9s 220ms/step - loss: 1.6423 - regression_loss: 0.9023 - classification_loss: 0.7401 - val_loss: 1.4425 - val_regression_loss: 0.7417 - val_classification_loss: 0.5319

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.6674

mAP: 0.6674

Epoch 00003: saving model to ../keras-retinanet/snapshots/resnet50_csv_03.h5

Epoch 4/25

40/40 [=====] - 9s 217ms/step - loss: 1.2515 - regression_loss: 0.8028 - classification_loss: 0.4487 - val_loss: 1.1148 - val_regression_loss: 0.6864 - val_classification_loss: 0.2996

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.6443

mAP: 0.6443

Epoch 00004: saving model to ../keras-retinanet/snapshots/resnet50_csv_04.h5

Epoch 5/25

40/40 [=====] - 9s 221ms/step - loss: 1.0229 - regression_loss: 0.7555 - classification_loss: 0.2674 - val_loss: 0.9569 - val_regression_loss: 0.6546 - val_classification_loss: 0.2190

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.8506

mAP: 0.8506

Epoch 00005: saving model to ../keras-retinanet/snapshots/resnet50_csv_05.h5

Epoch 6/25

40/40 [=====] - 9s 219ms/step - loss: 0.9239 - regression_loss: 0.7244 - classification_loss: 0.1995 - val_loss: 0.8798 - val_regression_loss: 0.6261 - val_classification_loss: 0.1697

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9185

mAP: 0.9185

Epoch 00006: saving model to ../keras-retinanet/snapshots/resnet50_csv_06.h5

Epoch 7/25

40/40 [=====] - 9s 220ms/step - loss: 0.8369 - regression_loss: 0.6804 - classification_loss: 0.1565 - val_loss: 0.8222 - val_regression_loss: 0.6071 - val_classification_loss: 0.1327

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9363
mAP: 0.9363

Epoch 00007: saving model to ../keras-retinanet/snapshots/resnet50_csv_07.h5

Epoch 8/25

40/40 [=====] - 9s 221ms/step - loss: 0.7914 - regression_loss: 0.6630 - classification_loss: 0.1284 - val_loss: 0.7789 - val_regression_loss: 0.5779 - val_classification_loss: 0.1074

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9323
mAP: 0.9323

Epoch 00008: saving model to ../keras-retinanet/snapshots/resnet50_csv_08.h5

Epoch 9/25

40/40 [=====] - 9s 222ms/step - loss: 0.7644 - regression_loss: 0.6583 - classification_loss: 0.1061 - val_loss: 0.7384 - val_regression_loss: 0.5589 - val_classification_loss: 0.0889

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9509
mAP: 0.9509

Epoch 00009: saving model to ../keras-retinanet/snapshots/resnet50_csv_09.h5

Epoch 10/25

40/40 [=====] - 9s 222ms/step - loss: 0.7070 - regression_loss: 0.6146 - classification_loss: 0.0925 - val_loss: 0.7150 - val_regression_loss: 0.5459 - val_classification_loss: 0.0740

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9548
mAP: 0.9548

Epoch 00010: saving model to ../keras-retinanet/snapshots/resnet50_csv_10.h5

Epoch 11/25

40/40 [=====] - 9s 223ms/step - loss: 0.6510 - regression_loss: 0.5752 - classification_loss: 0.0758 - val_loss: 0.6869 - val_regression_loss: 0.5282 - val_classification_loss: 0.0638

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9602
mAP: 0.9602

Epoch 00011: saving model to ../keras-retinanet/snapshots/resnet50_csv_11.h5

Epoch 12/25

40/40 [=====] - 9s 223ms/step - loss: 0.6502 - regression_loss: 0.5799 - classification_loss: 0.0703 - val_loss: 0.6732 - val_regression_loss: 0.5164 - val_classification_loss: 0.0570

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9708
mAP: 0.9708

Epoch 00012: saving model to ../keras-retinanet/snapshots/resnet50_csv_12.h5

Epoch 13/25

40/40 [=====] - 9s 224ms/step - loss: 0.6340 - regression_loss: 0.5727 - classification_loss: 0.0614 - val_loss: 0.6758 - val_regression_loss: 0.5175 - val_classification_loss: 0.0520
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9724
mAP: 0.9724

Epoch 00013: saving model to ../keras-retinanet/snapshots/resnet50_csv_13.h5

Epoch 14/25

40/40 [=====] - 9s 224ms/step - loss: 0.6444 - regression_loss: 0.5876 - classification_loss: 0.0568 - val_loss: 0.6537 - val_regression_loss: 0.5042 - val_classification_loss: 0.0477
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9744
mAP: 0.9744

Epoch 00014: saving model to ../keras-retinanet/snapshots/resnet50_csv_14.h5

Epoch 15/25

40/40 [=====] - 9s 228ms/step - loss: 0.6013 - regression_loss: 0.5513 - classification_loss: 0.0500 - val_loss: 0.6391 - val_regression_loss: 0.4902 - val_classification_loss: 0.0437
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9810
mAP: 0.9810

Epoch 00015: saving model to ../keras-retinanet/snapshots/resnet50_csv_15.h5

Epoch 16/25

40/40 [=====] - 9s 224ms/step - loss: 0.5857 - regression_loss: 0.5390 - classification_loss: 0.0467 - val_loss: 0.6376 - val_regression_loss: 0.4871 - val_classification_loss: 0.0410
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9694
mAP: 0.9694

Epoch 00016: saving model to ../keras-retinanet/snapshots/resnet50_csv_16.h5

Epoch 17/25

40/40 [=====] - 9s 224ms/step - loss: 0.5777 - regression_loss: 0.5352 - classification_loss: 0.0425 - val_loss: 0.6265 - val_regression_loss: 0.4823 - val_classification_loss: 0.0378
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9795
mAP: 0.9795

Epoch 00017: saving model to ../keras-retinanet/snapshots/resnet50_csv_17.h5

Epoch 18/25

40/40 [=====] - 9s 225ms/step - loss: 0.5316 - regression_loss: 0.4902 - classification_loss: 0.0413 - val_loss: 0.6092 - val_regression_loss: 0.4725 - val_classification_loss: 0.0363
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9822
mAP: 0.9822

Epoch 00018: saving model to ../keras-retinanet/snapshots/resnet50_csv_18.h5

Epoch 19/25

40/40 [=====] - 9s 226ms/step - loss: 0.5695 - regression_loss: 0.5316 - classification_loss: 0.0378 - val_loss: 0.6129 - val_regression_loss: 0.4744 - val_classification_loss: 0.0339
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9809
mAP: 0.9809

Epoch 00019: saving model to ../keras-retinanet/snapshots/resnet50_csv_19.h5

Epoch 20/25

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02ss: 0.4937 - classification_loss: 0.0346
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9832
mAP: 0.9832

Epoch 00020: saving model to ../keras-retinanet/snapshots/resnet50_csv_20.h5

Epoch 21/25

40/40 [=====] - 9s 224ms/step - loss: 0.5299 - regression_loss: 0.4969 - classification_loss: 0.0330 - val_loss: 0.6093 - val_regression_loss: 0.4607 - val_classification_loss: 0.0316
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9848
mAP: 0.9848

Epoch 00021: saving model to ../keras-retinanet/snapshots/resnet50_csv_21.h5

h5

Epoch 22/25

40/40 [=====] - 9s 225ms/step - loss: 0.5314 - regression_loss: 0.5006 - classification_loss: 0.0307 - val_loss: 0.5996 - val_regression_loss: 0.4578 - val_classification_loss: 0.0307

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9859

mAP: 0.9859

Epoch 00022: saving model to ../keras-retinanet/snapshots/resnet50_csv_22.h5

Epoch 23/25

40/40 [=====] - 9s 224ms/step - loss: 0.5237 - regression_loss: 0.4935 - classification_loss: 0.0302 - val_loss: 0.5968 - val_regression_loss: 0.4576 - val_classification_loss: 0.0295

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9893

mAP: 0.9893

Epoch 00023: saving model to ../keras-retinanet/snapshots/resnet50_csv_23.h5

Epoch 24/25

40/40 [=====] - 9s 225ms/step - loss: 0.4993 - regression_loss: 0.4712 - classification_loss: 0.0280 - val_loss: 0.5931 - val_regression_loss: 0.4504 - val_classification_loss: 0.0280

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9874

mAP: 0.9874

Epoch 00024: saving model to ../keras-retinanet/snapshots/resnet50_csv_24.h5

Epoch 25/25

40/40 [=====] - 9s 225ms/step - loss: 0.5055 - regression_loss: 0.4793 - classification_loss: 0.0263 - val_loss: 0.5815 - val_regression_loss: 0.4428 - val_classification_loss: 0.0268

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9898

mAP: 0.9898

Epoch 00025: saving model to ../keras-retinanet/snapshots/resnet50_csv_25.h5

[2.3979743838310243, 1.976007702946663, 1.6423406273126602, 1.2515111058950423, 1.0229133144021034, 0.9238914206624032, 0.8369041934609414, 0.7914491653442383, 0.7644127398729325, 0.707029177993536, 0.65097676217556, 0.6501977130770683, 0.6340355649590492, 0.6444300942122936, 0.6012726128101349, 0.585662579536438, 0.5776935018599033, 0.5315693996846675, 0.5694740489125252, 0.5307817198336124, 0.5298919335007668, 0.5313627429306507, 0.5237378045916558, 0.49926464781165125, 0.5055439837276936]

[2.114528179168701, 1.7602005004882812, 1.4424914121627808, 1.114795684814

4531, 0.9568963646888733, 0.8798388242721558, 0.8222388625144958, 0.778909
2659950256, 0.738417387008667, 0.7149962186813354, 0.686911404132843, 0.67
31758117675781, 0.6758071780204773, 0.6537424921989441, 0.639111995697021
5, 0.63759446144104, 0.6265404224395752, 0.6091660261154175, 0.61288231611
25183, 0.6068788170814514, 0.6092689633369446, 0.5995933413505554, 0.59676
46837234497, 0.5930567383766174, 0.5815327167510986]

In [12]:

```
!python ../keras-retinanet/keras_retinanet/bin/train.py --steps 40 --epochs 50 --snapsh  
ot-path ../keras-retinanet/snapshots \N  
--snapshot ../keras-retinanet/snapshots/resnet50_csv_25.h5 \  
--initial-epoch 25 \  
--no-resize --batch-size 4 \  
--compute-val-loss\  
csv train_set_03-03.csv classes.csv \  
--val-annotations val_set_03-03.csv
```

Using TensorFlow backend.

2020-03-03 03:46:29.249513: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libnvinfer.so.6

2020-03-03 03:46:29.251085: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libnvinfer_plugin.so.6

Loading model, this may take a second...

2020-03-03 03:46:30.154925: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcuda.so.1

2020-03-03 03:46:30.180683: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 03:46:30.181783: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1555] Found device 0 with properties:

pciBusID: 0000:00:05.0 name: Quadro P5000 computeCapability: 6.1

coreClock: 1.7335GHz coreCount: 20 deviceMemorySize: 15.90GiB deviceMemoryBandwidth: 269.00GiB/s

2020-03-03 03:46:30.181829: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcudart.so.10.1

2020-03-03 03:46:30.181889: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcublas.so.10

2020-03-03 03:46:30.183738: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcufft.so.10

2020-03-03 03:46:30.184044: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcurand.so.10

2020-03-03 03:46:30.185893: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcusolver.so.10

2020-03-03 03:46:30.186914: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcusparsesolver.so.10

2020-03-03 03:46:30.186958: I tensorflow/stream_executor/platform/default/dso_loader.cc:44] Successfully opened dynamic library libcudnn.so.7

2020-03-03 03:46:30.187066: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 03:46:30.188136: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 03:46:30.189033: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1697] Adding visible gpu devices: 0

2020-03-03 03:46:30.189459: I tensorflow/core/platform/cpu_feature_guard.cc:142] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2 FMA

2020-03-03 03:46:30.195375: I tensorflow/core/platform/profile_utils/cpu_utils.cc:94] CPU Frequency: 2600000000 Hz

2020-03-03 03:46:30.195949: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x456bd10 initialized for platform Host (this does not guarantee that XLA will be used). Devices:

2020-03-03 03:46:30.195972: I tensorflow/compiler/xla/service/service.cc:176] StreamExecutor device (0): Host, Default Version

2020-03-03 03:46:30.281003: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 03:46:30.281898: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x452ad10 initialized for platform CUDA (this does not guarantee that XLA will be used). Devices:

2020-03-03 03:46:30.281920: I tensorflow/compiler/xla/service/service.cc:176] StreamExecutor device (0): Quadro P5000, Compute Capability 6.1

2020-03-03 03:46:30.282085: I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:981] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node zero

2020-03-03 03:46:30.282917: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1182] Successfully initialized the GPU device.

```

e.cc:1555] Found device 0 with properties:
pciBusID: 0000:00:05.0 name: Quadro P5000 computeCapability: 6.1
coreClock: 1.7335GHz coreCount: 20 deviceMemorySize: 15.90GiB deviceMemory
Bandwidth: 269.00GiB/s
2020-03-03 03:46:30.282966: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcudart.so.10.1
2020-03-03 03:46:30.282985: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcublas.so.10
2020-03-03 03:46:30.283020: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcufft.so.10
2020-03-03 03:46:30.283042: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcurand.so.10
2020-03-03 03:46:30.283055: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcusolver.so.10
2020-03-03 03:46:30.283076: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcusparses.so.10
2020-03-03 03:46:30.283087: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcudnn.so.7
2020-03-03 03:46:30.283133: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 03:46:30.283943: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 03:46:30.284687: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1697] Adding visible gpu devices: 0
2020-03-03 03:46:30.284721: I tensorflow/stream_executor/platform/default/
dso_loader.cc:44] Successfully opened dynamic library libcudart.so.10.1
2020-03-03 03:46:30.521722: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1096] Device interconnect StreamExecutor with strength 1 edge matrix:
2020-03-03 03:46:30.521780: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1102]      0
2020-03-03 03:46:30.521788: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1115] 0:  N
2020-03-03 03:46:30.522029: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 03:46:30.522840: I tensorflow/stream_executor/cuda/cuda_gpu_exe
cutor.cc:981] successful NUMA node read from SysFS had negative value (-
1), but there must be at least one NUMA node, so returning NUMA node zero
2020-03-03 03:46:30.523592: I tensorflow/core/common_runtime/gpu/gpu_devic
e.cc:1241] Created TensorFlow device (/job:localhost/replica:0/task:0/devi
ce:GPU:0 with 15309 MB memory) -> physical GPU (device: 0, name: Quadro P5
000, pci bus id: 0000:00:05.0, compute capability: 6.1)
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -22.627417, -11.313708,  22.627417,  11.313708],
       [-28.50876 , -14.25438 ,  28.50876 ,  14.25438 ],
       [-35.918785, -17.959393,  35.918785,  17.959393],
       [-16.      , -16.      ,  16.      ,  16.      ],
       [-20.158737, -20.158737,  20.158737,  20.158737],
       [-25.398417, -25.398417,  25.398417,  25.398417],
       [-11.313708, -22.627417,  11.313708,  22.627417],
       [-14.25438 , -28.50876 ,  14.25438 ,  28.50876 ],
       [-17.959393, -35.918785,  17.959393,  35.918785]], dtype=float32)>
anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -45.254833, -22.627417,  45.254833,  22.627417],
       [-57.01752 , -28.50876 ,  57.01752 ,  28.50876 ],
       [-71.83757 , -35.918785,  71.83757 ,  35.918785],
       [-32.      , -32.      ,  32.      ,  32.      ],
       [-40.317474, -40.317474,  40.317474,  40.317474],

```

```

[-50.796833, -50.796833, 50.796833, 50.796833],
[-22.627417, -45.254833, 22.627417, 45.254833],
[-28.50876 , -57.01752 , 28.50876 , 57.01752 ],
[-35.918785, -71.83757 , 35.918785, 71.83757 ]], dtype=float32)>
anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -90.50967 , -45.254833,  90.50967 ,  45.254833],
       [-114.03504 , -57.01752 , 114.03504 ,  57.01752 ],
       [-143.67514 , -71.83757 , 143.67514 ,  71.83757 ],
       [ -64.      , -64.      ,  64.      ,  64.      ],
       [ -80.63495 , -80.63495 ,  80.63495 ,  80.63495 ],
       [-101.593666, -101.593666, 101.593666, 101.593666],
       [ -45.254833, -90.50967 ,  45.254833,  90.50967 ],
       [ -57.01752 , -114.03504 ,  57.01752 , 114.03504 ],
       [ -71.83757 , -143.67514 ,  71.83757 , 143.67514 ]],
      dtype=float32)> anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -181.01933, -90.50967, 181.01933,  90.50967],
       [-228.07008, -114.03504, 228.07008, 114.03504],
       [-287.35028, -143.67514, 287.35028, 143.67514],
       [-128.      , -128.      , 128.      , 128.      ],
       [-161.2699 , -161.2699 , 161.2699 , 161.2699 ],
       [-203.18733, -203.18733, 203.18733, 203.18733],
       [ -90.50967, -181.01933,  90.50967, 181.01933],
       [-114.03504, -228.07008, 114.03504, 228.07008],
       [-143.67514, -287.35028, 143.67514, 287.35028]], dtype=float32)>
anchors
tracking <tf.Variable 'Variable:0' shape=(9, 4) dtype=float32, numpy=
array([[ -362.03867, -181.01933, 362.03867, 181.01933],
       [-456.14017, -228.07008, 456.14017, 228.07008],
       [-574.70056, -287.35028, 574.70056, 287.35028],
       [-256.      , -256.      , 256.      , 256.      ],
       [-322.5398 , -322.5398 , 322.5398 , 322.5398 ],
       [-406.37466, -406.37466, 406.37466, 406.37466],
       [-181.01933, -362.03867, 181.01933, 362.03867],
       [-228.07008, -456.14017, 228.07008, 456.14017],
       [-287.35028, -574.70056, 287.35028, 574.70056]], dtype=float32)>
anchors
Model: "retinanet"

```

Layer (type)	Output Shape	Param #	Connected to
=====			
input_1 (InputLayer)	(None, None, None, 3 0		
padding_conv1 (ZeroPadding2D)	(None, None, None, 3 0		input_1 [0][0]
conv1 (Conv2D)	(None, None, None, 6 9408		padding_c onv1[0][0]
bn_conv1 (BatchNormalization)	(None, None, None, 6 256		conv1[0] [0]
conv1_relu (Activation)	(None, None, None, 6 0		bn_conv1

[0][0]

pool1 (MaxPooling2D) u[0][0]	(None, None, None, 6 0	conv1_rel
res2a_branch2a (Conv2D) [0]	(None, None, None, 6 4096	pool1[0]
bn2a_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 6 256	res2a_bra
res2a_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 6 0	bn2a_bran
padding2a_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 6 0	res2a_bra
res2a_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 6 36864	padding2a
bn2a_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 6 256	res2a_bra
res2a_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 6 0	bn2a_bran
res2a_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 16384	res2a_bra
res2a_branch1 (Conv2D) [0]	(None, None, None, 2 16384	pool1[0]
bn2a_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 2 1024	res2a_bra
bn2a_branch1 (BatchNormalizatio nch1[0][0]	(None, None, None, 2 1024	res2a_bra
res2a (Add) ch2c[0][0]	(None, None, None, 2 0	bn2a_bran
ch1[0][0]		bn2a_bran
res2a_relu (Activation) [0]	(None, None, None, 2 0	res2a[0]

res2b_branch2a (Conv2D) u[0][0]	(None, None, None, 6 16384	res2a_relu[0][0]
bn2b_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 6 256	res2b_branch2a[0][0]
res2b_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 6 0	bn2b_branch2a[0][0]
padding2b_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 6 0	res2b_branch2a_relu[0][0]
res2b_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 6 36864	padding2b_branch2b[0][0]
bn2b_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 6 256	res2b_branch2b[0][0]
res2b_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 6 0	bn2b_branch2b[0][0]
res2b_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 16384	res2b_branch2b_relu[0][0]
bn2b_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 2 1024	res2b_branch2c[0][0]
res2b (Add) ch2c[0][0]	(None, None, None, 2 0	bn2b_branch2c[0][0]
u[0][0]		res2a_relu[0][0]
res2b_relu (Activation) [0]	(None, None, None, 2 0	res2b[0]
res2c_branch2a (Conv2D) u[0][0]	(None, None, None, 6 16384	res2b_relu[0][0]
bn2c_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 6 256	res2c_branch2a[0][0]
res2c_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 6 0	bn2c_branch2a[0][0]
padding2c_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 6 0	res2c_branch2a_relu[0][0]

res2c_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 6 36864	padding2c
bn2c_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 6 256	res2c_bra
res2c_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 6 0	bn2c_bran
res2c_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 16384	res2c_bra
bn2c_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 2 1024	res2c_bra
res2c (Add) ch2c[0][0]	(None, None, None, 2 0	bn2c_bran
		res2b_rel
u[0][0]		
res2c_relu (Activation) [0]	(None, None, None, 2 0	res2c[0]
res3a_branch2a (Conv2D) u[0][0]	(None, None, None, 1 32768	res2c_rel
bn3a_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 1 512	res3a_bra
res3a_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 1 0	bn3a_bran
padding3a_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 1 0	res3a_bra
res3a_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3a
bn3a_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 1 512	res3a_bra
res3a_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 1 0	bn3a_bran
res3a_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3a_bra

res3a_branch1 (Conv2D) u[0][0]	(None, None, None, 5 131072	res2c_relu[0]
bn3a_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 5 2048	res3a_branch2c[0][0]
bn3a_branch1 (BatchNormalizatio nch1[0][0]	(None, None, None, 5 2048	res3a_branch1[0][0]
res3a (Add) ch2c[0][0]	(None, None, None, 5 0	bn3a_branch2c[0][0]
ch1[0][0]		bn3a_branch1[0][0]
res3a_relu (Activation) [0]	(None, None, None, 5 0	res3a[0]
res3b_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3a_relu[0]
bn3b_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 1 512	res3b_branch2a[0][0]
res3b_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 1 0	bn3b_branch2a[0][0]
padding3b_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 1 0	res3b_branch2a_relu[0][0]
res3b_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3b_branch2a_relu[0][0]
bn3b_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 1 512	res3b_branch2b[0][0]
res3b_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 1 0	bn3b_branch2b[0][0]
res3b_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3b_branch2b_relu[0][0]
bn3b_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 5 2048	res3b_branch2c[0][0]
res3b (Add)	(None, None, None, 5 0	bn3b_branch2c[0][0]

ch2c[0][0]		res3a_re1
u[0][0]		
res3b_relu (Activation) [0]	(None, None, None, 5 0	res3b[0]
res3c_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3b_re1
bn3c_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 1 512	res3c_bra
res3c_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 1 0	bn3c_bran
padding3c_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 1 0	res3c_bra
res3c_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3c
bn3c_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 1 512	res3c_bra
res3c_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 1 0	bn3c_bran
res3c_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3c_bra
bn3c_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 5 2048	res3c_bra
res3c (Add) ch2c[0][0]	(None, None, None, 5 0	bn3c_bran
u[0][0]		res3b_re1
res3c_relu (Activation) [0]	(None, None, None, 5 0	res3c[0]
res3d_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3c_re1
bn3d_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 1 512	res3d_bra

res3d_branch2a_relu (Activation)	(None, None, None, 1 0)	bn3d_branch2a[0][0]
padding3d_branch2b (ZeroPadding)	(None, None, None, 1 0)	res3d_branch2a_relu[0][0]
res3d_branch2b (Conv2D)	(None, None, None, 1 147456)	padding3d_branch2b[0][0]
bn3d_branch2b (BatchNormalization)	(None, None, None, 1 512)	res3d_branch2b[0][0]
res3d_branch2b_relu (Activation)	(None, None, None, 1 0)	bn3d_branch2b[0][0]
res3d_branch2c (Conv2D)	(None, None, None, 5 65536)	res3d_branch2b_relu[0][0]
bn3d_branch2c (BatchNormalization)	(None, None, None, 5 2048)	res3d_branch2c[0][0]
res3d (Add)	(None, None, None, 5 0)	bn3d_branch2c[0][0]
res3d_relu (Activation)	(None, None, None, 5 0)	res3c_relu[0][0]
res4a_branch2a (Conv2D)	(None, None, None, 2 131072)	res3d_relu[0]
bn4a_branch2a (BatchNormalization)	(None, None, None, 2 1024)	res4a_branch2a[0][0]
res4a_branch2a_relu (Activation)	(None, None, None, 2 0)	bn4a_branch2a[0][0]
padding4a_branch2b (ZeroPadding)	(None, None, None, 2 0)	res4a_branch2a_relu[0][0]
res4a_branch2b (Conv2D)	(None, None, None, 2 589824)	padding4a_branch2b[0][0]
bn4a_branch2b (BatchNormalization)	(None, None, None, 2 1024)	res4a_branch2b[0][0]

nch2b[0][0]

res4a_branch2b_relu (Activation)	(None, None, None, 2 0	bn4a_branch2b[0][0]
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res4a_branch2c (Conv2D)	(None, None, None, 1 262144	res4a_branch2c[0][0]
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res4a_branch1 (Conv2D)	(None, None, None, 1 524288	res3d_relu[0][0]
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bn4a_branch2c (BatchNormalization)	(None, None, None, 1 4096	res4a_branch2c[0][0]
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bn4a_branch1 (BatchNormalization)	(None, None, None, 1 4096	res4a_branch1[0][0]
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res4a (Add)	(None, None, None, 1 0	bn4a_branch2c[0][0]
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ch1[0][0]		bn4a_branch1[0][0]
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res4a_relu (Activation)	(None, None, None, 1 0	res4a[0]
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res4b_branch2a (Conv2D)	(None, None, None, 2 262144	res4a_relu[0]
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bn4b_branch2a (BatchNormalization)	(None, None, None, 2 1024	res4b_branch2a[0][0]
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res4b_branch2a_relu (Activation)	(None, None, None, 2 0	bn4b_branch2a[0][0]
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padding4b_branch2b (ZeroPadding)	(None, None, None, 2 0	res4b_branch2a_relu[0][0]
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res4b_branch2b (Conv2D)	(None, None, None, 2 589824	padding4b_branch2b[0][0]
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bn4b_branch2b (BatchNormalization)	(None, None, None, 2 1024	res4b_branch2b[0][0]
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res4b_branch2b_relu (Activation)	(None, None, None, 2 0	bn4b_branch2b[0][0]
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res4b_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 1 262144	res4b_bra
bn4b_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 1 4096	res4b_bra
res4b (Add) ch2c[0][0] u[0][0]	(None, None, None, 1 0	bn4b_bran res4a_rel
res4b_relu (Activation) [0]	(None, None, None, 1 0	res4b[0]
res4c_branch2a (Conv2D) u[0][0]	(None, None, None, 2 262144	res4b_rel
bn4c_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 2 1024	res4c_bra
res4c_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 2 0	bn4c_bran
padding4c_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 2 0	res4c_bra
res4c_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 2 589824	padding4c
bn4c_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 2 1024	res4c_bra
res4c_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 2 0	bn4c_bran
res4c_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 1 262144	res4c_bra
bn4c_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 1 4096	res4c_bra
res4c (Add) ch2c[0][0] u[0][0]	(None, None, None, 1 0	bn4c_bran res4b_rel
res4c_relu (Activation)	(None, None, None, 1 0	res4c[0]

[0]

res4d_branch2a (Conv2D) u[0][0]	(None, None, None, 2 262144	res4c_relu[0][0]
bn4d_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 2 1024	res4d_branch2a[0][0]
res4d_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 2 0	bn4d_branch2a[0][0]
padding4d_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 2 0	res4d_branch2a_relu[0][0]
res4d_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 2 589824	padding4d_branch2a_relu[0][0]
bn4d_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 2 1024	res4d_branch2b[0][0]
res4d_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 2 0	bn4d_branch2b[0][0]
res4d_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 1 262144	res4d_branch2b_relu[0][0]
bn4d_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 1 4096	res4d_branch2c[0][0]
res4d (Add) ch2c[0][0]	(None, None, None, 1 0	bn4d_branch2c_relu[0][0]
res4d_relu (Activation) [0]	(None, None, None, 1 0	res4d[0]
res4e_branch2a (Conv2D) u[0][0]	(None, None, None, 2 262144	res4d_relu[0][0]
bn4e_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 2 1024	res4e_branch2a[0][0]
res4e_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 2 0	bn4e_branch2a[0][0]

padding4e_branch2b (ZeroPadding (None, None, None, 2 0 nch2a_relu[0][0])		res4e_bra
res4e_branch2b (Conv2D) (None, None, None, 2 589824 _branch2b[0][0])		padding4e
bn4e_branch2b (BatchNormalizati (None, None, None, 2 1024 nch2b[0][0])		res4e_bra
res4e_branch2b_relu (Activation (None, None, None, 2 0 ch2b[0][0])		bn4e_bran
res4e_branch2c (Conv2D) (None, None, None, 1 262144 nch2b_relu[0][0])		res4e_bra
bn4e_branch2c (BatchNormalizati (None, None, None, 1 4096 nch2c[0][0])		res4e_bra
res4e (Add) (None, None, None, 1 0 ch2c[0][0])		bn4e_bran
res4e_relu (Activation) (None, None, None, 1 0 [0])		res4d_rel
res4f_branch2a (Conv2D) (None, None, None, 2 262144 u[0][0])		res4e_rel
bn4f_branch2a (BatchNormalizati (None, None, None, 2 1024 nch2a[0][0])		res4f_bra
res4f_branch2a_relu (Activation (None, None, None, 2 0 ch2a[0][0])		bn4f_bran
padding4f_branch2b (ZeroPadding (None, None, None, 2 0 nch2a_relu[0][0])		res4f_bra
res4f_branch2b (Conv2D) (None, None, None, 2 589824 _branch2b[0][0])		padding4f
bn4f_branch2b (BatchNormalizati (None, None, None, 2 1024 nch2b[0][0])		res4f_bra
res4f_branch2b_relu (Activation (None, None, None, 2 0 ch2b[0][0])		bn4f_bran

res4f_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 1 262144	res4f_bra
bn4f_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 1 4096	res4f_bra
res4f (Add) ch2c[0][0]	(None, None, None, 1 0	bn4f_bran
u[0][0]		res4e_rel
res4f_relu (Activation) [0]	(None, None, None, 1 0	res4f[0]
res5a_branch2a (Conv2D) u[0][0]	(None, None, None, 5 524288	res4f_rel
bn5a_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 5 2048	res5a_bra
res5a_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 5 0	bn5a_bran
padding5a_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 5 0	res5a_bra
res5a_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 5 2359296	padding5a
bn5a_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 5 2048	res5a_bra
res5a_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 5 0	bn5a_bran
res5a_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 1048576	res5a_bra
res5a_branch1 (Conv2D) u[0][0]	(None, None, None, 2 2097152	res4f_rel
bn5a_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 2 8192	res5a_bra
bn5a_branch1 (BatchNormalizatio nch1[0][0]	(None, None, None, 2 8192	res5a_bra

res5a (Add) ch2c[0][0]	(None, None, None, 2 0	bn5a_bran bn5a_bran
res5a_relu (Activation) [0]	(None, None, None, 2 0	res5a[0]
res5b_branch2a (Conv2D) u[0][0]	(None, None, None, 5 1048576	res5a_rel
bn5b_branch2a (BatchNormalizati nch2a[0][0]	(None, None, None, 5 2048	res5b_bra
res5b_branch2a_relu (Activation ch2a[0][0]	(None, None, None, 5 0	bn5b_bran
padding5b_branch2b (ZeroPadding nch2a_relu[0][0]	(None, None, None, 5 0	res5b_bra
res5b_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 5 2359296	padding5b
bn5b_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 5 2048	res5b_bra
res5b_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 5 0	bn5b_bran
res5b_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 2 1048576	res5b_bra
bn5b_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 2 8192	res5b_bra
res5b (Add) ch2c[0][0]	(None, None, None, 2 0	bn5b_bran res5a_rel
res5b_relu (Activation) [0]	(None, None, None, 2 0	res5b[0]
res5c_branch2a (Conv2D) u[0][0]	(None, None, None, 5 1048576	res5b_rel

bn5c_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 5 2048	res5c_bra
res5c_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 5 0	bn5c_bran
padding5c_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 5 0	res5c_bra
res5c_branch2b (Conv2D) _branch2b[0][0])	(None, None, None, 5 2359296	padding5c
bn5c_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 5 2048	res5c_bra
res5c_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 5 0	bn5c_bran
res5c_branch2c (Conv2D) nch2b_relu[0][0])	(None, None, None, 2 1048576	res5c_bra
bn5c_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 2 8192	res5c_bra
res5c (Add) ch2c[0][0])	(None, None, None, 2 0	bn5c_bran
u[0][0])		res5b_rel
res5c_relu (Activation) [0])	(None, None, None, 2 0	res5c[0]
C5_reduced (Conv2D) u[0][0])	(None, None, None, 2 524544	res5c_rel
P5_upsampled (UpsampleLike) d[0][0])	(None, None, None, 2 0	C5_reduce
u[0][0])		res4f_rel
C4_reduced (Conv2D) u[0][0])	(None, None, None, 2 262400	res4f_rel
P4_merged (Add) led[0][0])	(None, None, None, 2 0	P5_upsamp
d[0][0])		C4_reduce

P4_upsampled (UpsampleLike) [0][0]	(None, None, None, 2 0		P4_merged res3d_rel u[0][0]
C3_reduced (Conv2D) u[0][0]	(None, None, None, 2 131328		res3d_rel
P6 (Conv2D) u[0][0]	(None, None, None, 2 4718848		res5c_rel
P3_merged (Add) led[0][0]	(None, None, None, 2 0		P4_upsamp C3_reduce d[0][0]
C6_relu (Activation)	(None, None, None, 2 0		P6[0][0]
P3 (Conv2D) [0][0]	(None, None, None, 2 590080		P3_merged
P4 (Conv2D) [0][0]	(None, None, None, 2 590080		P4_merged
P5 (Conv2D) d[0][0]	(None, None, None, 2 590080		C5_reduce
P7 (Conv2D) [0][0]	(None, None, None, 2 590080		C6_relu
regression_submodel (Model)	(None, None, 4)	2443300	P3[0][0] P4[0][0] P5[0][0] P6[0][0] P7[0][0]
classification_submodel (Model)	(None, None, 1)	2381065	P3[0][0] P4[0][0] P5[0][0] P6[0][0] P7[0][0]
regression (Concatenate) n_submodel[1][0]	(None, None, 4)	0	regressio regressio regressio
n_submodel[2][0]			
n_submodel[3][0]			

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n_submodel[4][0]

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n_submodel[5][0]

classification (Concatenate)	(None, None, 1)	0	classific
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640 instances of class Brick with average precision: 0.9906

mAP: 0.9906

Epoch 00028: saving model to ../keras-retinanet/snapshots/resnet50_csv_28.h5

Epoch 29/50

40/40 [=====] - 9s 217ms/step - loss: 0.4766 - regression_loss: 0.4524 - classification_loss: 0.0241 - val_loss: 0.5731 - val_regression_loss: 0.4281 - val_classification_loss: 0.0230

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9902

mAP: 0.9902

Epoch 00029: saving model to ../keras-retinanet/snapshots/resnet50_csv_29.h5

Epoch 30/50

40/40 [=====] - 9s 223ms/step - loss: 0.4625 - regression_loss: 0.4410 - classification_loss: 0.0215 - val_loss: 0.5610 - val_regression_loss: 0.4257 - val_classification_loss: 0.0228

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9885

mAP: 0.9885

Epoch 00030: saving model to ../keras-retinanet/snapshots/resnet50_csv_30.h5

Epoch 31/50

40/40 [=====] - 9s 227ms/step - loss: 0.4726 - regression_loss: 0.4518 - classification_loss: 0.0209 - val_loss: 0.5588 - val_regression_loss: 0.4183 - val_classification_loss: 0.0221

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9913

mAP: 0.9913

Epoch 00031: saving model to ../keras-retinanet/snapshots/resnet50_csv_31.h5

Epoch 32/50

40/40 [=====] - 9s 219ms/step - loss: 0.4630 - regression_loss: 0.4431 - classification_loss: 0.0200 - val_loss: 0.5578 - val_regression_loss: 0.4192 - val_classification_loss: 0.0210

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9867

mAP: 0.9867

Epoch 00032: saving model to ../keras-retinanet/snapshots/resnet50_csv_32.h5

Epoch 00032: ReduceLROnPlateau reducing learning rate to 9.999999747378752e-07.

Epoch 33/50

40/40 [=====] - 10s 242ms/step - loss: 0.4461 - regression_loss: 0.4268 - classification_loss: 0.0193 - val_loss: 0.5548 - val_regression_loss: 0.4157 - val_classification_loss: 0.0210
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9880
mAP: 0.9880

Epoch 00033: saving model to ../keras-retinanet/snapshots/resnet50_csv_33.h5

Epoch 34/50

40/40 [=====] - 9s 219ms/step - loss: 0.4434 - regression_loss: 0.4238 - classification_loss: 0.0197 - val_loss: 0.5541 - val_regression_loss: 0.4142 - val_classification_loss: 0.0209
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9876
mAP: 0.9876

Epoch 00034: saving model to ../keras-retinanet/snapshots/resnet50_csv_34.h5

Epoch 35/50

40/40 [=====] - 9s 222ms/step - loss: 0.4472 - regression_loss: 0.4277 - classification_loss: 0.0195 - val_loss: 0.5542 - val_regression_loss: 0.4139 - val_classification_loss: 0.0207
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9886
mAP: 0.9886

Epoch 00035: saving model to ../keras-retinanet/snapshots/resnet50_csv_35.h5

Epoch 36/50

40/40 [=====] - 9s 222ms/step - loss: 0.4488 - regression_loss: 0.4297 - classification_loss: 0.0191 - val_loss: 0.5536 - val_regression_loss: 0.4133 - val_classification_loss: 0.0206
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00
640 instances of class Brick with average precision: 0.9892
mAP: 0.9892

Epoch 00036: saving model to ../keras-retinanet/snapshots/resnet50_csv_36.h5

Epoch 00036: ReduceLROnPlateau reducing learning rate to 9.99999974752428e-08.

Epoch 37/50

40/40 [=====] - 9s 224ms/step - loss: 0.4465 - regression_loss: 0.4272 - classification_loss: 0.0193 - val_loss: 0.5533 - val_regression_loss: 0.4133 - val_classification_loss: 0.0207
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00037: saving model to ../keras-retinanet/snapshots/resnet50_csv_37.h5

Epoch 38/50

40/40 [=====] - 9s 221ms/step - loss: 0.4608 - regression_loss: 0.4417 - classification_loss: 0.0191 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00038: saving model to ../keras-retinanet/snapshots/resnet50_csv_38.h5

Epoch 00038: ReduceLROnPlateau reducing learning rate to 1.0000000116860975e-08.

Epoch 39/50

40/40 [=====] - 9s 228ms/step - loss: 0.4285 - regression_loss: 0.4096 - classification_loss: 0.0190 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00039: saving model to ../keras-retinanet/snapshots/resnet50_csv_39.h5

Epoch 40/50

40/40 [=====] - 9s 221ms/step - loss: 0.4634 - regression_loss: 0.4449 - classification_loss: 0.0185 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00040: saving model to ../keras-retinanet/snapshots/resnet50_csv_40.h5

Epoch 41/50

40/40 [=====] - 9s 224ms/step - loss: 0.4463 - regression_loss: 0.4270 - classification_loss: 0.0193 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00041: saving model to ../keras-retinanet/snapshots/resnet50_csv_41.h5

h5

Epoch 00041: ReduceLROnPlateau reducing learning rate to 9.999999939225292e-10.

Epoch 42/50

40/40 [=====] - 9s 220ms/step - loss: 0.4361 - regression_loss: 0.4171 - classification_loss: 0.0190 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00042: saving model to ../keras-retinanet/snapshots/resnet50_csv_42.h5

Epoch 43/50

40/40 [=====] - 9s 223ms/step - loss: 0.4680 - regression_loss: 0.4485 - classification_loss: 0.0195 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00043: saving model to ../keras-retinanet/snapshots/resnet50_csv_43.h5

Epoch 00043: ReduceLROnPlateau reducing learning rate to 9.999999717180686e-11.

Epoch 44/50

40/40 [=====] - 9s 220ms/step - loss: 0.4318 - regression_loss: 0.4133 - classification_loss: 0.0185 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00044: saving model to ../keras-retinanet/snapshots/resnet50_csv_44.h5

Epoch 45/50

40/40 [=====] - 9s 220ms/step - loss: 0.4467 - regression_loss: 0.4274 - classification_loss: 0.0192 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00045: saving model to ../keras-retinanet/snapshots/resnet50_csv_45.h5

Epoch 00045: ReduceLROnPlateau reducing learning rate to 9.99999943962493e

-12.

Epoch 46/50

40/40 [=====] - 9s 220ms/step - loss: 0.4584 - regression_loss: 0.4386 - classification_loss: 0.0198 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00046: saving model to ../keras-retinanet/snapshots/resnet50_csv_46.h5

Epoch 47/50

40/40 [=====] - 9s 220ms/step - loss: 0.4389 - regression_loss: 0.4203 - classification_loss: 0.0186 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00047: saving model to ../keras-retinanet/snapshots/resnet50_csv_47.h5

Epoch 00047: ReduceLROnPlateau reducing learning rate to 9.999999092680235e-13.

Epoch 48/50

40/40 [=====] - 9s 220ms/step - loss: 0.4531 - regression_loss: 0.4329 - classification_loss: 0.0202 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00048: saving model to ../keras-retinanet/snapshots/resnet50_csv_48.h5

Epoch 49/50

40/40 [=====] - 9s 221ms/step - loss: 0.4465 - regression_loss: 0.4282 - classification_loss: 0.0184 - val_loss: 0.5531 - val_regression_loss: 0.4132 - val_classification_loss: 0.0207

Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:00:02

Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:00:00

640 instances of class Brick with average precision: 0.9892

mAP: 0.9892

Epoch 00049: saving model to ../keras-retinanet/snapshots/resnet50_csv_49.h5

Epoch 00049: ReduceLROnPlateau reducing learning rate to 9.9999988758398e-14.

Epoch 50/50

40/40 [=====] - 9s 220ms/step - loss: 0.4539 - re

```
gression_loss: 0.4343 - classification_loss: 0.0196 - val_loss: 0.5531 - v
al_regression_loss: 0.4132 - val_classification_loss: 0.0207
Running network: 100% (40 of 40) |#####| Elapsed Time: 0:00:02 Time: 0:
00:02
Parsing annotations: 100% (40 of 40) |###| Elapsed Time: 0:00:00 Time: 0:
00:00
640 instances of class Brick with average precision: 0.9892
mAP: 0.9892
```

```
Epoch 00050: saving model to ../keras-retinanet/snapshots/resnet50_csv_50.
h5
[0.4917926214635372, 0.48028828427195547, 0.4875263400375843, 0.4765531957
149506, 0.4625413931906223, 0.4726445831358433, 0.46304027512669566, 0.446
12648487091067, 0.44344911724328995, 0.44720288291573523, 0.44882843643426
895, 0.44649705961346625, 0.4607990741729736, 0.4285103853791952, 0.463449
16298985483, 0.44632722437381744, 0.43610288873314856, 0.4680471606552601,
0.4318242955952883, 0.4466864176094532, 0.4584286041557789, 0.438897059857
84533, 0.453060369938612, 0.44654217213392255, 0.4539185732603073]
[0.5773240923881531, 0.5773134827613831, 0.5721344351768494, 0.57314807176
58997, 0.5609754323959351, 0.5587805509567261, 0.5577809810638428, 0.55476
11117362976, 0.5541437268257141, 0.5541797280311584, 0.5535520315170288,
0.5532702207565308, 0.5530824661254883, 0.5531097650527954, 0.55309194326
40076, 0.5530785918235779, 0.5530761480331421, 0.5530765056610107, 0.55307
65056610107, 0.5530765056610107, 0.5530765056610107, 0.5530765056610107,
0.5530765056610107, 0.5530765056610107, 0.5530765056610107]
```

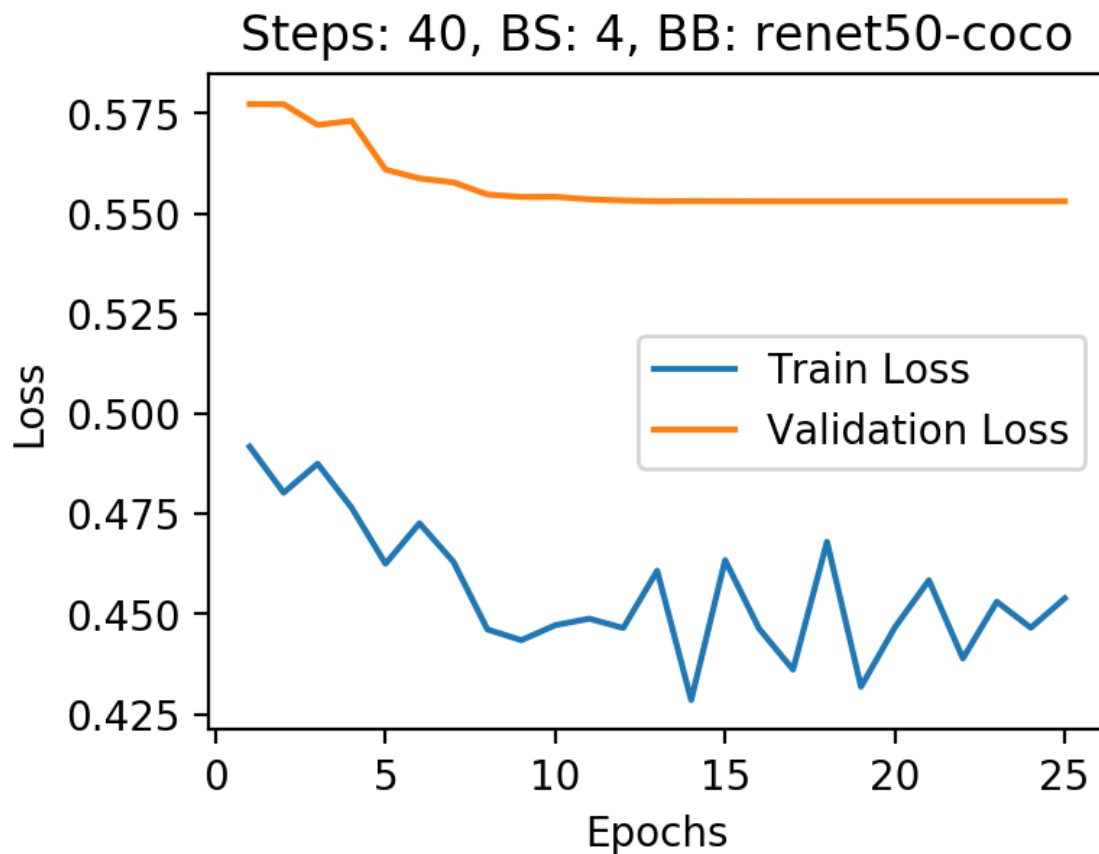
In [13]:

```
loss_data = genfromtxt('val_train_set_03-03_losses.csv', delimiter=',')
loss_data = loss_data.T
print(loss_data)
```

```
[[0.49179262 0.48028828 0.48752634 0.4765532 0.46254139 0.47264458
0.46304028 0.44612648 0.44344912 0.44720288 0.44882844 0.44649706
0.46079907 0.42851039 0.46344916 0.44632722 0.43610289 0.46804716
0.4318243 0.44668642 0.4584286 0.43889706 0.45306037 0.44654217
0.45391857]
[0.57732409 0.57731348 0.57213444 0.57314807 0.56097543 0.55878055
0.55778098 0.55476111 0.55414373 0.55417973 0.55355203 0.55327022
0.55308247 0.55310977 0.55309194 0.55307859 0.55307615 0.55307651
0.55307651 0.55307651 0.55307651 0.55307651 0.55307651 0.55307651
0.55307651]]
```

In [14]:

```
plt.figure(figsize=(4, 3), dpi=200)
plt.plot(range(1, 1 + len(loss_data[0])), loss_data[0])
plt.plot(range(1, 1 + len(loss_data[1])), loss_data[1])
plt.legend(['Train Loss', 'Validation Loss'])
plt.title('Steps: 40, BS: 4, BB: renet50-coco')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.savefig('./val_train_set_03-03_losses.png', bbox_inches='tight')
```



In []: