

# Object Detection

## Using keras-retinanet-0.5.0

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### Load necessary modules

In [1]:

```
# show images inline
%matplotlib inline

# automatically reload modules when they have changed
%load_ext autoreload
%autoreload 2

# import keras
import keras

# import keras_retinanet
from keras_retinanet import models
from keras_retinanet.utils.image import read_image_bgr, preprocess_image, resize_image
from keras_retinanet.utils.visualization import draw_box, draw_caption
from keras_retinanet.utils.colors import label_color

# import miscellaneous modules
import matplotlib.pyplot as plt
import cv2
import os
import numpy as np
import time

# set tf backend to allow memory to grow, instead of claiming everything
import tensorflow as tf

def get_session():
    config = tf.ConfigProto()
    config.gpu_options.allow_growth = True
    return tf.Session(config=config)

# use this environment flag to change which GPU to use
#os.environ["CUDA_VISIBLE_DEVICES"] = "1"

# set the modified tf session as backend in keras
keras.backend.tensorflow_backend.set_session(get_session())
```

Using TensorFlow backend.

### Load RetinaNet model

In [2]:

```
# adjust this to point to your downloaded/trained model
# models can be downloaded here: https://github.com/fizyr/keras-retinanet/releases
# model_path = os.path.join('..', 'snapshots', 'resnet50_coco_best_v2.1.0.h5')

path_image = 'ML/Object_Detection2/image/'
path_restnet = 'ML/Dataset_Tensorflow/'

model_path = os.path.join(path_restnet, 'resnet50_coco_best_v2.1.0.h5')
# Load retinanet model
model = models.load_model(model_path, backbone_name='resnet50')

# if the model is not converted to an inference model, use the line below
# see: https://github.com/fizyr/keras-retinanet#converting-a-training-model-to-inference-model
#model = models.convert_model(model)

print(model.summary())

# Load label to names mapping for visualization purposes
labels_to_names = {0: 'person', 1: 'bicycle', 2: 'car', 3: 'motorcycle', 4: 'airplane',
 5: 'bus', 6: 'train', 7: 'truck', 8: 'boat', 9: 'traffic light', 10: 'fire hydrant', 11: 'stop sign',
 12: 'parking meter', 13: 'bench', 14: 'bird', 15: 'cat', 16: 'dog', 17: 'horse', 18: 'sheep',
 19: 'cow', 20: 'elephant', 21: 'bear', 22: 'zebra', 23: 'giraffe', 24: 'backpack', 25: 'umbrella',
 26: 'handbag', 27: 'tie', 28: 'suitcase', 29: 'frisbee', 30: 'skis', 31: 'snowboard', 32: 'sports ball',
 33: 'kite', 34: 'baseball bat', 35: 'baseball glove', 36: 'skateboard', 37: 'surfboard', 38: 'tennis racket',
 39: 'bottle', 40: 'wine glass', 41: 'cup', 42: 'fork', 43: 'knife', 44: 'spoon', 45: 'bowl', 46: 'banana',
 47: 'apple', 48: 'sandwich', 49: 'orange', 50: 'broccoli', 51: 'carrot', 52: 'hot dog', 53: 'pizza',
 54: 'donut', 55: 'cake', 56: 'chair', 57: 'couch', 58: 'potted plant', 59: 'bed', 60: 'dining table',
 61: 'toilet', 62: 'tv', 63: 'laptop', 64: 'mouse', 65: 'remote', 66: 'keyboard', 67: 'cell phone',
 68: 'microwave', 69: 'oven', 70: 'toaster', 71: 'sink', 72: 'refrigerator', 73: 'book', 74: 'clock',
 75: 'vase', 76: 'scissors', 77: 'teddy bear', 78: 'hair drier', 79: 'toothbrush'}
```

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_conv1[0][0]
=====			
bn_conv1 (BatchNormalization)	(None, None, None, 6 256		conv1[0]
=====			
conv1_relu (Activation)	(None, None, None, 6 0		bn_conv1[0][0]
=====			
pool1 (MaxPooling2D)	(None, None, None, 6 0		conv1_relu[0][0]
=====			
res2a_branch2a (Conv2D)	(None, None, None, 6 4096		pool1[0]
=====			
bn2a_branch2a (BatchNormalization)	(None, None, None, 6 256		res2a_branch2a[0][0]
=====			
res2a_branch2a_relu (Activation)	(None, None, None, 6 0		bn2a_branch2a[0][0]
=====			
padding2a_branch2b (ZeroPadding2D)	(None, None, None, 6 0		res2a_branch2a_relu[0][0]
=====			
res2a_branch2b (Conv2D)	(None, None, None, 6 36864		padding2a_branch2b[0][0]
=====			
bn2a_branch2b (BatchNormalization)	(None, None, None, 6 256		res2a_branch2b[0][0]
=====			
res2a_branch2b_relu (Activation)	(None, None, None, 6 0		bn2a_branch2b[0][0]
=====			
res2a_branch2c (Conv2D)	(None, None, None, 2 16384		res2a_branch2b_relu[0][0]

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_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

res2a\_relu

u[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

bn2c\_branch2a (BatchNormalizati  
nch2a[0][0])

(None, None, None, 6 256

res2c\_bra

res2c\_branch2a\_relu (Activation  
ch2a[0][0])

(None, None, None, 6 0

bn2c\_bran

padding2c\_branch2b (ZeroPadding  
nch2a\_relu[0][0])

(None, None, None, 6 0

res2c\_bra

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

u[0][0]

res2b\_relu

res2c\_relu (Activation)  
[0]

(None, None, None, 2 0

res2c[0]

res3a\_branch2a (Conv2D)  
u[0][0]

(None, None, None, 1 32768

res2c\_relu

bn3a\_branch2a (BatchNormalizati  
nch2a[0][0])

(None, None, None, 1 512

res3a\_bra

res3a_branch2a_relu (Activation)	(None, None, None, 1 0)	bn3a_branch2a_relu[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_branch2b[0][0]
res3a_branch2c (Conv2D)	(None, None, None, 5 65536)	res3a_branch2b_relu[0][0]
res3a_branch1 (Conv2D)	(None, None, None, 5 131072)	res2c_relu[0][0]
bn3a_branch2c (BatchNormalization)	(None, None, None, 5 2048)	res3a_branch2c[0][0]
bn3a_branch1 (BatchNormalization)	(None, None, None, 5 2048)	res3a_branch1[0][0]
res3a (Add)	(None, None, None, 5 0)	bn3a_branch2c[0][0] bn3a_branch1[0][0]
res3a_relu (Activation)	(None, None, None, 5 0)	res3a[0]
res3b_branch2a (Conv2D)	(None, None, None, 1 65536)	res3a_relu[0][0]
bn3b_branch2a (BatchNormalization)	(None, None, None, 1 512)	res3b_branch2a[0][0]
res3b_branch2a_relu (Activation)	(None, None, None, 1 0)	bn3b_branch2a[0][0]
padding3b_branch2b (ZeroPadding)	(None, None, None, 1 0)	res3b_branch2a_relu[0][0]

res3b_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3b
bn3b_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 1 512	res3b_bra
res3b_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 1 0	bn3b_bran
res3b_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3b_bra
bn3b_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 5 2048	res3b_bra
res3b (Add) ch2c[0][0]	(None, None, None, 5 0	bn3b_bran
u[0][0]		res3a_rel
res3b_relu (Activation) [0]	(None, None, None, 5 0	res3b[0]
res3c_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3b_rel
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)	(None, None, None, 5 65536	res3c_bra

nch2b\_relu[0][0]

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bn3c_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 5 2048	res3c_bra
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res3c (Add) ch2c[0][0]	(None, None, None, 5 0	bn3c_bran
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u[0][0]

res3b\_rel

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res3c_relu (Activation) [0]	(None, None, None, 5 0	res3c[0]
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res3d_branch2a (Conv2D) u[0][0]	(None, None, None, 1 65536	res3c_rel
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bn3d_branch2a (BatchNormalizati nch2a[0][0])	(None, None, None, 1 512	res3d_bra
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res3d_branch2a_relu (Activation ch2a[0][0])	(None, None, None, 1 0	bn3d_bran
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padding3d_branch2b (ZeroPadding nch2a_relu[0][0])	(None, None, None, 1 0	res3d_bra
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res3d_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 1 147456	padding3d
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bn3d_branch2b (BatchNormalizati nch2b[0][0])	(None, None, None, 1 512	res3d_bra
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res3d_branch2b_relu (Activation ch2b[0][0])	(None, None, None, 1 0	bn3d_bran
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res3d_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 5 65536	res3d_bra
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bn3d_branch2c (BatchNormalizati nch2c[0][0])	(None, None, None, 5 2048	res3d_bra
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res3d (Add) ch2c[0][0]	(None, None, None, 5 0	bn3d_bran
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u[0][0]

res3c\_rel

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res3d_relu (Activation) [0]	(None, None, None, 5 0	res3d[0]
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res4a_branch2a (Conv2D) u[0][0]	(None, None, None, 2 131072	res3d_rel
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
res4a_branch2b (Conv2D) _branch2b[0][0]	(None, None, None, 2 589824	padding4a
bn4a_branch2b (BatchNormalizati nch2b[0][0]	(None, None, None, 2 1024	res4a_bra
res4a_branch2b_relu (Activation ch2b[0][0]	(None, None, None, 2 0	bn4a_bran
res4a_branch2c (Conv2D) nch2b_relu[0][0]	(None, None, None, 1 262144	res4a_bra
res4a_branch1 (Conv2D) u[0][0]	(None, None, None, 1 524288	res3d_rel
bn4a_branch2c (BatchNormalizati nch2c[0][0]	(None, None, None, 1 4096	res4a_bra
bn4a_branch1 (BatchNormalizatio nch1[0][0]	(None, None, None, 1 4096	res4a_bra
res4a (Add) ch2c[0][0]	(None, None, None, 1 0	bn4a_bran
		bn4a_bran
res4a_relu (Activation) [0]	(None, None, None, 1 0	res4a[0]
res4b_branch2a (Conv2D) u[0][0]	(None, None, None, 2 262144	res4a_rel
bn4b_branch2a (BatchNormalizati	(None, None, None, 2 1024	res4b_bra

nch2a[0][0]

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

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padding4b_branch2b (ZeroPadding (None, None, None, 2 0	res4b_bra
nch2a_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 (BatchNormalizati (None, None, None, 2 1024	res4b_bra
nch2b[0][0]	

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res4b_branch2b_relu (Activation (None, None, None, 2 0	bn4b_bran
ch2b[0][0]	

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res4b_branch2c (Conv2D)	(None, None, None, 1 262144	res4b_bra
nch2b_relu[0][0]		

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bn4b_branch2c (BatchNormalizati (None, None, None, 1 4096	res4b_bra
nch2c[0][0]	

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res4b (Add)	(None, None, None, 1 0	bn4b_bran
ch2c[0][0]		
u[0][0]		res4a_rel

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res4b_relu (Activation)	(None, None, None, 1 0	res4b[0]
[0]		

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res4c_branch2a (Conv2D)	(None, None, None, 2 262144	res4b_rel
u[0][0]		

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bn4c_branch2a (BatchNormalizati (None, None, None, 2 1024	res4c_bra
nch2a[0][0]	

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res4c_branch2a_relu (Activation (None, None, None, 2 0	bn4c_bran
ch2a[0][0]	

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padding4c_branch2b (ZeroPadding (None, None, None, 2 0	res4c_bra
nch2a_relu[0][0]	

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res4c_branch2b (Conv2D)	(None, None, None, 2 589824	padding4c
_branch2b[0][0]		

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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
u[0][0])		res4b_rel
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 res4d_rel u[0][0]
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])	(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
u[0][0]		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_re1
P5_upsampled (UpsampleLike) d[0][0] u[0][0]	(None, None, None, 2 0	C5_reduce res4f_re1
C4_reduced (Conv2D) u[0][0]	(None, None, None, 2 262400	res4f_re1
P4_merged (Add) led[0][0] d[0][0]	(None, None, None, 2 0	P5_upsamp C4_reduce
P4_upsampled (UpsampleLike) [0][0] u[0][0]	(None, None, None, 2 0	P4_merged 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] d[0][0]	(None, None, None, 2 0	P4_upsamp 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
anchors_0 (Anchors)	(None, None, 4)	0	P3[0][0]
anchors_1 (Anchors)	(None, None, 4)	0	P4[0][0]
anchors_2 (Anchors)	(None, None, 4)	0	P5[0][0]
anchors_3 (Anchors)	(None, None, 4)	0	P6[0][0]
anchors_4 (Anchors)	(None, None, 4)	0	P7[0][0]
regression_submodel (Model)	(None, None, 4)	2443300	P3[0][0] P4[0][0] P5[0][0] P6[0][0] P7[0][0]
anchors (Concatenate) [0][0] [0][0] [0][0] [0][0] [0][0]	(None, None, 4)	0	anchors_0 anchors_1 anchors_2 anchors_3 anchors_4
regression (Concatenate) n_submodel[1][0] n_submodel[2][0] n_submodel[3][0] n_submodel[4][0] n_submodel[5][0]	(None, None, 4)	0	regressio regressio regressio regressio regressio
boxes (RegressBoxes)	(None, None, 4)	0	anchors

[0][0]			regressio
n[0][0]			
classification_submodel (Model) (None, None, 80)			P3[0][0]
			P4[0][0]
			P5[0][0]
			P6[0][0]
			P7[0][0]
clipped_boxes (ClipBoxes) (None, None, 4)			input_1
[0][0]			boxes[0]
[0]			
classification (Concatenate) (None, None, 80)			classific
ation_submodel[1][0]			classific
ation_submodel[2][0]			classific
ation_submodel[3][0]			classific
ation_submodel[4][0]			classific
ation_submodel[5][0]			
filtered_detections (FilterDete [(None, 300, 4), (No 0			clipped_b
oxes[0][0]			classific
ation[0][0]			
=====			
Total params: 38,021,812			
Trainable params: 37,915,572			
Non-trainable params: 106,240			
None			

```
C:\ProgramData\Anaconda3\envs\retinanet\lib\site-packages\keras\engine\sav
ing.py:292: UserWarning: No training configuration found in save file: the
model was *not* compiled. Compile it manually.
  warnings.warn('No training configuration found in save file: ')
```

## Load Image

In [3]:

```
# conda install pillow
from PIL import Image
```

## Run detection

In [13]:

```
def object_detection(detect_image):

    # Detection image
    image = read_image_bgr(detect_image)
    print('Detecting objets in image :....',detect_image)
    # copy to draw on
    draw = image.copy()
    draw = cv2.cvtColor(draw, cv2.COLOR_BGR2RGB)

    # preprocess image for network
    image = preprocess_image(image)
    image, scale = resize_image(image)

    # -- process image -----
    start = time.time()
    boxes, scores, labels = model.predict_on_batch(np.expand_dims(image, axis=0))
    print("processing time: ", time.time() - start)
    # correct for image scale
    boxes /= scale
    #-----
    # visualize detections
    for box, score, label in zip(boxes[0], scores[0], labels[0]):
        # scores are sorted so we can break
        if score < 0.5:
            break

        color = label_color(label)

        b = box.astype(int)
        draw_box(draw, b, color=color)

        caption = "{} {:.3f}".format(labels_to_names[label], score)
        draw_caption(draw, b, caption)

    #-----Plot Image -----
    plt.figure(figsize=(15, 15))
    plt.axis('off')
    plt.imshow(draw)
    plt.show()
```

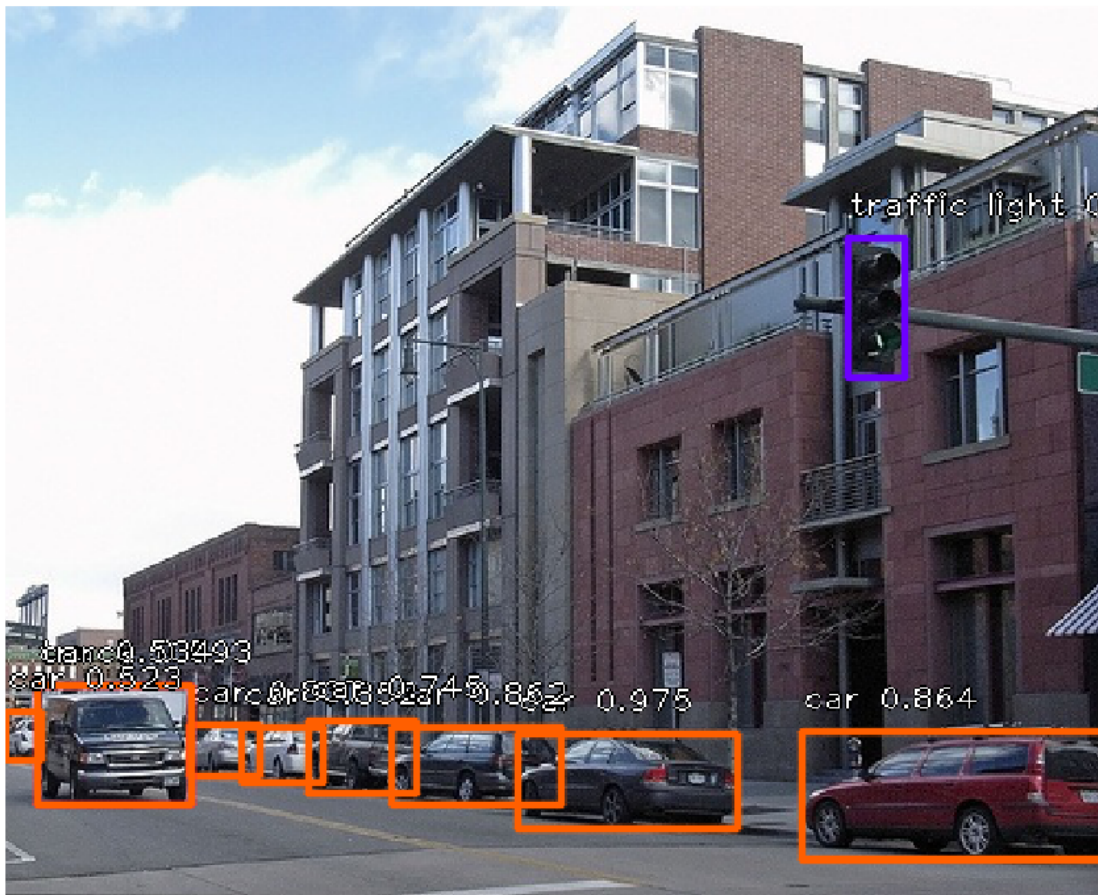
In [14]:

```
# Input Load image
name = input("Enter name file: ")
if len(name) < 1:
    name = input("Error, please re-enter : ")

original_image = path_image + name
input_image = Image.open(original_image)

print("image in : ", original_image)
# print original image
#image.show()
input_image
# --- Object Detection -----
drawx = input_image
object_detection(original_image)
```

Enter name file: 000004.jpg  
 image in : ML/Object\_Detection2/image/000004.jpg  
 Detecting objets in image :.... ML/Object\_Detection2/image/000004.jpg  
 processing time: 52.9046905040741



In [15]:

```
# Input Load image
name = input("Enter name file: ")
if len(name) < 1:
    name = input("Error, please re-enter : ")

original_image = path_image + name
input_image = Image.open(original_image)

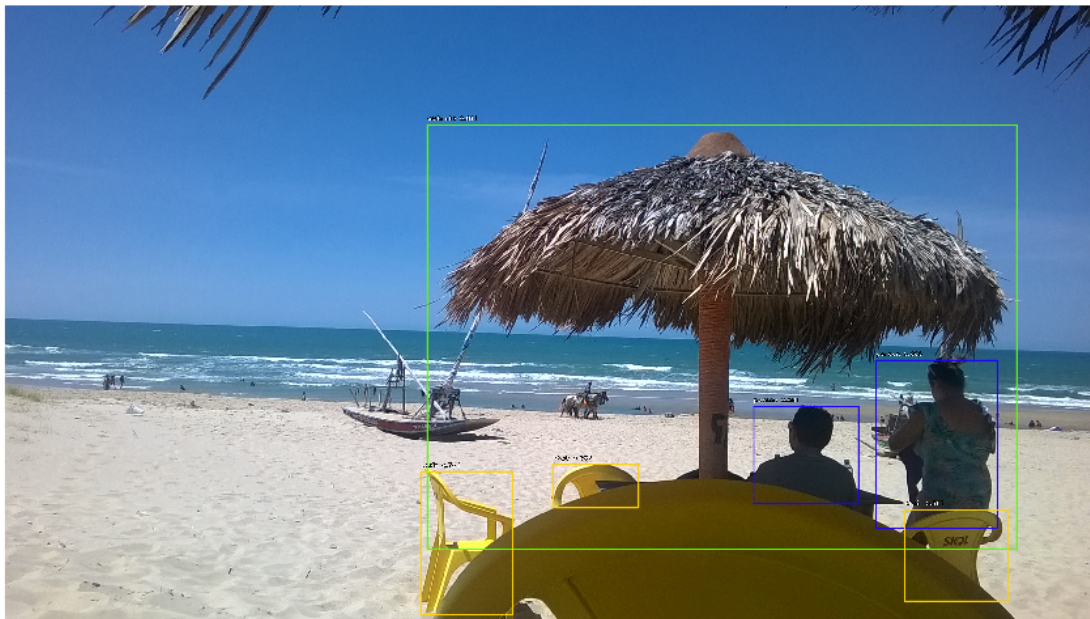
print("image in : ", original_image)
# print original image
#image.show()
input_image
# --- Object Detection -----
drawx = input_image
object_detection(original_image)
```

Enter name file: WP\_20170813\_002.jpg

image in : ML/Object\_Detection2/image/WP\_20170813\_002.jpg

Detecting objets in image :.... ML/Object\_Detection2/image/WP\_20170813\_002.jpg

processing time: 65.09550404548645



In [16]:

```
# Input Load image
name = input("Enter name file: ")
if len(name) < 1:
    name = input("Error, please re-enter : ")

original_image = path_image + name
input_image = Image.open(original_image)

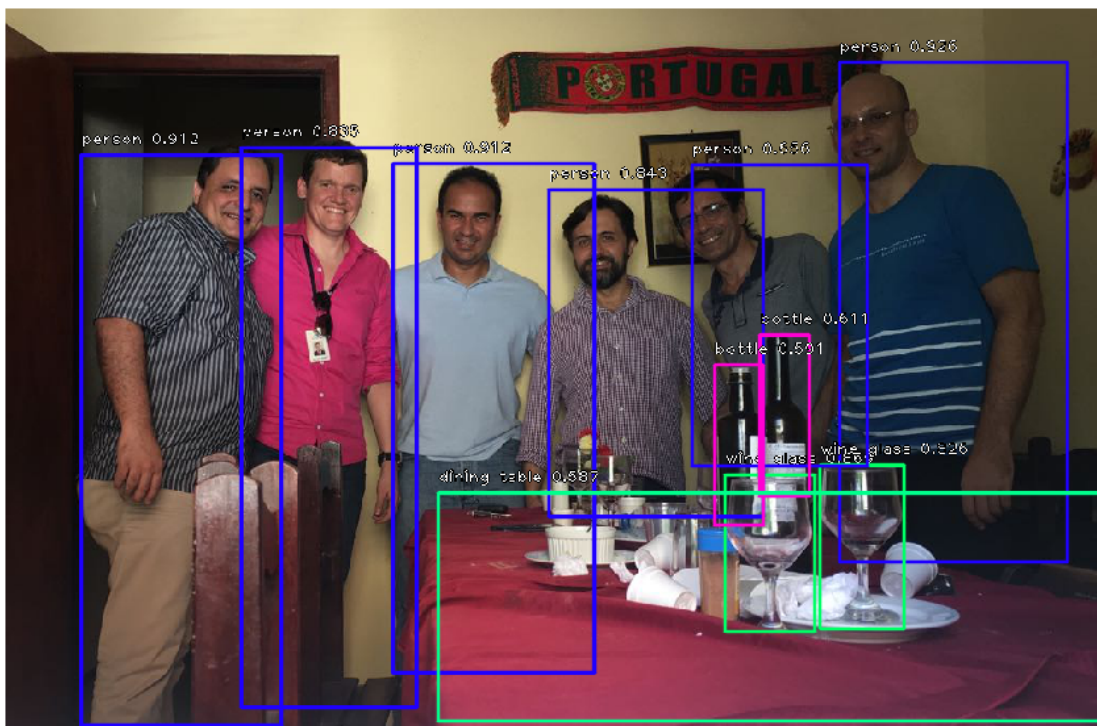
print("image in : ", original_image)
# print original image
#image.show()
input_image
# --- Object Detection -----
drawx = input_image
object_detection(original_image)
```

Enter name file: IMG-20180328-WA0009.jpg

image in : ML/Object\_Detection2/image/IMG-20180328-WA0009.jpg

Detecting objets in image :.... ML/Object\_Detection2/image/IMG-20180328-WA0009.jpg

processing time: 64.01403903961182





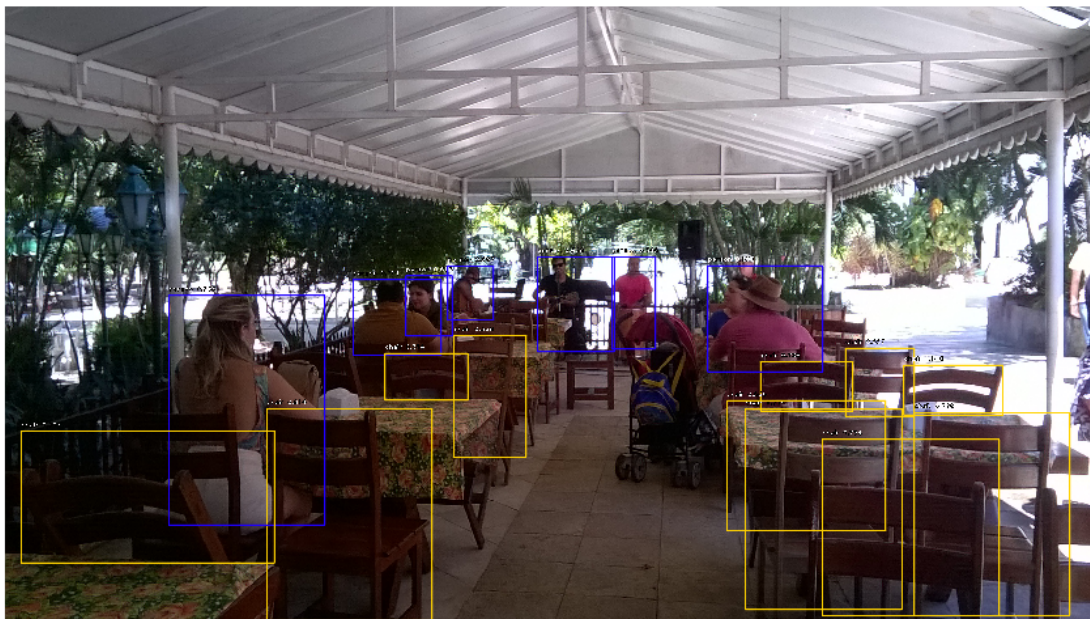
In [17]:

```
# Input Load image
name = input("Enter name file: ")
if len(name) < 1:
    name = input("Error, please re-enter : ")

original_image = path_image + name
input_image = Image.open(original_image)

print("image in : ", original_image)
# print original image
#image.show()
input_image
# --- Object Detection -----
drawx = input_image
object_detection(original_image)
```

Enter name file: WP\_20170826\_12\_55\_07\_Pro.jpg  
image in : ML/Object\_Detection2/image/WP\_20170826\_12\_55\_07\_Pro.jpg  
Detecting objets in image :.... ML/Object\_Detection2/image/WP\_20170826\_12\_55\_07\_Pro.jpg  
processing time: 66.18337178230286



In [18]:

```
# Input Load image
name = input("Enter name file: ")
if len(name) < 1:
    name = input("Error, please re-enter : ")

original_image = path_image + name
input_image = Image.open(original_image)

print("image in : ", original_image)
# print original image
#image.show()
input_image
# --- Object Detection -----
drawx = input_image
object_detection(original_image)
```

Enter name file: WP\_20170813\_11\_41\_01\_Pro.jpg  
image in : ML/Object\_Detection2/image/WP\_20170813\_11\_41\_01\_Pro.jpg  
Detecting objets in image :.... ML/Object\_Detection2/image/WP\_20170813\_11\_41\_01\_Pro.jpg  
processing time: 65.87770533561707



In [ ]: