```
# clone darknet repo
!git clone https://github.com/AlexeyAB/darknet
```

```
Cloning into 'darknet'...
remote: Enumerating objects: 15424, done.
remote: Counting objects: 100% (1/1), done.
remote: Total 15424 (delta 0), reused 1 (delta 0), pack-reused 15423
Receiving objects: 100% (15424/15424), 14.05 MiB | 10.08 MiB/s, done.
Resolving deltas: 100% (10364/10364), done.
```

```
# change makefile to have GPU and OPENCV enabled
%cd darknet
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile
!sed -i 's/GPU=0/GPU=1/' Makefile
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile
```

```
/content/darknet
```

```
# verify CUDA
!/usr/local/cuda/bin/nvcc --version
```

```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2020 NVIDIA Corporation
Built on Mon_Oct_12_20:09:46_PDT_2020
Cuda compilation tools, release 11.1, V11.1.105
Build cuda_11.1.TC455_06.29190527_0
```

```
# make darknet (builds darknet so that you can then use the darknet executable file
!make
```

```
./src/blas_kernels.cu(1130): warning: variable "step" was set but never used

./src/blas_kernels.cu(1736): warning: variable "stage_id" was declared but never referenc

./src/blas_kernels.cu(1086): warning: variable "out_index" was declared but never referen

./src/blas_kernels.cu(1130): warning: variable "step" was set but never used

./src/blas_kernels.cu(1736): warning: variable "stage_id" was declared but never referenc

./src/blas_kernels.cu(1086): warning: variable "out_index" was declared but never referen

./src/blas_kernels.cu(1130): warning: variable "step" was set but never used

./src/blas_kernels.cu(1736): warning: variable "stage_id" was declared but never referenc

./src/blas_kernels.cu(1086): warning: variable "out_index" was declared but never referen

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./src/blas_kernels.cu(1736): warning: variable "stage_id" was declared but never referenc

./src/blas_kernels.cu(1086): warning: variable "out_index" was declared but never referen

./src/blas_kernels.cu(1130): warning: variable "step" was set but never used
```

```
./src/blas_kernels.cu(1736): warning: variable "stage_id" was declared but never referenc

./src/blas_kernels.cu: In function 'void backward_shortcut_multilayer_gpu(int, int, int,
./src/blas_kernels.cu:1130:5: warning: variable 'step' set but not used [-Wunused-but-s
     int step = 0;
         ^~~~
nvcc -gencode arch=compute_35,code=sm_35 -gencode arch=compute_50,code=[sm_50,compute_50]
nvcc warning : The 'compute_35', 'compute_37', 'compute_50', 'sm_35', 'sm_37' and 'sm_50'
nvcc -gencode arch=compute_35,code=sm_35 -gencode arch=compute_50,code=[sm_50,compute_50]
nvcc warning : The 'compute_35', 'compute_37', 'compute_50', 'sm_35', 'sm_37' and 'sm_50'
nvcc -gencode arch=compute_35,code=sm_35 -gencode arch=compute_50,code=[sm_50,compute_50]
nvcc warning : The 'compute_35', 'compute_37', 'compute_50', 'sm_35', 'sm_37' and 'sm_50'
nvcc -gencode arch=compute_35,code=sm_35 -gencode arch=compute_50,code=[sm_50,compute_50]
nvcc warning : The 'compute_35', 'compute_37', 'compute_50', 'sm_35', 'sm_37' and 'sm_50'
./src/network_kernels.cu(379): warning: variable "l" was declared but never referenced

./src/network_kernels.cu(379): warning: variable "l" was declared but never referenced

./src/network_kernels.cu(379): warning: variable "l" was declared but never referenced

./src/network_kernels.cu(379): warning: variable "l" was declared but never referenced

./src/network_kernels.cu(379): warning: variable "l" was declared but never referenced

./src/network_kernels.cu: In function 'float train_network_datum_gpu(network, float*, fl
./src/network_kernels.cu:379:7: warning: variable 'l' set but not used [-Wunused-but-se
        layer l = net.layers[net.n - 1];
       ^
nvcc -gencode arch=compute_35,code=sm_35 -gencode arch=compute_50,code=[sm_50,compute_50]
nvcc warning : The 'compute_35', 'compute_37', 'compute_50', 'sm_35', 'sm_37' and 'sm_50'
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags
```

```
!wget  https://github.com/AlexeyAB/darknet/releases/download/darknet_yolo_v3_optimal/yolov4.weights
```

```
--2022-06-14 10:13:56--  https://github.com/AlexeyAB/darknet/releases/download/darknet_yolo_v
Resolving github.com (github.com)... 20.205.243.166
Connecting to github.com (github.com)|20.205.243.166|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/753889
--2022-06-14 10:13:56--  https://objects.githubusercontent.com/github-production-release-asse
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.110.133, 1
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.110.133|:
HTTP request sent, awaiting response... 200 OK
Length: 257717640 (246M) [application/octet-stream]
Saving to: 'yolov4.weights'

yolov4.weights      100%[===================>] 245.78M   303MB/s    in 0.8s

2022-06-14 10:13:58 (303 MB/s) - 'yolov4.weights' saved [257717640/257717640]
```

```
# define helper functions
def imShow(path):
```

```python
import cv2
import matplotlib.pyplot as plt
%matplotlib inline

image = cv2.imread(path)
height, width = image.shape[:2]
resized_image = cv2.resize(image,(3*width, 3*height), interpolation = cv2.INTER_CUBIC)

fig = plt.gcf()
fig.set_size_inches(18, 10)
plt.axis("off")
plt.imshow(cv2.cvtColor(resized_image, cv2.COLOR_BGR2RGB))
plt.show()
```

```python
# use this to upload files
def upload():
    from google.colab import files
    uploaded = files.upload()
    for name, data in uploaded.items():
        with open(name, 'wb') as f:
            f.write(data)
            print ('saved file', name)
```

```python
# use this to download a file
def download(path):
    from google.colab import files
    files.download(path)
```

```python
# run darknet detection on test images
!./darknet detector test cfg/coco.data cfg/yolov4.cfg yolov4.weights data/person.jpg
```

```
            127 conv    128        1 x 1/ 1      38 x  38 x 256 ->    38 x  38 x 128 0.000 BF
            128 upsample               2x      38 x  38 x 128 ->    76 x  76 x 128
            129 route  54                                     ->    76 x  76 x 256
            130 conv    128        1 x 1/ 1      76 x  76 x 256 ->    76 x  76 x 128 0.379 BF
            131 route  130 128                                 ->    76 x  76 x 256
            132 conv    128        1 x 1/ 1      76 x  76 x 256 ->    76 x  76 x 128 0.379 BF
            133 conv    256        3 x 3/ 1      76 x  76 x 128 ->    76 x  76 x 256 3.407 BF
            134 conv    128        1 x 1/ 1      76 x  76 x 256 ->    76 x  76 x 128 0.379 BF
            135 conv    256        3 x 3/ 1      76 x  76 x 128 ->    76 x  76 x 256 3.407 BF
            136 conv    128        1 x 1/ 1      76 x  76 x 256 ->    76 x  76 x 128 0.379 BF
            137 conv    256        3 x 3/ 1      76 x  76 x 128 ->    76 x  76 x 256 3.407 BF
            138 conv    255        1 x 1/ 1      76 x  76 x 256 ->    76 x  76 x 255 0.754 BF
            139 yolo
            [yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, delta_
            nms_kind: greedynms (1), beta = 0.600000
            140 route  136                                     ->     76 x  76 x 128
            141 conv    256        3 x 3/ 2      76 x  76 x 128 ->    38 x  38 x 256 0.852 BF
            142 route  141 126                                 ->    38 x  38 x 512
            143 conv    256        1 x 1/ 1      38 x  38 x 512 ->    38 x  38 x 256 0.379 BF
            144 conv    512        3 x 3/ 1      38 x  38 x 256 ->    38 x  38 x 512 3.407 BF
            145 conv    256        1 x 1/ 1      38 x  38 x 512 ->    38 x  38 x 256 0.379 BF
            146 conv    512        3 x 3/ 1      38 x  38 x 256 ->    38 x  38 x 512 3.407 BF
            147 conv    256        1 x 1/ 1      38 x  38 x 512 ->    38 x  38 x 256 0.379 BF
            148 conv    512        3 x 3/ 1      38 x  38 x 256 ->    38 x  38 x 512 3.407 BF
            149 conv    255        1 x 1/ 1      38 x  38 x 512 ->    38 x  38 x 255 0.377 BF
            150 yolo
            [yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, delta_
```

```
nms_kind: greedynms (1), beta = 0.600000
 151 route  147                                          ->   38 x   38 x 256
 152 conv    512       3 x 3/ 2    38 x  38 x 256 ->   19 x  19 x 512 0.852 BF
 153 route  152 116                                ->   19 x  19 x1024
 154 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
 155 conv   1024       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x1024 3.407 BF
 156 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
 157 conv   1024       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x1024 3.407 BF
 158 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
 159 conv   1024       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x1024 3.407 BF
 160 conv    255       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 255 0.189 BF
 161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, delta_
nms_kind: greedynms (1), beta = 0.600000
Total BFLOPS 128.459
avg_outputs = 1068395
 Allocate additional workspace_size = 52.43 MB
Loading weights from yolov4.weights...
 seen 64, trained: 32032 K-images (500 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
 Detection layer: 139 - type = 28
 Detection layer: 150 - type = 28
 Detection layer: 161 - type = 28
data/person.jpg: Predicted in 54.570000 milli-seconds.
dog: 99%
person: 100%
horse: 98%
Unable to init server: Could not connect: Connection refused

(predictions:1091): Gtk-WARNING **: 10:14:05.410: cannot open display:
```

imShow('predictions.jpg')

```
%cd ..
upload()
%cd darknet
```

/content

选择文件 crossroads.jpg

- **crossroads.jpg**(image/jpeg) - 109697 bytes, last modified: 2022/6/9 - 100% done

Saving crossroads.jpg to crossroads.jpg

saved file crossroads.jpg

/content/darknet


```
!./darknet detector test cfg/coco.data cfg/yolov4.cfg yolov4.weights ../crossroads.jpg
imShow('predictions.jpg')
```

```
  CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
  CUDNN_HALF=1
 OpenCV version: 3.2.0
 0 : compute_capability = 750, cudnn_half = 1, GPU: Tesla T4
net.optimized_memory = 0
mini_batch = 1, batch = 8, time_steps = 1, train = 0
   layer   filters  size/strd(dil)      input                output
   0 Create CUDA-stream - 0
 Create cudnn-handle 0
conv     32       3 x 3/ 1    608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
   1 conv     64       3 x 3/ 2    608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
   2 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   3 route  1                                 ->  304 x 304 x  64
   4 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   5 conv     32       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
   6 conv     64       3 x 3/ 1    304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
   7 Shortcut Layer: 4,   wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
   8 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   9 route  8 2                               ->  304 x 304 x 128
  10 conv     64       1 x 1/ 1    304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
  11 conv    128       3 x 3/ 2    304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
  12 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
  13 route  11                                ->  152 x 152 x 128
  14 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
  15 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
  16 conv     64       3 x 3/ 1    152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
  17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
  18 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
  19 conv     64       3 x 3/ 1    152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
  20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
  21 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
  22 route  21 12                             ->  152 x 152 x 128
  23 conv    128       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
  24 conv    256       3 x 3/ 2    152 x 152 x 128 ->   76 x  76 x 256 3.407 BF
  25 conv    128       1 x 1/ 1     76 x  76 x 256 ->   76 x  76 x 128 0.379 BF
  26 route  24                                ->   76 x  76 x 256
  27 conv    128       1 x 1/ 1     76 x  76 x 256 ->   76 x  76 x 128 0.379 BF
  28 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  29 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  30 Shortcut Layer: 27,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  31 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  32 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  33 Shortcut Layer: 30,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  34 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  35 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  36 Shortcut Layer: 33,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  37 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  38 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  39 Shortcut Layer: 36,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  40 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  41 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  42 Shortcut Layer: 39,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  43 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  44 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  45 Shortcut Layer: 42,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  46 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  47 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  48 Shortcut Layer: 45,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  49 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  50 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
```

```
 51 Shortcut Layer: 48,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
 52 conv    128       1 x 1/ 1    76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
 53 route  52 25                                 ->   76 x  76 x 256
 54 conv    256       1 x 1/ 1    76 x  76 x 256 ->   76 x  76 x 256 0.757 BF
 55 conv    512       3 x 3/ 2    76 x  76 x 256 ->   38 x  38 x 512 3.407 BF
 56 conv    256       1 x 1/ 1    38 x  38 x 512 ->   38 x  38 x 256 0.379 BF
 57 route  55                                     ->   38 x  38 x 512
 58 conv    256       1 x 1/ 1    38 x  38 x 512 ->   38 x  38 x 256 0.379 BF
 59 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 60 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 61 Shortcut Layer: 58,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 62 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 63 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 64 Shortcut Layer: 61,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 65 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 66 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 67 Shortcut Layer: 64,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 68 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 69 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 70 Shortcut Layer: 67,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 71 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 72 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 73 Shortcut Layer: 70,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 74 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 75 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 76 Shortcut Layer: 73,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 77 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 78 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 79 Shortcut Layer: 76,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 80 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 81 conv    256       3 x 3/ 1    38 x  38 x 256 ->   38 x  38 x 256 1.703 BF
 82 Shortcut Layer: 79,  wt = 0, wn = 0, outputs:  38 x  38 x 256 0.000 BF
 83 conv    256       1 x 1/ 1    38 x  38 x 256 ->   38 x  38 x 256 0.189 BF
 84 route  83 56                                 ->   38 x  38 x 512
 85 conv    512       1 x 1/ 1    38 x  38 x 512 ->   38 x  38 x 512 0.757 BF
 86 conv    1024      3 x 3/ 2    38 x  38 x 512 ->   19 x  19 x1024 3.407 BF
 87 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
 88 route  86                                     ->   19 x  19 x1024
 89 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
 90 conv    512       1 x 1/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.189 BF
 91 conv    512       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x 512 1.703 BF
 92 Shortcut Layer: 89,  wt = 0, wn = 0, outputs:  19 x  19 x 512 0.000 BF
 93 conv    512       1 x 1/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.189 BF
 94 conv    512       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x 512 1.703 BF
 95 Shortcut Layer: 92,  wt = 0, wn = 0, outputs:  19 x  19 x 512 0.000 BF
 96 conv    512       1 x 1/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.189 BF
 97 conv    512       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x 512 1.703 BF
 98 Shortcut Layer: 95,  wt = 0, wn = 0, outputs:  19 x  19 x 512 0.000 BF
 99 conv    512       1 x 1/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.189 BF
100 conv    512       3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x 512 1.703 BF
101 Shortcut Layer: 98,  wt = 0, wn = 0, outputs:  19 x  19 x 512 0.000 BF
102 conv    512       1 x 1/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.189 BF
103 route  102 87                                ->   19 x  19 x1024
104 conv    1024      1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x1024 0.757 BF
105 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
106 conv    1024      3 x 3/ 1    19 x  19 x 512 ->   19 x  19 x1024 3.407 BF
107 conv    512       1 x 1/ 1    19 x  19 x1024 ->   19 x  19 x 512 0.379 BF
108 max               5x 5/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.005 BF
109 route  107                                    ->   19 x  19 x 512
110 max               9x 9/ 1    19 x  19 x 512 ->   19 x  19 x 512 0.015 BF
```

```
 111 route    107                                          ->    19 x   19 x 512
 112 max               13x13/ 1    19 x   19 x 512 ->   19 x   19 x 512 0.031 BF
 113 route    112 110 108 107                              ->   19 x   19 x2048
 114 conv     512      1 x 1/ 1    19 x   19 x2048 ->   19 x   19 x 512 0.757 BF
 115 conv    1024      3 x 3/ 1    19 x   19 x 512 ->   19 x   19 x1024 3.407 BF
 116 conv     512      1 x 1/ 1    19 x   19 x1024 ->   19 x   19 x 512 0.379 BF
 117 conv     256      1 x 1/ 1    19 x   19 x 512 ->   19 x   19 x 256 0.095 BF
 118 upsample                 2x   19 x   19 x 256 ->   38 x   38 x 256
 119 route    85                                          ->   38 x   38 x 512
 120 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 121 route    120 118                                     ->   38 x   38 x 512
 122 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 123 conv     512      3 x 3/ 1    38 x   38 x 256 ->   38 x   38 x 512 3.407 BF
 124 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 125 conv     512      3 x 3/ 1    38 x   38 x 256 ->   38 x   38 x 512 3.407 BF
 126 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 127 conv     128      1 x 1/ 1    38 x   38 x 256 ->   38 x   38 x 128 0.095 BF
 128 upsample                 2x   38 x   38 x 128 ->   76 x   76 x 128
 129 route    54                                          ->   76 x   76 x 256
 130 conv     128      1 x 1/ 1    76 x   76 x 256 ->   76 x   76 x 128 0.379 BF
 131 route    130 128                                     ->   76 x   76 x 256
 132 conv     128      1 x 1/ 1    76 x   76 x 256 ->   76 x   76 x 128 0.379 BF
 133 conv     256      3 x 3/ 1    76 x   76 x 128 ->   76 x   76 x 256 3.407 BF
 134 conv     128      1 x 1/ 1    76 x   76 x 256 ->   76 x   76 x 128 0.379 BF
 135 conv     256      3 x 3/ 1    76 x   76 x 128 ->   76 x   76 x 256 3.407 BF
 136 conv     128      1 x 1/ 1    76 x   76 x 256 ->   76 x   76 x 128 0.379 BF
 137 conv     256      3 x 3/ 1    76 x   76 x 128 ->   76 x   76 x 256 3.407 BF
 138 conv     255      1 x 1/ 1    76 x   76 x 256 ->   76 x   76 x 255 0.754 BF
 139 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, delta_norm
nms_kind: greedynms (1), beta = 0.600000
 140 route    136                                          ->    76 x   76 x 128
 141 conv     256      3 x 3/ 2    76 x   76 x 128 ->   38 x   38 x 256 0.852 BF
 142 route    141 126                                     ->   38 x   38 x 512
 143 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 144 conv     512      3 x 3/ 1    38 x   38 x 256 ->   38 x   38 x 512 3.407 BF
 145 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 146 conv     512      3 x 3/ 1    38 x   38 x 256 ->   38 x   38 x 512 3.407 BF
 147 conv     256      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
 148 conv     512      3 x 3/ 1    38 x   38 x 256 ->   38 x   38 x 512 3.407 BF
 149 conv     255      1 x 1/ 1    38 x   38 x 512 ->   38 x   38 x 255 0.377 BF
 150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, delta_norm
nms_kind: greedynms (1), beta = 0.600000
 151 route    147                                          ->    38 x   38 x 256
 152 conv     512      3 x 3/ 2    38 x   38 x 256 ->   19 x   19 x 512 0.852 BF
 153 route    152 116                                     ->   19 x   19 x1024
 154 conv     512      1 x 1/ 1    19 x   19 x1024 ->   19 x   19 x 512 0.379 BF
 155 conv    1024      3 x 3/ 1    19 x   19 x 512 ->   19 x   19 x1024 3.407 BF
 156 conv     512      1 x 1/ 1    19 x   19 x1024 ->   19 x   19 x 512 0.379 BF
 157 conv    1024      3 x 3/ 1    19 x   19 x 512 ->   19 x   19 x1024 3.407 BF
 158 conv     512      1 x 1/ 1    19 x   19 x1024 ->   19 x   19 x 512 0.379 BF
 159 conv    1024      3 x 3/ 1    19 x   19 x 512 ->   19 x   19 x1024 3.407 BF
 160 conv     255      1 x 1/ 1    19 x   19 x1024 ->   19 x   19 x 255 0.189 BF
 161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, delta_norm
nms_kind: greedynms (1), beta = 0.600000
Total BFLOPS 128.459
avg_outputs = 1068395
 Allocate additional workspace_size = 52.43 MB
```

```
Loading weights from yolov4.weights...
 seen 64, trained: 32032 K-images (500 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
 Detection layer: 139 - type = 28
 Detection layer: 150 - type = 28
 Detection layer: 161 - type = 28
../crossroads.jpg: Predicted in 54.577000 milli-seconds.
car: 60%
car: 100%
car: 99%
car: 43%
car: 72%
car: 89%
traffic light: 28%
car: 79%
traffic light: 76%
person: 89%
person: 91%
car: 34%
traffic light: 42%
traffic light: 31%
car: 45%
Unable to init server: Could not connect: Connection refused
```

(predictions:1112): Gtk-WARNING **: 10:16:41.858: cannot open display:

✓ 8秒   完成时间: 13:16   ● ✕