TrainC2TSR

August 19, 2020

1 TRAINING C2TSR MODEL USING YOLO V3

1.1 Step 0: Check if you are able to connect to GPU runtime and view the configuration available

[1]:
```
# verify CUDA
!/usr/local/cuda/bin/nvcc --version
```

```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2019 NVIDIA Corporation
Built on Sun_Jul_28_19:07:16_PDT_2019
Cuda compilation tools, release 10.1, V10.1.243
```

[2]:
```
# Check if NVIDIA GPU is enabled
!nvidia-smi
```

```
Wed Aug 19 14:29:18 2020
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 450.57       Driver Version: 418.67       CUDA Version: 10.1     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|                               |                      |               MIG M. |
|===============================+======================+======================|
|   0  Tesla T4            Off  | 00000000:00:04.0 Off |                    0 |
| N/A   48C    P8    10W /  70W |      0MiB / 15079MiB |      0%      Default |
|                               |                      |                 ERR! |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                                  |
|  GPU   GI   CI        PID   Type   Process name                  GPU Memory |
|        ID   ID                                                   Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
```

1.2 Step 1: Mount Google Drive

Connect to Google drive from Google Colab VM. I have created trainC2TSR folder on drive and uploaded the .zip file of image dataset there

[3]:
```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Go to this URL in a browser: https://accounts.google.com/o/oauth2/auth?client_id
=947318989803-6bn6qk8qdgf4n4g3pfee6491hc0brc4i.apps.googleusercontent.com&redire
ct_uri=urn%3aietf%3awg%3aoauth%3a2.0%3aoob&scope=email%20https%3a%2f%2fwww.googl
eapis.com%2fauth%2fdocs.test%20https%3a%2f%2fwww.googleapis.com%2fauth%2fdrive%2
0https%3a%2f%2fwww.googleapis.com%2fauth%2fdrive.photos.readonly%20https%3a%2f%2
fwww.googleapis.com%2fauth%2fpeopleapi.readonly&response_type=code

Enter your authorization code:
··········
Mounted at /content/gdrive
```

[4]:
```
# this creates a symbolic link so that now the path /content/gdrive/My\ Drive/␣
 ↪is equal to /mydrive
!ln -s /content/gdrive/My\ Drive/ /mydrive
!ls /mydrive/trainC2TSR/
```

```
generate_train.py  obj.names   test_on_images.py
latest             obj.zip     test_on_images.py.gdoc
obj.data           testImages  yolov3_custom.cfg
```

[5]:
```
# this is where my zip is stored (I created a yolov3 folder where I will get my␣
 ↪required files from)
!ls /mydrive/trainC2TSR
```

```
generate_train.py  obj.names   test_on_images.py
latest             obj.zip     test_on_images.py.gdoc
obj.data           testImages  yolov3_custom.cfg
```

1.2.1 Defining a few utility functions

A few handler functions to interact with Gdrive and local machine

[6]:
```
# define helper functions
def imShow(path):
  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()

# 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)

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

1.3 Step 2: Clone Darknet framework

Clone the darknet framework code from AlexeyAB's famous github repository and adjust the Makefile to enable OPENCV and GPU for darknet

[7]:
```
# clone darknet repo
!git clone https://github.com/AlexeyAB/darknet
```

```
Cloning into 'darknet'...
remote: Enumerating objects: 14263, done.
remote: Total 14263 (delta 0), reused 0 (delta 0), pack-reused 14263
Receiving objects: 100% (14263/14263), 12.63 MiB | 16.47 MiB/s, done.
Resolving deltas: 100% (9774/9774), done.
```

[8]:
```
# 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
```

```
/content/darknet
```

1.4 Step 3: Build Darknet

Darknet framework is written in C. Hence, we use cmake to build the darknet framework in cloud using updated makefile

[9]:
```
# make darknet (build)
!make
```

```
mkdir -p ./obj/
mkdir -p backup
chmod +x *.sh
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config
--cflags opencv4 2> /dev/null || pkg-config --cflags opencv` -DGPU
-I/usr/local/cuda/include/ -DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-
unknown-pragmas -fPIC -Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include
-c ./src/image_opencv.cpp -o obj/image_opencv.o
./src/image_opencv.cpp: In function ‘void

draw_detections_cv_v3(void**, detection*, int, float, char**, image**, int,

int)’:
./src/image_opencv.cpp:926:23: warning: variable
‘rgb’ set but not used [-Wunused-but-set-

variable]
                  float rgb[3];
                        ^~~
./src/image_opencv.cpp: In function ‘void

draw_train_loss(char*, void**, int, float, float, int, int, float, int, char*,

float, int, int, double)’:
./src/image_opencv.cpp:1127:13: warning: this
‘if’ clause does not guard... [-Wmisleading-

indentation]
             if (iteration_old == 0)
             ^~
./src/image_opencv.cpp:1130:10: note: ...this
statement, but the latter is misleadingly indented as if it were guarded by the
‘if’
          if (iteration_old != 0){
          ^~
./src/image_opencv.cpp: In function ‘void

cv_draw_object(image, float*, int, int, int*, float*, int*, int, char**)’:
./src/image_opencv.cpp:1424:14: warning: unused
variable ‘buff’ [-Wunused-variable]
         char buff[100];
              ^~~~
./src/image_opencv.cpp:1400:9: warning: unused
```

```
variable ‘it_tb_res’ [-Wunused-variable]
     int it_tb_res = cv::createTrackbar(it_trackbar_name,
window_name, &it_trackbar_value, 1000);
         ^~~~~~~~~
./src/image_opencv.cpp:1404:9: warning: unused
variable ‘lr_tb_res’ [-Wunused-variable]
     int lr_tb_res = cv::createTrackbar(lr_trackbar_name,
window_name, &lr_trackbar_value, 20);
         ^~~~~~~~~
./src/image_opencv.cpp:1408:9: warning: unused
variable ‘cl_tb_res’ [-Wunused-variable]
     int cl_tb_res = cv::createTrackbar(cl_trackbar_name,
window_name, &cl_trackbar_value, classes-1);
         ^~~~~~~~~
./src/image_opencv.cpp:1411:9: warning: unused
variable ‘bo_tb_res’ [-Wunused-variable]
     int bo_tb_res = cv::createTrackbar(bo_trackbar_name,
window_name, boxonly, 1);
         ^~~~~~~~~
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config
--cflags opencv4 2> /dev/null || pkg-config --cflags opencv` -DGPU
-I/usr/local/cuda/include/ -DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-
unknown-pragmas -fPIC -Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include
-c ./src/http_stream.cpp -o obj/http_stream.o
In file included from ./src/http_stream.cpp:580:0:
./src/httplib.h:129:0: warning: "INVALID_SOCKET"
redefined
 #define INVALID_SOCKET (-1)

./src/http_stream.cpp:73:0: note: this is the
location of the previous definition
 #define INVALID_SOCKET -1

./src/http_stream.cpp: In member function ‘bool

JSON_sender::write(const char*)’:
./src/http_stream.cpp:249:21: warning: unused
variable ‘n’ [-Wunused-variable]
                int n = _write(client, outputbuf, outlen);
                    ^
./src/http_stream.cpp: In member function ‘bool

MJPG_sender::write(const cv::Mat&)’:
./src/http_stream.cpp:507:113: warning: format
‘%zu’ expects argument of type ‘size_t’, but
argument 3 has type ‘int’ [-Wformat=]
                sprintf(head, "--mjpegstream\r\nContent-Type:
image/jpeg\r\nContent-Length: %zu\r\n\r\n", outlen);
```

```
                                    ^
./src/http_stream.cpp: In function ‘void
set_track_id(detection*, int, float, float, float, int, int, int)’:
./src/http_stream.cpp:845:27: warning: comparison
between signed and unsigned integer expressions [-Wsign-
compare]
         for (int i = 0; i < v.size(); ++i) {
                         ~~~~~~~~~~~~
./src/http_stream.cpp:853:33: warning: comparison
between signed and unsigned integer expressions [-Wsign-
compare]
     for (int old_id = 0; old_id < old_dets.size(); ++old_id) {
                          ~~~~~~~~~~~~~~~~~~~~~~~
./src/http_stream.cpp:873:31: warning: comparison
between signed and unsigned integer expressions [-Wsign-
compare]
     for (int index = 0; index < new_dets_num*old_dets.size();
++index) {
                         ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
./src/http_stream.cpp:908:28: warning: comparison
between signed and unsigned integer expressions [-Wsign-
compare]
     if (old_dets_dq.size() > deque_size)
old_dets_dq.pop_front();
         ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/gemm.c -o
obj/gemm.o
./src/gemm.c: In function ‘convolution_2d’:
./src/gemm.c:2038:15: warning: unused variable
‘out_w’ [-Wunused-variable]
     const int out_w = (w + 2 * pad - ksize) / stride + 1;
// output_width=input_width for stride=1 and pad=1
               ^~~~~
./src/gemm.c:2037:15: warning: unused variable
‘out_h’ [-Wunused-variable]
     const int out_h = (h + 2 * pad - ksize) / stride + 1;
// output_height=input_height for stride=1 and pad=1
               ^~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/utils.c -o
```

```
obj/utils.o
./src/utils.c: In function ‘custom_hash’:
./src/utils.c:1040:12: warning: suggest
parentheses around assignment used as truth value
[-Wparentheses]
     while (c = *str++)
            ^
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/dark_cuda.c -o
obj/dark_cuda.o
./src/dark_cuda.c: In function
‘cudnn_check_error_extended’:
./src/dark_cuda.c:224:20: warning: comparison
between ‘cudaError_t {aka enum cudaError}’ and ‘enum

<anonymous>’ [-Wenum-compare]
         if (status != CUDNN_STATUS_SUCCESS)
                    ^~
./src/dark_cuda.c: In function
‘pre_allocate_pinned_memory’:
./src/dark_cuda.c:276:40: warning: format
‘%u’ expects argument of type ‘unsigned int’, but
argument 2 has type ‘long unsigned int’
[-Wformat=]
         printf("pre_allocate: size = %Iu MB, num_of_blocks =
%Iu, block_size = %Iu MB \n",
                                       ~~~
                                       %Ilu
             size / (1024*1024), num_of_blocks, pinned_block_size
/ (1024 * 1024));
             ~~~~~~~~~~~~~~~~~~
./src/dark_cuda.c:276:64: warning: format
‘%u’ expects argument of type ‘unsigned int’, but
argument 3 has type ‘size_t {aka const long unsigned int}’
[-Wformat=]
         printf("pre_allocate: size = %Iu MB, num_of_blocks =
%Iu, block_size = %Iu MB \n",
~~~
                                                              %Ilu
./src/dark_cuda.c:276:82: warning: format
‘%u’ expects argument of type ‘unsigned int’, but
argument 4 has type ‘long unsigned int’
[-Wformat=]
         printf("pre_allocate: size = %Iu MB, num_of_blocks = %Iu, block_size =
%Iu MB \n",
~~~
```

```
%llu
./src/dark_cuda.c:286:37: warning: format
‘%d’ expects argument of type ‘int’, but argument 2
has type ‘size_t {aka const long unsigned int}’
[-Wformat=]
                  printf(" Allocated %d pinned block \n",
pinned_block_size);
                                     ~^
                                     %ld
./src/dark_cuda.c: In function
‘cuda_make_array_pinned_preallocated’:
./src/dark_cuda.c:307:43: warning: format
‘%d’ expects argument of type ‘int’, but argument 2
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
             printf("\n Pinned block_id = %d, filled = %f %%
\n", pinned_block_id, filled);
                                           ~^
                                           %ld
./src/dark_cuda.c:322:64: warning: format
‘%d’ expects argument of type ‘int’, but argument 2
has type ‘long unsigned int’ [-Wformat=]
             printf("Try to allocate new pinned memory, size =
%d MB \n", size / (1024 * 1024));
~^          ~~~~~~~~~~~~~~~~~~~
                                                              %ld
./src/dark_cuda.c:328:63: warning: format
‘%d’ expects argument of type ‘int’, but argument 2
has type ‘long unsigned int’ [-Wformat=]
             printf("Try to allocate new pinned BLOCK, size =
%d MB \n", size / (1024 * 1024));
~^          ~~~~~~~~~~~~~~~~~~~
                                                            %ld
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/convolutional_layer.c -o obj/convolutional_layer.o
./src/convolutional_layer.c: In function
‘forward_convolutional_layer’:
./src/convolutional_layer.c:1337:32: warning:
unused variable ‘t_intput_size’ [-Wunused-
variable]
                        size_t t_intput_size =
binary_transpose_align_input(k, n, state.workspace, &l.t_bit_input, ldb_align,
l.bit_align);
```

```
                                    ^~~~~~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/list.c -o
obj/list.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/image.c -o
obj/image.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/activations.c
-o obj/activations.o
./src/activations.c: In function ‘activate’:
./src/activations.c:79:5: warning: enumeration
value ‘RELU6’ not handled in switch [-Wswitch]
     switch(a){
     ^~~~~~
./src/activations.c:79:5: warning: enumeration
value ‘SWISH’ not handled in switch [-Wswitch]
./src/activations.c:79:5: warning: enumeration
value ‘MISH’ not handled in switch [-Wswitch]
./src/activations.c:79:5: warning: enumeration
value ‘HARD_MISH’ not handled in switch
[-Wswitch]
./src/activations.c:79:5: warning: enumeration
value ‘NORM_CHAN’ not handled in switch
[-Wswitch]
./src/activations.c:79:5: warning: enumeration
value ‘NORM_CHAN_SOFTMAX’ not handled in switch
[-Wswitch]
./src/activations.c:79:5: warning: enumeration
value ‘NORM_CHAN_SOFTMAX_MAXVAL’ not handled in switch
[-Wswitch]
./src/activations.c: In function ‘gradient’:
./src/activations.c:310:5: warning: enumeration
value ‘SWISH’ not handled in switch [-Wswitch]
     switch(a){
     ^~~~~~
./src/activations.c:310:5: warning: enumeration
value ‘MISH’ not handled in switch [-Wswitch]
./src/activations.c:310:5: warning: enumeration
value ‘HARD_MISH’ not handled in switch
[-Wswitch]
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
```

```
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/im2col.c -o
obj/im2col.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/col2im.c -o
obj/col2im.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/blas.c -o
obj/blas.o
./src/blas.c: In function
‘backward_shortcut_multilayer_cpu’:
./src/blas.c:207:21: warning: unused variable
‘out_index’ [-Wunused-variable]
                int out_index = id;
                    ^~~~~~~~~
./src/blas.c: In function ‘find_sim’:
./src/blas.c:597:59: warning: format
‘%d’ expects argument of type ‘int’, but argument 2
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         printf(" Error: find_sim(): sim isn't found: i = %d, j
= %d, z = %d \n", i, j, z);
                                                          ~~
                                                          %ld
./src/blas.c:597:67: warning: format
‘%d’ expects argument of type ‘int’, but argument 3
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         printf(" Error: find_sim(): sim isn't found: i = %d, j =
%d, z = %d \n", i, j, z);
~~
%ld
./src/blas.c:597:75: warning: format
‘%d’ expects argument of type ‘int’, but argument 4
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         printf(" Error: find_sim(): sim isn't found: i = %d, j = %d, z =
%d \n", i, j, z);
~~
%ld
./src/blas.c: In function ‘find_P_constrastive’:
./src/blas.c:611:68: warning: format
‘%d’ expects argument of type ‘int’, but argument 2
```

```
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         printf(" Error: find_P_constrastive(): P isn't found: i =
%d, j = %d, z = %d \n", i, j, z);
~^
%ld
./src/blas.c:611:76: warning: format
‘%d’ expects argument of type ‘int’, but argument 3
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         printf(" Error: find_P_constrastive(): P isn't found: i = %d, j =
%d, z = %d \n", i, j, z);
~^
%ld
./src/blas.c:611:84: warning: format
‘%d’ expects argument of type ‘int’, but argument 4
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         printf(" Error: find_P_constrastive(): P isn't found: i = %d, j = %d, z
= %d \n", i, j, z);
   ~^
   %ld
./src/blas.c: In function ‘P_constrastive_f’:
./src/blas.c:651:79: warning: format
‘%d’ expects argument of type ‘int’, but argument 3
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         fprintf(stderr, " Error: in P_constrastive must be i != l, while i =
%d, l = %d \n", i, l);
~^
%ld
./src/blas.c:651:87: warning: format
‘%d’ expects argument of type ‘int’, but argument 4
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         fprintf(stderr, " Error: in P_constrastive must be i != l, while i =
%d, l = %d \n", i, l);
      ~^
      %ld
./src/blas.c: In function ‘P_constrastive’:
./src/blas.c:780:79: warning: format
‘%d’ expects argument of type ‘int’, but argument 3
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         fprintf(stderr, " Error: in P_constrastive must be i != l, while i =
%d, l = %d \n", i, l);
~^
%ld
```

```
./src/blas.c:780:87: warning: format
‘%d’ expects argument of type ‘int’, but argument 4
has type ‘size_t {aka long unsigned int}’
[-Wformat=]
         fprintf(stderr, " Error: in P_constrastive must be i != l, while i =
%d, l = %d \n", i, l);
      ~~
      %ld
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/crop_layer.c
-o obj/crop_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/dropout_layer.c -o obj/dropout_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/maxpool_layer.c -o obj/maxpool_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/softmax_layer.c -o obj/softmax_layer.o
./src/softmax_layer.c: In function
‘make_contrastive_layer’:
./src/softmax_layer.c:202:101: warning: format
‘%d’ expects argument of type ‘int’, but argument 9
has type ‘size_t {aka const long unsigned int}’
[-Wformat=]
     fprintf(stderr, "contrastive %4d x%4d x%4d x emb_size %4d x batch: %4d
classes = %4d, step = %4d \n", w, h, l.n, l.embedding_size,
batch, l.classes, step);
                    ~~~
                    %4ld
./src/softmax_layer.c: In function
‘forward_contrastive_layer’:
./src/softmax_layer.c:243:27: warning: variable
‘max_truth’ set but not used [-Wunused-but-set-
variable]
                     float max_truth = 0;
                           ^~~~~~~~~
./src/softmax_layer.c:420:71: warning: format
```

```
‘%d’ expects argument of type ‘int’, but argument 2
has type ‘size_t {aka const long unsigned int}’
[-Wformat=]
             printf(" Error: too large number of bboxes: contr_size =
%d > max_contr_size  = %d \n", contr_size, max_contr_size);
~~
%ld
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/data.c -o
obj/data.o
./src/data.c: In function ‘load_data_detection’:
./src/data.c:1294:24: warning: unused variable
‘x’ [-Wunused-variable]
                 int k, x, y;
                        ^
./src/data.c:1090:43: warning: variable
‘r_scale’ set but not used [-Wunused-but-set-
variable]
     float r1 = 0, r2 = 0, r3 = 0, r4 = 0, r_scale = 0;
                                           ^~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/matrix.c -o
obj/matrix.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/network.c -o
obj/network.o
./src/network.c: In function ‘resize_network’:
./src/network.c:615:42: warning: passing argument
1 of ‘cudaHostAlloc’ from incompatible pointer type
[-Wincompatible-pointer-types]
         if (cudaSuccess ==
cudaHostAlloc(&net->input_pinned_cpu, size * sizeof(float),
cudaHostRegisterMapped))
                                          ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/network.c:1:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
```

```
**pHost, size_t size, unsigned int flags);
                                          ^~~~~~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/connected_layer.c -o obj/connected_layer.o
./src/connected_layer.c: In function
‘forward_connected_layer_gpu’:
./src/connected_layer.c:346:11: warning: unused
variable ‘one’ [-Wunused-variable]
     float one = 1;    // alpha[0], beta[0]
           ^~~
./src/connected_layer.c:344:13: warning: unused
variable ‘c’ [-Wunused-variable]
     float * c = l.output_gpu;
             ^
./src/connected_layer.c:343:13: warning: unused
variable ‘b’ [-Wunused-variable]
     float * b = l.weights_gpu;
             ^
./src/connected_layer.c:342:13: warning: unused
variable ‘a’ [-Wunused-variable]
     float * a = state.input;
             ^
./src/connected_layer.c:341:9: warning: unused
variable ‘n’ [-Wunused-variable]
     int n = l.outputs;
         ^
./src/connected_layer.c:340:9: warning: unused
variable ‘k’ [-Wunused-variable]
     int k = l.inputs;
         ^
./src/connected_layer.c:339:9: warning: unused
variable ‘m’ [-Wunused-variable]
     int m = l.batch;
         ^
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/cost_layer.c
-o obj/cost_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/parser.c -o
obj/parser.o
./src/parser.c: In function
```

```
‘parse_network_cfg_custom’:
./src/parser.c:1663:42: warning: passing argument
1 of ‘cudaHostAlloc’ from incompatible pointer type
[-Wincompatible-pointer-types]
         if (cudaSuccess ==
cudaHostAlloc(&net.input_pinned_cpu, size * sizeof(float),
cudaHostRegisterMapped)) net.input_pinned_cpu_flag = 1;
                                                ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/activations.h:3,
                 from ./src/activation_layer.h:4,
                 from ./src/parser.c:6:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~~
./src/parser.c: In function
‘get_classes_multipliers’:
./src/parser.c:427:29: warning: argument 1 range
[18446744071562067968, 18446744073709551615] exceeds maximum object size
9223372036854775807 [-Walloc-size-larger-than=]
         classes_multipliers = (float *)calloc(classes_counters,

sizeof(float));
         ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

~~~~~~~~~~
In file included from ./src/parser.c:3:0:
/usr/include/stdlib.h:541:14: note: in a call to
allocation function ‘calloc’ declared here
 extern void *calloc (size_t __nmemb, size_t __size)
              ^~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/option_list.c
-o obj/option_list.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/darknet.c -o
obj/darknet.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
```

```
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/detection_layer.c -o obj/detection_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/captcha.c -o
obj/captcha.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/route_layer.c
-o obj/route_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/writing.c -o
obj/writing.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/box.c -o
obj/box.o
./src/box.c: In function ‘box_iou_kind’:
./src/box.c:154:5: warning: enumeration value
‘MSE’ not handled in switch [-Wswitch]
     switch(iou_kind) {
     ^~~~~~
./src/box.c: In function ‘diounms_sort’:
./src/box.c:898:27: warning: unused variable
‘beta_prob’ [-Wunused-variable]
                     float beta_prob = pow(dets[j].prob[k], 2)
/ sum_prob;
                           ^~~~~~~~~
./src/box.c:897:27: warning: unused variable
‘alpha_prob’ [-Wunused-variable]
                     float alpha_prob = pow(dets[i].prob[k], 2)
/ sum_prob;
                           ^~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/nightmare.c -o
obj/nightmare.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/normalization_layer.c -o obj/normalization_layer.o
```

```
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/avgpool_layer.c -o obj/avgpool_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/coco.c -o
obj/coco.o
./src/coco.c: In function ‘validate_coco_recall’:
./src/coco.c:248:11: warning: unused variable
‘base’ [-Wunused-variable]
     char *base = "results/comp4_det_test_";
           ^~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/dice.c -o
obj/dice.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/yolo.c -o
obj/yolo.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/detector.c -o
obj/detector.o
./src/detector.c: In function ‘print_cocos’:
./src/detector.c:477:29: warning: format not a
string literal and no format arguments [-Wformat-security]
                fprintf(fp, buff);
                            ^~~~
./src/detector.c: In function ‘eliminate_bdd’:
./src/detector.c:570:21: warning: statement with
no effect [-Wunused-value]
                    for (k; buf[k + n] != '\0'; k++)
                    ^~~
./src/detector.c: In function ‘validate_detector’:
./src/detector.c:691:13: warning: unused variable
‘mkd2’ [-Wunused-variable]
         int mkd2 = make_directory(buff2, 0777);
             ^~~~
./src/detector.c:689:13: warning: unused variable
‘mkd’ [-Wunused-variable]
         int mkd = make_directory(buff, 0777);
```

```
            ^~~
./src/detector.c: In function
‘validate_detector_map’:
./src/detector.c:1322:15: warning: unused
variable ‘class_recall’ [-Wunused-variable]
         float class_recall = (float)tp_for_thresh_per_class[i]
/ ((float)tp_for_thresh_per_class[i] + (float)(truth_classes_count[i] -
tp_for_thresh_per_class[i]));
               ^~~~~~~~~~~~
./src/detector.c:1321:15: warning: unused
variable ‘class_precision’ [-Wunused-variable]
         float class_precision =
(float)tp_for_thresh_per_class[i] / ((float)tp_for_thresh_per_class[i] +
(float)fp_for_thresh_per_class[i]);
               ^~~~~~~~~~~~~~~
./src/detector.c: In function ‘draw_object’:
./src/detector.c:1856:19: warning: unused
variable ‘inv_loss’ [-Wunused-variable]
             float inv_loss = 1.0 / max_val_cmp(0.01,
avg_loss);
                   ^~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/layer.c -o
obj/layer.o
./src/layer.c: In function ‘free_layer_custom’:
./src/layer.c:204:68: warning: suggest
parentheses around ‘&&’ within ‘||’
[-Wparentheses]
     if (l.delta_gpu && (l.optimized_memory < 1 || l.keep_delta_gpu

&& l.optimized_memory < 3)) cuda_free(l.delta_gpu), l.delta_gpu = NULL;
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/compare.c -o
obj/compare.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/classifier.c
-o obj/classifier.o
./src/classifier.c: In function ‘train_classifier’:
./src/classifier.c:146:9: warning: unused
variable ‘count’ [-Wunused-variable]
     int count = 0;
```

```
         ^~~~~
./src/classifier.c: In function
‘predict_classifier’:
./src/classifier.c:855:13: warning: unused
variable ‘time’ [-Wunused-variable]
     clock_t time;
             ^~~~
./src/classifier.c: In function ‘demo_classifier’:
./src/classifier.c:1287:49: warning: unused
variable ‘tval_result’ [-Wunused-variable]
         struct timeval tval_before, tval_after, tval_result;
                                                 ^~~~~~~~~~~
./src/classifier.c:1287:37: warning: unused
variable ‘tval_after’ [-Wunused-variable]
         struct timeval tval_before, tval_after, tval_result;
                                     ^~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/local_layer.c
-o obj/local_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/swag.c -o
obj/swag.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/shortcut_layer.c -o obj/shortcut_layer.o
./src/shortcut_layer.c: In function
‘make_shortcut_layer’:
./src/shortcut_layer.c:55:15: warning: unused
variable ‘scale’ [-Wunused-variable]
         float scale = sqrt(2. / l.nweights);
               ^~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/activation_layer.c -o obj/activation_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/rnn_layer.c -o
obj/rnn_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
```

```
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/gru_layer.c -o
obj/gru_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/rnn.c -o
obj/rnn.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/rnn_vid.c -o
obj/rnn_vid.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/crnn_layer.c
-o obj/crnn_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/demo.c -o
obj/demo.o
./src/demo.c: In function ‘detect_in_thread’:
./src/demo.c:100:16: warning: unused variable
‘prediction’ [-Wunused-variable]
         float *prediction = network_predict(net, X);
                ^~~~~~~~~~
./src/demo.c:98:15: warning: unused variable
‘l’ [-Wunused-variable]
         layer l = net.layers[net.n - 1];
               ^
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/tag.c -o
obj/tag.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/cifar.c -o
obj/cifar.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/go.c -o
obj/go.o
```

```
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/batchnorm_layer.c -o obj/batchnorm_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/art.c -o
obj/art.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/region_layer.c
-o obj/region_layer.o
./src/region_layer.c: In function
‘resize_region_layer’:
./src/region_layer.c:59:9: warning: unused
variable ‘old_h’ [-Wunused-variable]
     int old_h = l->h;
         ^~~~~
./src/region_layer.c:58:9: warning: unused
variable ‘old_w’ [-Wunused-variable]
     int old_w = l->w;
         ^~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/reorg_layer.c
-o obj/reorg_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/reorg_old_layer.c -o obj/reorg_old_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/super.c -o
obj/super.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/voxel.c -o
obj/voxel.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
```

```
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/tree.c -o
obj/tree.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/yolo_layer.c
-o obj/yolo_layer.o
./src/yolo_layer.c: In function ‘make_yolo_layer’:
./src/yolo_layer.c:66:38: warning: passing
argument 1 of ‘cudaHostAlloc’ from incompatible pointer type
[-Wincompatible-pointer-types]
     if (cudaSuccess == cudaHostAlloc(&l.output,
batch*l.outputs*sizeof(float), cudaHostRegisterMapped)) l.output_pinned = 1;
                                      ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/activations.h:3,
                 from ./src/layer.h:4,
                 from ./src/yolo_layer.h:5,
                 from ./src/yolo_layer.c:1:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~
./src/yolo_layer.c:73:38: warning: passing
argument 1 of ‘cudaHostAlloc’ from incompatible pointer type
[-Wincompatible-pointer-types]
     if (cudaSuccess == cudaHostAlloc(&l.delta,
batch*l.outputs*sizeof(float), cudaHostRegisterMapped)) l.delta_pinned = 1;
                                      ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/activations.h:3,
                 from ./src/layer.h:4,
                 from ./src/yolo_layer.h:5,
                 from ./src/yolo_layer.c:1:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~
./src/yolo_layer.c: In function ‘resize_yolo_layer’:
./src/yolo_layer.c:103:42: warning: passing
argument 1 of ‘cudaHostAlloc’ from incompatible pointer type
[-Wincompatible-pointer-types]
```

```
         if (cudaSuccess != cudaHostAlloc(&l->output,
l->batch*l->outputs * sizeof(float), cudaHostRegisterMapped)) {
                                                    ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/activations.h:3,
                 from ./src/layer.h:4,
                 from ./src/yolo_layer.h:5,
                 from ./src/yolo_layer.c:1:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~
./src/yolo_layer.c:112:42: warning: passing
argument 1 of ‘cudaHostAlloc’ from incompatible pointer type
[-Wincompatible-pointer-types]
         if (cudaSuccess != cudaHostAlloc(&l->delta,
l->batch*l->outputs * sizeof(float), cudaHostRegisterMapped)) {
                                                    ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/activations.h:3,
                 from ./src/layer.h:4,
                 from ./src/yolo_layer.h:5,
                 from ./src/yolo_layer.c:1:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~
./src/yolo_layer.c: In function
‘forward_yolo_layer’:
./src/yolo_layer.c:390:25: warning: variable
‘best_match_t’ set but not used [-Wunused-but-set-
variable]
                     int best_match_t = 0;
                         ^~~~~~~~~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/gaussian_yolo_layer.c -o obj/gaussian_yolo_layer.o
./src/gaussian_yolo_layer.c: In function
‘make_gaussian_yolo_layer’:
```

```
./src/gaussian_yolo_layer.c:71:38: warning:
passing argument 1 of ‘cudaHostAlloc’ from incompatible
pointer type [-Wincompatible-pointer-types]
     if (cudaSuccess == cudaHostAlloc(&l.output,
batch*l.outputs * sizeof(float), cudaHostRegisterMapped)) l.output_pinned = 1;
                                      ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/gaussian_yolo_layer.h:5,
                 from ./src/gaussian_yolo_layer.c:7:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~
./src/gaussian_yolo_layer.c:78:38: warning:
passing argument 1 of ‘cudaHostAlloc’ from incompatible
pointer type [-Wincompatible-pointer-types]
     if (cudaSuccess == cudaHostAlloc(&l.delta, batch*l.outputs
* sizeof(float), cudaHostRegisterMapped)) l.delta_pinned = 1;
                                      ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/gaussian_yolo_layer.h:5,
                 from ./src/gaussian_yolo_layer.c:7:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                       ^~~~~~~~~~~~~
./src/gaussian_yolo_layer.c: In function
‘resize_gaussian_yolo_layer’:
./src/gaussian_yolo_layer.c:110:42: warning:
passing argument 1 of ‘cudaHostAlloc’ from incompatible
pointer type [-Wincompatible-pointer-types]
         if (cudaSuccess != cudaHostAlloc(&l->output,
l->batch*l->outputs * sizeof(float), cudaHostRegisterMapped)) {
                                          ^
In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/gaussian_yolo_layer.h:5,
                 from ./src/gaussian_yolo_layer.c:7:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
```

```
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                     ^~~~~~~~~~~~~~

./src/gaussian_yolo_layer.c:119:42: warning:

passing argument 1 of ‘cudaHostAlloc’ from incompatible
pointer type [-Wincompatible-pointer-types]
         if (cudaSuccess != cudaHostAlloc(&l->delta,
l->batch*l->outputs * sizeof(float), cudaHostRegisterMapped)) {
                                          ^

In file included from /usr/local/cuda/include/cuda_runtime.h:96:0,
                 from include/darknet.h:41,
                 from ./src/gaussian_yolo_layer.h:5,
                 from ./src/gaussian_yolo_layer.c:7:
/usr/local/cuda/include/cuda_runtime_api.h:4391:39:
note: expected ‘void **’ but argument is of type
‘float **’
 extern __host__ cudaError_t CUDARTAPI cudaHostAlloc(void
**pHost, size_t size, unsigned int flags);
                                     ^~~~~~~~~~~~~~

gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/upsample_layer.c -o obj/upsample_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/lstm_layer.c
-o obj/lstm_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/conv_lstm_layer.c -o obj/conv_lstm_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c
./src/scale_channels_layer.c -o obj/scale_channels_layer.o
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2>
/dev/null || pkg-config --cflags opencv` -DGPU -I/usr/local/cuda/include/
-DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC
-Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include -c ./src/sam_layer.c -o
obj/sam_layer.o
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
```

```
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/convolutional_kernels.cu -o
obj/convolutional_kernels.o
./src/convolutional_kernels.cu: In function ‘void

backward_convolutional_layer_gpu(convolutional_layer, network_state)’:
./src/convolutional_kernels.cu:853:40: warning:

comparison between signed and unsigned integer expressions
[-Wsign-compare]
                  if (*state.net.max_output16_size < l.nweights)
{
                  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/activation_kernels.cu -o
obj/activation_kernels.o
./src/activation_kernels.cu(263): warning: variable "MISH_THRESHOLD" was
declared but never referenced

./src/activation_kernels.cu(263): warning: variable "MISH_THRESHOLD" was
declared but never referenced

./src/activation_kernels.cu(263): warning: variable "MISH_THRESHOLD" was
declared but never referenced

./src/activation_kernels.cu(263): warning: variable "MISH_THRESHOLD" was
declared but never referenced

./src/activation_kernels.cu(263): warning: variable "MISH_THRESHOLD" was
declared but never referenced

nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
```

```
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/im2col_kernels.cu -o
obj/im2col_kernels.o
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/col2im_kernels.cu -o
obj/col2im_kernels.o
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/blas_kernels.cu -o
obj/blas_kernels.o
./src/blas_kernels.cu(1086): warning: variable "out_index" was declared but
never referenced

./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
referenced

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

./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
referenced

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

./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
referenced

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

./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
referenced

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

./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
referenced

./src/blas_kernels.cu: In function ‘void
backward_shortcut_multilayer_gpu(int, int, int, int*, float**, float*, float*,
float*, float*, int, float*, float**, WEIGHTS_NORMALIZATION_T)’:
./src/blas_kernels.cu:1130:5: warning: variable
‘step’ set but not used [-Wunused-but-set-
variable]
     int step = 0;
     ^~~~
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/crop_layer_kernels.cu -o
obj/crop_layer_kernels.o
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/dropout_layer_kernels.cu -o
obj/dropout_layer_kernels.o
./src/dropout_layer_kernels.cu(140): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(245): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(262): warning: variable "block_prob" was declared
but never referenced
```

```
./src/dropout_layer_kernels.cu(140): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(245): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(262): warning: variable "block_prob" was declared
but never referenced

./src/dropout_layer_kernels.cu(140): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(245): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(262): warning: variable "block_prob" was declared
but never referenced

./src/dropout_layer_kernels.cu(140): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(245): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(262): warning: variable "block_prob" was declared
but never referenced

./src/dropout_layer_kernels.cu(140): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(245): warning: variable "cur_scale" was declared
but never referenced

./src/dropout_layer_kernels.cu(262): warning: variable "block_prob" was declared
but never referenced

nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/maxpool_layer_kernels.cu -o
obj/maxpool_layer_kernels.o
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
```

```
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/network_kernels.cu -o
obj/network_kernels.o
./src/network_kernels.cu(364): warning: variable "l" was declared but never
referenced

./src/network_kernels.cu(364): warning: variable "l" was declared but never
referenced

./src/network_kernels.cu(364): warning: variable "l" was declared but never
referenced

./src/network_kernels.cu(364): warning: variable "l" was declared but never
referenced

./src/network_kernels.cu(364): warning: variable "l" was declared but never
referenced

./src/network_kernels.cu: In function ‘float
train_network_datum_gpu(network, float*, float*)’:
./src/network_kernels.cu:364:7: warning: variable
‘l’ set but not used [-Wunused-but-set-variable]
         layer l = net.layers[net.n - 1];
       ^
nvcc -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=sm_35
-gencode arch=compute_50,code=[sm_50,compute_50] -gencode
arch=compute_52,code=[sm_52,compute_52] -gencode
arch=compute_61,code=[sm_61,compute_61] -Iinclude/ -I3rdparty/stb/include
-DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags
opencv` -DGPU -I/usr/local/cuda/include/ -DCUDNN --compiler-options "-Wall
-Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -Ofast -DOPENCV
-DGPU -DCUDNN -I/usr/local/cudnn/include" -c ./src/avgpool_layer_kernels.cu -o
obj/avgpool_layer_kernels.o
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config
--cflags opencv4 2> /dev/null || pkg-config --cflags opencv` -DGPU
-I/usr/local/cuda/include/ -DCUDNN -Wall -Wfatal-errors -Wno-unused-result -Wno-
unknown-pragmas -fPIC -Ofast -DOPENCV -DGPU -DCUDNN -I/usr/local/cudnn/include
obj/image_opencv.o obj/http_stream.o obj/gemm.o obj/utils.o obj/dark_cuda.o
obj/convolutional_layer.o obj/list.o obj/image.o obj/activations.o obj/im2col.o
obj/col2im.o obj/blas.o obj/crop_layer.o obj/dropout_layer.o obj/maxpool_layer.o
obj/softmax_layer.o obj/data.o obj/matrix.o obj/network.o obj/connected_layer.o
obj/cost_layer.o obj/parser.o obj/option_list.o obj/darknet.o
obj/detection_layer.o obj/captcha.o obj/route_layer.o obj/writing.o obj/box.o
```

```
obj/nightmare.o obj/normalization_layer.o obj/avgpool_layer.o obj/coco.o
obj/dice.o obj/yolo.o obj/detector.o obj/layer.o obj/compare.o obj/classifier.o
obj/local_layer.o obj/swag.o obj/shortcut_layer.o obj/activation_layer.o
obj/rnn_layer.o obj/gru_layer.o obj/rnn.o obj/rnn_vid.o obj/crnn_layer.o
obj/demo.o obj/tag.o obj/cifar.o obj/go.o obj/batchnorm_layer.o obj/art.o
obj/region_layer.o obj/reorg_layer.o obj/reorg_old_layer.o obj/super.o
obj/voxel.o obj/tree.o obj/yolo_layer.o obj/gaussian_yolo_layer.o
obj/upsample_layer.o obj/lstm_layer.o obj/conv_lstm_layer.o
obj/scale_channels_layer.o obj/sam_layer.o obj/convolutional_kernels.o
obj/activation_kernels.o obj/im2col_kernels.o obj/col2im_kernels.o
obj/blas_kernels.o obj/crop_layer_kernels.o obj/dropout_layer_kernels.o
obj/maxpool_layer_kernels.o obj/network_kernels.o obj/avgpool_layer_kernels.o -o
darknet -lm -pthread `pkg-config --libs opencv4 2> /dev/null || pkg-config
--libs opencv` -L/usr/local/cuda/lib64 -lcuda -lcudart -lcublas -lcurand
-L/usr/local/cudnn/lib64 -lcudnn -lstdc++
```

1.5 Step 4: Moving Your Custom Dataset Into Your Cloud VM

The image dataset id ready and arranged in a zip file. So, I can move it into this cloud VM and use it for training. I renamed the .zip file to obj.zip and then uploaded to my google drive. This actividy reduced the time it takes to transfer our dataset into cloud VM.

[ ]:
```
# copy the .zip file into the root directory of cloud VM
#%cd darknet
!cp /mydrive/trainC2TSR/obj.zip ../
```

[ ]:
```
# unzip the zip file and its contents should now be in /darknet/data/obj
!unzip ../obj.zip -d data/obj
```

[ ]:
```
! mv data/obj/FramesBrCr/* data/obj/
! rm -r data/obj/FramesBrCr
```

1.6 Step 5: Adjusting configuration files for YOLO v3

This step involves properly configuring the custom .cfg file, obj.data, obj.names and train.txt file. I used Google text editor to edit the files.

i) Cfg File yolov3 configuration file is set as per Cocoa dataset and detecting 80 different classes. Hence, we need to adjust the configuration. So, copy over the yolov3_custom2.cfg to drive and edit it as per C2TSR model.

I have commented out this line so as to avoid overriding of the file while training the model for multiple times and updating it every time we train our model.

I have updated following parameters.

batch = 64 (this many images+labels are used in the forward pass to compute a gradient and update the weights via backpropagation.)

subdivisions = 16 The batch is subdivided in this many "blocks". The images of a block are ran in parallel on the gpu.

max_batches = 114000 (2000*# of classes)

steps = 91200(80% of max_batches),102000(90% of max_batches) (Adjust the learning rate after 500 and 1000 batches scales=0.1,0.2: After 91200, multiply the LR by 0.1, then after 102000 multiply again by 0.2)

classes = 57

filters = 186 (# of classes + 5) * 3 - # of convolutional kernels in a layer

Following is the explanation about other parameters:

decay: Maybe a term to diminish the weights to avoid having large values. For stability reasons I guess.

momentum: I guess the new gradient is computed by momentum * previous_gradient + (1-momentum) * gradient_of_current_batch. Makes the gradient more stable.

adam: optimizer

burn_in: For the first x batches, slowly increase the learning rate until its final value (your learning_rate parameter value). Use this to decide on a learning rate by monitoring until what value the loss decreases (before it starts to diverge). **policy**: Use the steps and scales parameters below to adjust the learning rate during training

angle: augment image by rotation up to this angle (in degree) layers

activation: Activation function, relu, leaky relu, etc.

stopbackward: Do backpropagation until this layer only. Put it in the panultimate convolution layer before the first yolo layer to train only the layers behind that, e.g. when using pretrained weights.

random: Put in the yolo layers. If set to 1 do data augmentation by resizing the images to different sizes every few batches. Use to generalize over object sizes. Change random from 1 to 0 to speed up training but slightly reduce accuracy of model. Will also help save memory if you run into any memory issues.

[ ]:
```
# download cfg to google drive and change its name. (I have already configured␣
 ↪it, so to avoid override of the file I have commented out this line)
#!cp cfg/yolov3.cfg /mydrive/trainC2TSR/yolov3_custom2.cfg
```

[10]:
```
# upload the custom .cfg back to cloud VM from Google Drive
#%cd darknet
!cp /mydrive/trainC2TSR/yolov3_custom.cfg ./cfg

# upload the custom .cfg back to cloud VM from local machine (uncomment to use)
#%cd cfg
#upload()
#%cd ..
```

ii) obj.names and obj.data **obj.names** is same exactly as classes.txt which gets created during dataset creation step

obj.data file contains number of classes accordingly as well as a backup location This backup path is where we will save the weights of our model throughout training.

[11]:
```
# upload the obj.names and obj.data files to cloud VM from Google Drive
!cp /mydrive/trainC2TSR/obj.names ./data
!cp /mydrive/trainC2TSR/obj.data  ./data

# upload the obj.names and obj.data files to cloud VM from local machine␣
 ↪(uncomment to use)
#%cd data
#upload()
#%cd ..
```

iii) Generating train.txt The train.txt file which hold the relative paths to all our training images.

[12]:
```
# upload the generate_train.py script to cloud VM from Google Drive
!cp /mydrive/trainC2TSR/generate_train.py ./

# upload the generate_train.py script to cloud VM from local machine (uncomment␣
 ↪to use)
#upload()
```

[ ]:
```
!python generate_train.py
```

[14]:
```
# verify train.txt can be seen in our darknet/data folder
!ls data/
```

```
9k.tree      eagle.jpg    imagenet.labels.list      obj.names          voc.names
coco9k.map   giraffe.jpg  imagenet.shortnames.list  openimages.names
coco.names   goal.txt     labels                    person.jpg
dog.jpg      horses.jpg   obj.data                  scream.jpg
```

1.7 Step 6: Download pre-trained weights for the convolutional layers.

This step downloads the weights for the convolutional layers of the YOLOv3 network. We don't necessarily need to use these weights but by using these weights helps the custom object detector to be way more accurate and not have to train as long.

[ ]:
```
# upload pretrained convolutional layer weights
!wget http://pjreddie.com/media/files/darknet53.conv.74
```

1.8 Step 7: Train Your Custom Object Detector!

Now in this step, we will train our C2TSR traffic signs and signals detector with 57 different classes by running the following command. (dont_show flag stops a chart from popping up since cloud

can't open images on the spot)

```
!./darknet detector train <path to obj.data> <path to custom config> darknet53.conv.74 -dont_sho
```

[ ]:
```
# train your custom detector
!./darknet detector train data/obj.data cfg/yolov3_custom.cfg darknet53.conv.74␣
↪-dont_show
```

Following command shows a chart of your average loss vs. iterations. For your model to be 'accurate' you would aim for a loss under 2.

[ ]:
```
imShow('chart.png')
```

Every 100 iterations a weights file called **yolov3_custom_last.weights** is saved to mydrive/trainC2TSR/backup/ folder (wherever your backup folder is). So, in case of runtime crashes, we can use this last weights and resume training our model

```
!./darknet detector train data/obj.data cfg/yolov3_custom.cfg /mydrive/yolov3/backup/yolov3_cust
```

[ ]:
```
!./darknet detector train data/obj.data cfg/yolov3_custom.cfg /mydrive/
↪trainC2TSR/latest/yolov3_custom_last.weights -dont_show
```

```
 CUDA-version: 10010 (10010), cuDNN: 7.6.5, GPU count: 1
 OpenCV version: 3.2.0
yolov3_custom
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 4, batch = 64, time_steps = 1, train = 1
   layer   filters  size/strd(dil)      input                output
   0 conv     32       3 x 3/ 1    416 x 416 x   3 ->  416 x 416 x  32 0.299 BF
   1 conv     64       3 x 3/ 2    416 x 416 x  32 ->  208 x 208 x  64 1.595 BF
   2 conv     32       1 x 1/ 1    208 x 208 x  64 ->  208 x 208 x  32 0.177 BF
   3 conv     64       3 x 3/ 1    208 x 208 x  32 ->  208 x 208 x  64 1.595 BF
   4 Shortcut Layer: 1,  wt = 0, wn = 0, outputs: 208 x 208 x  64 0.003 BF
   5 conv    128       3 x 3/ 2    208 x 208 x  64 ->  104 x 104 x 128 1.595 BF
   6 conv     64       1 x 1/ 1    104 x 104 x 128 ->  104 x 104 x  64 0.177 BF
   7 conv    128       3 x 3/ 1    104 x 104 x  64 ->  104 x 104 x 128 1.595 BF
   8 Shortcut Layer: 5,  wt = 0, wn = 0, outputs: 104 x 104 x 128 0.001 BF
   9 conv     64       1 x 1/ 1    104 x 104 x 128 ->  104 x 104 x  64 0.177 BF
  10 conv    128       3 x 3/ 1    104 x 104 x  64 ->  104 x 104 x 128 1.595 BF
  11 Shortcut Layer: 8,  wt = 0, wn = 0, outputs: 104 x 104 x 128 0.001 BF
  12 conv    256       3 x 3/ 2    104 x 104 x 128 ->   52 x  52 x 256 1.595 BF
  13 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  14 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  15 Shortcut Layer: 12,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  16 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  17 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  18 Shortcut Layer: 15,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  19 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
```

```
20 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
21 Shortcut Layer: 18,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
22 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
23 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
24 Shortcut Layer: 21,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
25 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
26 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
27 Shortcut Layer: 24,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
28 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
29 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
30 Shortcut Layer: 27,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
31 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
32 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
33 Shortcut Layer: 30,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
34 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
35 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
36 Shortcut Layer: 33,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
37 conv    512       3 x 3/ 2     52 x  52 x 256 ->   26 x  26 x 512 1.595 BF
38 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
39 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
40 Shortcut Layer: 37,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
41 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
42 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
43 Shortcut Layer: 40,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
44 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
45 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
46 Shortcut Layer: 43,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
47 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
48 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
49 Shortcut Layer: 46,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
50 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
51 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
52 Shortcut Layer: 49,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
53 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
54 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
55 Shortcut Layer: 52,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
56 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
57 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
58 Shortcut Layer: 55,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
59 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
60 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
61 Shortcut Layer: 58,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
62 conv   1024       3 x 3/ 2     26 x  26 x 512 ->   13 x  13 x1024 1.595 BF
63 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
64 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
65 Shortcut Layer: 62,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
66 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
67 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
```

```
  68 Shortcut Layer: 65,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  69 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  70 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  71 Shortcut Layer: 68,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  72 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  73 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  74 Shortcut Layer: 71,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  75 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  76 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  77 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  78 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  79 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  80 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  81 conv    186       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 186 0.064 BF
  82 yolo
[yolo] params: iou loss: mse (2), iou_norm: 0.75, cls_norm: 1.00, scale_x_y:
1.00
  83 route  79                                     ->   13 x  13 x 512
  84 conv    256       1 x 1/ 1     13 x  13 x 512 ->   13 x  13 x 256 0.044 BF
  85 upsample                 2x    13 x  13 x 256 ->   26 x  26 x 256
  86 route  85 61                                  ->   26 x  26 x 768
  87 conv    256       1 x 1/ 1     26 x  26 x 768 ->   26 x  26 x 256 0.266 BF
  88 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  89 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  90 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  91 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  92 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  93 conv    186       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 186 0.129 BF
  94 yolo
[yolo] params: iou loss: mse (2), iou_norm: 0.75, cls_norm: 1.00, scale_x_y:
1.00
  95 route  91                                     ->   26 x  26 x 256
  96 conv    128       1 x 1/ 1     26 x  26 x 256 ->   26 x  26 x 128 0.044 BF
  97 upsample                 2x    26 x  26 x 128 ->   52 x  52 x 128
  98 route  97 36                                  ->   52 x  52 x 384
  99 conv    128       1 x 1/ 1     52 x  52 x 384 ->   52 x  52 x 128 0.266 BF
 100 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
 101 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
 102 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
 103 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
 104 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
 105 conv    186       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 186 0.258 BF
 106 yolo
[yolo] params: iou loss: mse (2), iou_norm: 0.75, cls_norm: 1.00, scale_x_y:
1.00
Total BFLOPS 65.711
avg_outputs = 527867
 Allocate additional workspace_size = 12.46 MB
```

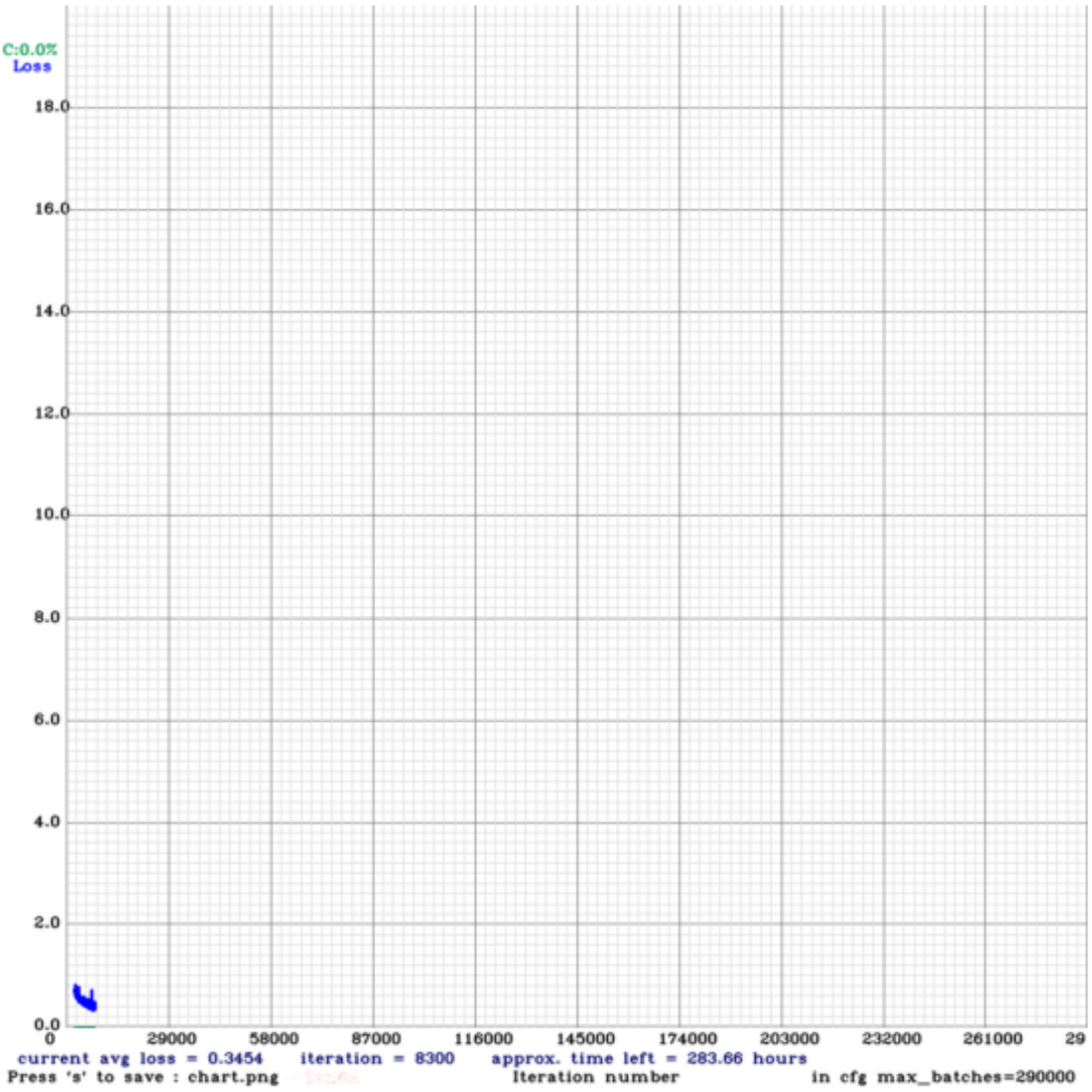
```
Loading weights from /mydrive/trainC2TSR/latest/yolov3_custom_last.weights...
 seen 64, trained: 5286 K-images (82 Kilo-batches_64)
Done! Loaded 107 layers from weights-file
Learning Rate: 0.001, Momentum: 0.9, Decay: 0.0005
 Detection layer: 82 - type = 28
 Detection layer: 94 - type = 28
 Detection layer: 106 - type = 28
Resizing, random_coef = 1.40

 608 x 608
 Create 6 permanent cpu-threads
 try to allocate additional workspace_size = 0.04 MB
 CUDA allocate done!
Loaded: 0.000052 seconds
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.680510,
GIOU: 0.644511), Class: 0.999947, Obj: 0.998411, No Obj: 0.000604, .5R:
1.000000, .75R: 0.000000, count: 1, class_loss = 0.000001, iou_loss = 0.042970,
total_loss = 0.042971
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.788603,
GIOU: 0.788603), Class: 0.999478, Obj: 0.999726, No Obj: 0.000110, .5R:
1.000000, .75R: 1.000000, count: 1, class_loss = 0.000000, iou_loss = 0.022112,
total_loss = 0.022112
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.892461,
GIOU: 0.892461), Class: 0.999828, Obj: 0.986496, No Obj: 0.000024, .5R:
1.000000, .75R: 1.000000, count: 1, class_loss = 0.000073, iou_loss = 0.013772,
total_loss = 0.013845
 total_bbox = 3, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000001, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000000, iou_loss = 0.000000,
total_loss = 0.000000
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.802380,
GIOU: 0.792256), Class: 0.857350, Obj: 0.837046, No Obj: 0.000237, .5R:
1.000000, .75R: 0.666667, count: 3, class_loss = 0.189402, iou_loss = 0.074624,
total_loss = 0.264026
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.779353,
GIOU: 0.768525), Class: 0.999681, Obj: 0.947092, No Obj: 0.000243, .5R:
1.000000, .75R: 0.666667, count: 12, class_loss = 0.247710, iou_loss = 0.246858,
total_loss = 0.494568
 total_bbox = 18, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.878022,
GIOU: 0.876719), Class: 0.999971, Obj: 0.999999, No Obj: 0.000234, .5R:
1.000000, .75R: 1.000000, count: 1, class_loss = 0.000019, iou_loss = 0.012046,
total_loss = 0.012065
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.863615,
GIOU: 0.857173), Class: 0.934734, Obj: 0.989311, No Obj: 0.000422, .5R:
1.000000, .75R: 1.000000, count: 6, class_loss = 0.029000, iou_loss = 0.091546,
total_loss = 0.120545
```

```
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.813860,
GIOU: 0.808064), Class: 0.891968, Obj: 0.963920, No Obj: 0.000177, .5R:
1.000000, .75R: 0.714286, count: 7, class_loss = 0.273742, iou_loss = 0.142617,
total_loss = 0.416359
 total_bbox = 32, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.577543,
GIOU: 0.506053), Class: 0.995881, Obj: 0.972797, No Obj: 0.000707, .5R:
1.000000, .75R: 0.000000, count: 1, class_loss = 0.000191, iou_loss = 0.089646,
total_loss = 0.089837
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000000, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000000, iou_loss = 0.000000,
total_loss = 0.000000
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.776008,
GIOU: 0.765055), Class: 0.999561, Obj: 0.992846, No Obj: 0.000120, .5R:
1.000000, .75R: 0.666667, count: 6, class_loss = 0.008934, iou_loss = 0.114248,
total_loss = 0.123182
 total_bbox = 39, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.909428,
GIOU: 0.909214), Class: 0.999997, Obj: 0.999969, No Obj: 0.000455, .5R:
1.000000, .75R: 1.000000, count: 1, class_loss = 0.000016, iou_loss = 0.007601,
total_loss = 0.007618
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.748007,
GIOU: 0.736304), Class: 0.999978, Obj: 0.882781, No Obj: 0.000203, .5R:
1.000000, .75R: 0.500000, count: 2, class_loss = 0.255305, iou_loss = 0.090817,
total_loss = 0.346122
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.845115,
GIOU: 0.842828), Class: 0.998597, Obj: 0.897555, No Obj: 0.000207, .5R:
1.000000, .75R: 0.777778, count: 9, class_loss = 0.100863, iou_loss = 0.126269,
total_loss = 0.227132
 total_bbox = 51, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000000, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000000, iou_loss = 0.000000,
total_loss = 0.000000
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.892214,
GIOU: 0.890994), Class: 0.999948, Obj: 0.997388, No Obj: 0.000244, .5R:
1.000000, .75R: 1.000000, count: 3, class_loss = 0.023378, iou_loss = 0.034269,
total_loss = 0.057646
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.738916,
GIOU: 0.721938), Class: 0.998468, Obj: 0.884405, No Obj: 0.000177, .5R:
0.900000, .75R: 0.600000, count: 10, class_loss = 0.331803, iou_loss = 0.371126,
total_loss = 0.702929
 total_bbox = 64, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000000, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000000, iou_loss = 0.000000,
total_loss = 0.000000
```

```
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.823144,
GIOU: 0.820877), Class: 0.999974, Obj: 0.998663, No Obj: 0.000058, .5R:
1.000000, .75R: 1.000000, count: 1, class_loss = 0.000000, iou_loss = 0.009609,
total_loss = 0.009610
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.761766,
GIOU: 0.757296), Class: 0.999328, Obj: 0.956598, No Obj: 0.000206, .5R:
1.000000, .75R: 0.600000, count: 10, class_loss = 0.019340, iou_loss = 0.286283,
total_loss = 0.305623
 total_bbox = 75, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.819227,
GIOU: 0.808551), Class: 0.989957, Obj: 0.995327, No Obj: 0.001038, .5R:
1.000000, .75R: 1.000000, count: 2, class_loss = 0.000260, iou_loss = 0.037149,
total_loss = 0.037409
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000001, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000017, iou_loss = 0.000000,
total_loss = 0.000017
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.785680,
GIOU: 0.776714), Class: 0.998626, Obj: 0.928171, No Obj: 0.000176, .5R:
1.000000, .75R: 0.700000, count: 10, class_loss = 0.243768, iou_loss = 0.179273,
total_loss = 0.423041
 total_bbox = 87, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000000, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000000, iou_loss = 0.000000,
total_loss = 0.000000
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.926176,
GIOU: 0.925111), Class: 0.999986, Obj: 0.998125, No Obj: 0.000065, .5R:
1.000000, .75R: 1.000000, count: 1, class_loss = 0.000005, iou_loss = 0.004164,
total_loss = 0.004169
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.789201,
GIOU: 0.784918), Class: 0.997261, Obj: 0.984541, No Obj: 0.000282, .5R:
1.000000, .75R: 0.600000, count: 15, class_loss = 0.009210, iou_loss = 0.328487,
total_loss = 0.337698
 total_bbox = 103, rewritten_bbox = 0.000000 %
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 82 Avg (IOU: 0.000000,
GIOU: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000000, .5R:
0.000000, .75R: 0.000000, count: 1, class_loss = 0.000000, iou_loss = 0.000000,
total_loss = 0.000000
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 94 Avg (IOU: 0.796617,
GIOU: 0.788407), Class: 0.997848, Obj: 0.904583, No Obj: 0.000120, .5R:
1.000000, .75R: 1.000000, count: 2, class_loss = 0.009081, iou_loss = 0.049627,
total_loss = 0.058709
v3 (mse loss, Normalizer: (iou: 0.75, cls: 1.00) Region 106 Avg (IOU: 0.820388,
GIOU: 0.816514), Class: 0.997807, Obj: 0.946053, No Obj: 0.000376, .5R:
1.000000, .75R: 0.866667, count: 15, class_loss = 0.061178, iou_loss = 0.228972,
total_loss = 0.290149
 total_bbox = 120, rewritten_bbox = 0.000000 %
```

[ ]:
```
imShow('chart.png')
```

```
[Errno 20] Not a directory: 'darknet'
/content/darknet
```



[16]:
```
!./darknet detector test /mydrive/trainC2TSR/obj.data /mydrive/trainC2TSR/
 ↪yolov3_custom.cfg /mydrive/trainC2TSR/latest/yolov3_custom_last.weights /
 ↪mydrive/trainC2TSR/testImages/frame_1575.jpg
```

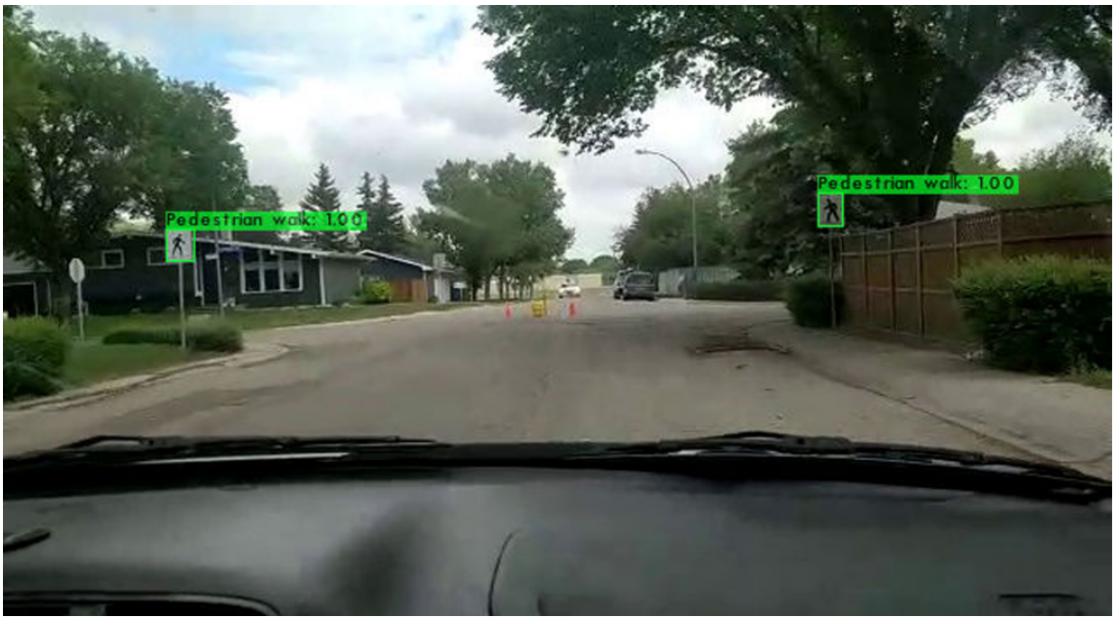
```
 CUDA-version: 10010 (10010), cuDNN: 7.6.5, GPU count: 1
 OpenCV version: 3.2.0
 0 : compute_capability = 750, cudnn_half = 0, GPU: Tesla T4
net.optimized_memory = 0
```

```
mini_batch = 1, batch = 16, time_steps = 1, train = 0
   layer   filters  size/strd(dil)      input                output
   0 conv     32       3 x 3/ 1    416 x 416 x   3 ->  416 x 416 x  32 0.299 BF
   1 conv     64       3 x 3/ 2    416 x 416 x  32 ->  208 x 208 x  64 1.595 BF
   2 conv     32       1 x 1/ 1    208 x 208 x  64 ->  208 x 208 x  32 0.177 BF
   3 conv     64       3 x 3/ 1    208 x 208 x  32 ->  208 x 208 x  64 1.595 BF
   4 Shortcut Layer: 1,  wt = 0, wn = 0, outputs: 208 x 208 x  64 0.003 BF
   5 conv    128       3 x 3/ 2    208 x 208 x  64 ->  104 x 104 x 128 1.595 BF
   6 conv     64       1 x 1/ 1    104 x 104 x 128 ->  104 x 104 x  64 0.177 BF
   7 conv    128       3 x 3/ 1    104 x 104 x  64 ->  104 x 104 x 128 1.595 BF
   8 Shortcut Layer: 5,  wt = 0, wn = 0, outputs: 104 x 104 x 128 0.001 BF
   9 conv     64       1 x 1/ 1    104 x 104 x 128 ->  104 x 104 x  64 0.177 BF
  10 conv    128       3 x 3/ 1    104 x 104 x  64 ->  104 x 104 x 128 1.595 BF
  11 Shortcut Layer: 8,  wt = 0, wn = 0, outputs: 104 x 104 x 128 0.001 BF
  12 conv    256       3 x 3/ 2    104 x 104 x 128 ->   52 x  52 x 256 1.595 BF
  13 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  14 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  15 Shortcut Layer: 12,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  16 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  17 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  18 Shortcut Layer: 15,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  19 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  20 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  21 Shortcut Layer: 18,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  22 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  23 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  24 Shortcut Layer: 21,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  25 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  26 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  27 Shortcut Layer: 24,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  28 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  29 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  30 Shortcut Layer: 27,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  31 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  32 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  33 Shortcut Layer: 30,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  34 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
  35 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
  36 Shortcut Layer: 33,  wt = 0, wn = 0, outputs:  52 x  52 x 256 0.001 BF
  37 conv    512       3 x 3/ 2     52 x  52 x 256 ->   26 x  26 x 512 1.595 BF
  38 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  39 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  40 Shortcut Layer: 37,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  41 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  42 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  43 Shortcut Layer: 40,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  44 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  45 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
```

```
  46 Shortcut Layer: 43,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  47 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  48 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  49 Shortcut Layer: 46,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  50 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  51 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  52 Shortcut Layer: 49,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  53 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  54 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  55 Shortcut Layer: 52,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  56 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  57 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  58 Shortcut Layer: 55,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  59 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  60 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  61 Shortcut Layer: 58,  wt = 0, wn = 0, outputs:  26 x  26 x 512 0.000 BF
  62 conv   1024       3 x 3/ 2     26 x  26 x 512 ->   13 x  13 x1024 1.595 BF
  63 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  64 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  65 Shortcut Layer: 62,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  66 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  67 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  68 Shortcut Layer: 65,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  69 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  70 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  71 Shortcut Layer: 68,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  72 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  73 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  74 Shortcut Layer: 71,  wt = 0, wn = 0, outputs:  13 x  13 x1024 0.000 BF
  75 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  76 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  77 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  78 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  79 conv    512       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 512 0.177 BF
  80 conv   1024       3 x 3/ 1     13 x  13 x 512 ->   13 x  13 x1024 1.595 BF
  81 conv    186       1 x 1/ 1     13 x  13 x1024 ->   13 x  13 x 186 0.064 BF
  82 yolo
[yolo] params: iou loss: mse (2), iou_norm: 0.75, cls_norm: 1.00, scale_x_y:
1.00
  83 route  79                                     ->   13 x  13 x 512
  84 conv    256       1 x 1/ 1     13 x  13 x 512 ->   13 x  13 x 256 0.044 BF
  85 upsample                 2x    13 x  13 x 256 ->   26 x  26 x 256
  86 route  85 61                                  ->   26 x  26 x 768
  87 conv    256       1 x 1/ 1     26 x  26 x 768 ->   26 x  26 x 256 0.266 BF
  88 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  89 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
  90 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  91 conv    256       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 256 0.177 BF
```

```
  92 conv    512       3 x 3/ 1     26 x  26 x 256 ->   26 x  26 x 512 1.595 BF
  93 conv    186       1 x 1/ 1     26 x  26 x 512 ->   26 x  26 x 186 0.129 BF
  94 yolo
[yolo] params: iou loss: mse (2), iou_norm: 0.75, cls_norm: 1.00, scale_x_y:
1.00
  95 route  91                                     ->   26 x  26 x 256
  96 conv    128       1 x 1/ 1     26 x  26 x 256 ->   26 x  26 x 128 0.044 BF
  97 upsample                 2x    26 x  26 x 128 ->   52 x  52 x 128
  98 route  97 36                                  ->   52 x  52 x 384
  99 conv    128       1 x 1/ 1     52 x  52 x 384 ->   52 x  52 x 128 0.266 BF
 100 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
 101 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
 102 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
 103 conv    128       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 128 0.177 BF
 104 conv    256       3 x 3/ 1     52 x  52 x 128 ->   52 x  52 x 256 1.595 BF
 105 conv    186       1 x 1/ 1     52 x  52 x 256 ->   52 x  52 x 186 0.258 BF
 106 yolo
[yolo] params: iou loss: mse (2), iou_norm: 0.75, cls_norm: 1.00, scale_x_y:
1.00
Total BFLOPS 65.711
avg_outputs = 527867
 Allocate additional workspace_size = 52.43 MB
Loading weights from /mydrive/trainC2TSR/latest/yolov3_custom_last.weights...
 seen 64, trained: 5452 K-images (85 Kilo-batches_64)
Done! Loaded 107 layers from weights-file
 Detection layer: 82 - type = 28
 Detection layer: 94 - type = 28
 Detection layer: 106 - type = 28
/mydrive/trainC2TSR/testImages/frame_1575.jpg: Predicted in 41.271000 milli-
seconds.
Pedestrian walk: 100%
Pedestrian walk: 100%
Unable to init server: Could not connect: Connection refused

(predictions:1356): Gtk-WARNING **: 14:34:18.515: cannot
open display:
```

[17]:
```
imShow('predictions.jpg')
```



[18]:
```
download('predictions.jpg')
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.Javascript object>
```