```
# Mount Google Drive
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
%cd /content/drive/MyDrive//yolov4/
```

```
/content/drive/MyDrive/yolov4
```

```
ls
```

```
darknet/  invoice/  yolov4_invoice.ipynb
```

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

```
fatal: destination path 'darknet' already exists and is not an empty directory.
```

```
%cd  /content/drive/MyDrive/yolov4/darknet
```

```
/content/drive/MyDrive/yolov4/darknet
```

```
ls
```

```
3rdparty/               darknet.py              LICENSE          vcpkg.json
backup/                 darknet_video.py        Makefile         vcpkg.json.opencv23
build/                  data/                   net_cam_v3.sh*   video_yolov3.sh*
build.ps1               docker-compose.yml      net_cam_v4.sh*   video_yolov4.sh*
cfg/                    Dockerfile.cpu          obj/             yolov4.conv.137
cmake/                  Dockerfile.gpu          package.xml      yolov4.conv.137.1
CMakeLists.txt          image_yolov3.sh*        README.md        yolov4-custom.cfg
```

```
darknet*                image_yolov4.sh*        results/
DarknetConfig.cmake.in  include/                scripts/
darknet_images.py       json_mjpeg_streams.sh*  src/
```

```
# Compile Darknet with GPU and OpenCV support
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile
!sed -i 's/GPU=0/GPU=1/' Makefile
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile
!make
```

```
chmod +x *.sh
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2> /dev/null ||
./src/image_opencv.cpp: In function ‘void draw_detections_cv_v3(void**, detection*, int, float, char**, image**, i
./src/image_opencv.cpp:945:23: warning: variable ‘rgb’ set but not used [-Wunused-but-set-variable]
  945 |                 float rgb[3];
      |                       ^~~
./src/image_opencv.cpp: In function ‘void cv_draw_object(image, float*, int, int, int*, float*, int*, int, char**)
./src/image_opencv.cpp:1443:14: warning: unused variable ‘buff’ [-Wunused-variable]
 1443 |         char buff[100];
      |              ^~~~
./src/image_opencv.cpp:1419:9: warning: unused variable ‘it_tb_res’ [-Wunused-variable]
 1419 |     int it_tb_res = cv::createTrackbar(it_trackbar_name, window_name, &it_trackbar_value, 1000);
      |         ^~~~~~~~~
./src/image_opencv.cpp:1423:9: warning: unused variable ‘lr_tb_res’ [-Wunused-variable]
 1423 |     int lr_tb_res = cv::createTrackbar(lr_trackbar_name, window_name, &lr_trackbar_value, 20);
      |         ^~~~~~~~~
./src/image_opencv.cpp:1427:9: warning: unused variable ‘cl_tb_res’ [-Wunused-variable]
 1427 |     int cl_tb_res = cv::createTrackbar(cl_trackbar_name, window_name, &cl_trackbar_value, classes-1);
      |         ^~~~~~~~~
./src/image_opencv.cpp:1430:9: warning: unused variable ‘bo_tb_res’ [-Wunused-variable]
 1430 |     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 ||
./src/http_stream.cpp: In member function ‘bool JSON_sender::write(const char*)’:
./src/http_stream.cpp:253:21: warning: unused variable ‘n’ [-Wunused-variable]
  253 |                 int n = _write(client, outputbuf, outlen);
      |                     ^
```

```
./src/http_stream.cpp: In function ‘void set_track_id(detection*, int, float, float, float, int, int, int)’:
./src/http_stream.cpp:866:27: warning: comparison of integer expressions of different signedness: ‘int’ and ‘std::
  866 |         for (int i = 0; i < v.size(); ++i) {
      |                         ~~^~~~~~~~~~
./src/http_stream.cpp:874:33: warning: comparison of integer expressions of different signedness: ‘int’ and ‘std::
  874 |     for (int old_id = 0; old_id < old_dets.size(); ++old_id) {
      |                          ~~~~~~~^~~~~~~~~~~~~~~~
./src/http_stream.cpp:893:31: warning: comparison of integer expressions of different signedness: ‘int’ and ‘std::
  893 |     for (int index = 0; index < new_dets_num*old_dets.size(); ++index) {
      |                         ~~~~~~^~~~~~~~~~~~~~~~~~~~~~~~~~~~
./src/http_stream.cpp:929:28: warning: comparison of integer expressions of different signedness: ‘std::deque<std:
  929 |     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 op
./src/gemm.c: In function ‘convolution_2d’:
./src/gemm.c:2042:15: warning: unused variable ‘out_w’ [-Wunused-variable]
 2042 |     const int out_w = (w + 2 * pad - ksize) / stride + 1;    // output_width=input_width for stride=1 and
      |               ^~~~~
./src/gemm.c:2041:15: warning: unused variable ‘out_h’ [-Wunused-variable]
 2041 |     const int out_h = (h + 2 * pad - ksize) / stride + 1;    // output_height=input_height for stride=1 ar
      |               ^~~~~
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --cflags op
./src/utils.c: In function ‘custom_hash’:
./src/utils.c:1093:12: warning: suggest parentheses around assignment used as truth value [-Wparentheses]
 1093 |     while (c = *str++)
      |            ^
In file included from /usr/include/string.h:535,
                 from include/darknet.h:14,
                 from ./src/utils.h:3,
                 from ./src/utils.c:4:
In function ‘strncpy’,
```

```
!chmod +x ./darknet
```

```
!wget https://raw.githubusercontent.com/AlexeyAB/darknet/master/cfg/yolov4.cfg -O yolov4-custom.cfg
!wget https://github.com/AlexeyAB/darknet/releases/download/darknet_yolo_v4_pre/yolov4.conv.137
```

```
--2024-06-10 06:22:05--  https://raw.githubusercontent.com/AlexeyAB/darknet/master/cfg/yolov4.cfg
```

```
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.199.109.133, 185.199.110.1
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 12231 (12K) [text/plain]
Saving to: ‘yolov4-custom.cfg’

yolov4-custom.cfg   100%[===================>]  11.94K  --.-KB/s    in 0.001s

2024-06-10 06:22:05 (16.3 MB/s) - ‘yolov4-custom.cfg’ saved [12231/12231]

--2024-06-10 06:22:05--  https://github.com/AlexeyAB/darknet/releases/download/darknet_yolo_v4_pre/yolov4.conv.137
Resolving github.com (github.com)... 140.82.112.3
Connecting to github.com (github.com)|140.82.112.3|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/75388965/95733400-b2d7-11eb
--2024-06-10 06:22:06--  https://objects.githubusercontent.com/github-production-release-asset-2e65be/75388965/957
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.108.133, 185.199.109.133, 185.1
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.108.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 170038676 (162M) [application/octet-stream]
Saving to: ‘yolov4.conv.137.2’

yolov4.conv.137.2   100%[===================>] 162.16M  70.5MB/s    in 2.3s

2024-06-10 06:22:08 (70.5 MB/s) - ‘yolov4.conv.137.2’ saved [170038676/170038676]
```

```
# Create obj.names
with open("/content/drive/MyDrive/yolov4/invoice/obj.names", "w") as f:
    f.write("paragraph\n")
    f.write("table\n")
```

```
# Create obj.data
with open("/content/drive/MyDrive/yolov4/invoice/obj.data", "w") as f:
    f.write("classes = 2\n")
    f.write("train = /content/drive/MyDrive/yolov4/invoice/train.txt\n")
    f.write("valid = /content/drive/MyDrive/yolov4/invoice/valid.txt\n")
```

```
    f.write("names = /content/drive/MyDrive/yolov4/invoice/obj.names\n")
    f.write("backup = /content/drive/MyDrive/yolov4/invoice/backup/\n")


import os

# Define base path to your dataset
base_path = '/content/drive/MyDrive/yolov4/invoice/'

# Paths to image directories
train_images_path = base_path + 'images/train/'
valid_images_path = base_path + 'images/valid/'

# List image files
train_images = [os.path.join(train_images_path, img) for img in os.listdir(train_images_path) if img.endswith('.jpg')]
valid_images = [os.path.join(valid_images_path, img) for img in os.listdir(valid_images_path) if img.endswith('.jpg')]

# Create train.txt
with open(base_path + 'train.txt', 'w') as f:
    f.write("\n".join(train_images) + "\n")

# Create valid.txt
with open(base_path + 'valid.txt', 'w') as f:
    f.write("\n".join(valid_images) + "\n")


# Step 2: Download yolov4.conv.137 File from an alternative source
!wget -O /content/drive/MyDrive/yolov4/invoice/yolov4.conv.137 https://github.com/AlexeyAB/darknet/releases/download/y
```

```
--2024-06-10 06:30:19--  https://github.com/AlexeyAB/darknet/releases/download/yolov4/yolov4.conv.137
Resolving github.com (github.com)... 140.82.112.4
Connecting to github.com (github.com)|140.82.112.4|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/75388965/2637cdb1-11b6-4da5
--2024-06-10 06:30:19--  https://objects.githubusercontent.com/github-production-release-asset-2e65be/75388965/263
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.108.133, 185.199.109.133, 185.1
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.108.133|:443... connected.
```

```
connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.108.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 170038676 (162M) [application/octet-stream]
Saving to: ‘/content/drive/MyDrive/yolov4/invoice/yolov4.conv.137’

/content/drive/MyDr 100%[===================>] 162.16M  61.0MB/s    in 2.7s

2024-06-10 06:30:22 (61.0 MB/s) - ‘/content/drive/MyDrive/yolov4/invoice/yolov4.conv.137’ saved [170038676/170038676]
```

```
# Copy the default YOLOv4 configuration file
!cp cfg/yolov4-custom.cfg /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg

# Modify the configuration file for your custom training
!sed -i 's/batch=64/batch=16/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i 's/subdivisions=16/subdivisions=8/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i 's/max_batches = 500200/max_batches = 4000/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i 's/steps=400000,450000/steps=3200,3600/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg

# Modify filters and classes for the [yolo] layers
!sed -i '610s/filters=255/filters=21/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i '696s/classes=80/classes=2/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i '703s/filters=255/filters=21/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i '789s/classes=80/classes=2/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i '796s/filters=21/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
!sed -i '882s/classes=80/classes=2/' /content/drive/MyDrive/yolov4/invoice/yolov4-custom.cfg
```

```
sed: -e expression #1, char 16: unterminated `s' command
```

```
import os

# Define the backup directory path
backup_dir = "/content/drive/MyDrive/yolov4/invoice/backup"

# Create the backup directory if it doesn't exist
if not os.path.exists(backup_dir):
    os.makedirs(backup_dir)
```

```
    os.makedirs(backup_dir)


# Move to the Darknet directory
%cd  /content/drive/MyDrive/yolov4/darknet

# Start training
!./darknet detector train /content/drive/MyDrive/yolov4/invoice/obj.data /content/drive/MyDrive/yolov4/invoice/yolov4·
```

```
Streaming output truncated to the last 5000 lines.
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.550646), count: 9, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.696939), count: 34, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.728938), count: 30, class_loss
 total_bbox = 470731, rewritten_bbox = 0.015720 %


 Tensor Cores are disabled until the first 3000 iterations are reached.
 (next mAP calculation at 1000 iterations) H871/500500: loss=12.8 hours left=329.8
 871: 12.834111, 9.777094 avg loss, 0.000576 rate, 2.788373 seconds, 13936 images, 329.808530 hours left
Loaded: 0.000060 seconds
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.700621), count: 7, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.642770), count: 25, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.710795), count: 23, class_loss
 total_bbox = 470786, rewritten_bbox = 0.015718 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.482907), count: 5, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.638639), count: 21, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.658059), count: 20, class_loss
 total_bbox = 470832, rewritten_bbox = 0.015717 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.766082), count: 2, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.664646), count: 13, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.664833), count: 21, class_loss
 total_bbox = 470868, rewritten_bbox = 0.015716 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.644093), count: 14, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.691438), count: 54, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.640926), count: 42, class_loss
 total_bbox = 470978, rewritten_bbox = 0.015712 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.638106), count: 9, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.650573), count: 43, class_loss
```

```
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.672911), count: 38, class_loss
 total_bbox = 471068, rewritten_bbox = 0.015709 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.656509), count: 2, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.717669), count: 37, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.695006), count: 35, class_loss
 total_bbox = 471142, rewritten_bbox = 0.015707 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.687863), count: 5, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.648766), count: 22, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.696407), count: 20, class_loss
 total_bbox = 471189, rewritten_bbox = 0.015705 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.749291), count: 3, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.738545), count: 46, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.685001), count: 37, class_loss
 total_bbox = 471275, rewritten_bbox = 0.015702 %


 Tensor Cores are disabled until the first 3000 iterations are reached.
 (next mAP calculation at 1000 iterations) H872/500500: loss=9.0 hours left=330.4
 872: 8.973979, 9.696782 avg loss, 0.000578 rate, 2.810473 seconds, 13952 images, 330.380437 hours left
Loaded: 0.000048 seconds
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.570301), count: 8, class_loss =
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.712774), count: 36, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.687207), count: 26, class_loss
 total_bbox = 471345, rewritten_bbox = 0.015700 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.562302), count: 19, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 150 Avg (IOU: 0.687019), count: 42, class_loss
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 161 Avg (IOU: 0.712761), count: 34, class_loss
 total_bbox = 471440, rewritten_bbox = 0.015697 %
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 139 Avg (IOU: 0.710430), count: 17, class_loss
```

```
# Evaluate the model
!./darknet detector map /content/drive/MyDrive/yolov4/invoice/obj.data /content/drive/MyDrive/yolov4/invoice/yolov4-cu
```

```
 CUDA-version: 12020 (12020), cuDNN: 8.9.6, CUDNN_HALF=1, GPU count: 1
 CUDNN_HALF=1
 OpenCV version: 4.5.4
 0 : compute_capability = 750, cudnn_half = 1, GPU: Tesla T4
net.optimized_memory = 0
mini_batch = 1, batch = 8, time_steps = 1, train = 0
```

```
   layer   filters  size/strd(dil)      input                output
   0 Create CUDA-stream - 0
 Create cudnn-handle 0
conv     32       3 x 3/ 1    608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
   1 conv     64       3 x 3/ 2    608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
   2 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   3 route  1                                     ->  304 x 304 x  64
   4 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   5 conv     32       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
   6 conv     64       3 x 3/ 1    304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
   7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
   8 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   9 route  8 2                                   ->  304 x 304 x 128
  10 conv     64       1 x 1/ 1    304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
  11 conv    128       3 x 3/ 2    304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
  12 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
  13 route  11                                    ->  152 x 152 x 128
  14 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
  15 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
  16 conv     64       3 x 3/ 1    152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
  17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
  18 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
  19 conv     64       3 x 3/ 1    152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
  20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
  21 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
  22 route  21 12                                ->  152 x 152 x 128
  23 conv    128       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
  24 conv    256       3 x 3/ 2    152 x 152 x 128 ->   76 x  76 x 256 3.407 BF
  25 conv    128       1 x 1/ 1     76 x  76 x 256 ->   76 x  76 x 128 0.379 BF
  26 route  24                                    ->   76 x  76 x 256
  27 conv    128       1 x 1/ 1     76 x  76 x 256 ->   76 x  76 x 128 0.379 BF
  28 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  29 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  30 Shortcut Layer: 27,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  31 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  32 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  33 Shortcut Layer: 30,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
  34 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
  35 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
  36 Shortcut Layer: 33,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
```

```
 37 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
 38 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
 39 Shortcut Layer: 36,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
 40 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
 41 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
 42 Shortcut Layer: 39,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
 43 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
 44 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
 45 Shortcut Layer: 42,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
 46 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
 47 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
 48 Shortcut Layer: 45,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
```

```
# Test the model on a sample image
!./darknet detector test /content/drive/MyDrive/yolov4/invoice/obj.data /content/drive/MyDrive/yolov4/invoice/yolov4-c
```

```
 CUDA-version: 12020 (12020), cuDNN: 8.9.6, CUDNN_HALF=1, GPU count: 1
 CUDNN_HALF=1
 OpenCV version: 4.5.4
 0 : compute_capability = 750, cudnn_half = 1, GPU: Tesla T4
net.optimized_memory = 0
mini_batch = 1, batch = 8, time_steps = 1, train = 0
   layer   filters  size/strd(dil)      input                output
   0 Create CUDA-stream - 0
 Create cudnn-handle 0
conv     32       3 x 3/ 1    608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
   1 conv     64       3 x 3/ 2    608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
   2 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   3 route  1                                     ->  304 x 304 x  64
   4 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   5 conv     32       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
   6 conv     64       3 x 3/ 1    304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
   7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
   8 conv     64       1 x 1/ 1    304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
   9 route  8 2                                   ->  304 x 304 x 128
  10 conv     64       1 x 1/ 1    304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
  11 conv    128       3 x 3/ 2    304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
  12 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
  13 route  11                                    ->  152 x 152 x 128
  14 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
```

```
14 conv     64       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
15 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
16 conv     64       3 x 3/ 1    152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
19 conv     64       3 x 3/ 1    152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
21 conv     64       1 x 1/ 1    152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
22 route  21 12                                  ->  152 x 152 x 128
23 conv    128       1 x 1/ 1    152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
24 conv    256       3 x 3/ 2    152 x 152 x 128 ->   76 x  76 x 256 3.407 BF
25 conv    128       1 x 1/ 1     76 x  76 x 256 ->   76 x  76 x 128 0.379 BF
26 route  24                                     ->   76 x  76 x 256
27 conv    128       1 x 1/ 1     76 x  76 x 256 ->   76 x  76 x 128 0.379 BF
28 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
29 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
30 Shortcut Layer: 27,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
31 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
32 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
33 Shortcut Layer: 30,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
34 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
35 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
36 Shortcut Layer: 33,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
37 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
38 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
39 Shortcut Layer: 36,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
40 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
41 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
42 Shortcut Layer: 39,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
43 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
44 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
45 Shortcut Layer: 42,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
46 conv    128       1 x 1/ 1     76 x  76 x 128 ->   76 x  76 x 128 0.189 BF
47 conv    128       3 x 3/ 1     76 x  76 x 128 ->   76 x  76 x 128 1.703 BF
48 Shortcut Layer: 45,  wt = 0, wn = 0, outputs:  76 x  76 x 128 0.001 BF
```