Mounting google drive first for a storage and GPU

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Mounted at /content/gdrive
```

Checking the GPU compatibility

```
!nvidia-smi
```

```
Thu May 27 05:31:36 2021
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 465.19.01    Driver Version: 460.32.03    CUDA Version: 11.2     |
|-------------------------------+----------------------+----------------------+
| 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   41C    P8     9W /  70W |      0MiB / 15109MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+

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

Cloning the Darknet GitHub repository

```
import os
os.environ['PATH'] += ':/usr/local/cuda/bin'
!rm -fr darknet
!git clone https://github.com/AlexeyAB/darknet/
```

```
Cloning into 'darknet'...
remote: Enumerating objects: 15054, done.
remote: Counting objects: 100% (52/52), done.
remote: Compressing objects: 100% (36/36), done.
remote: Total 15054 (delta 19), reused 35 (delta 15), pack-reused 15002
Receiving objects: 100% (15054/15054), 13.45 MiB | 23.99 MiB/s, done.
Resolving deltas: 100% (10217/10217), done.
```

Installing gcc and g++ for execution of the Darknet repo

```
1 !apt install gcc-5 g++-5 -y
2 !ln -s /usr/bin/gcc-5 /usr/local/cuda/bin/gcc
3 !ln -s /usr/bin/g++-5 /usr/local/cuda/bin/g++
```

```
    libquadmath0-dbg libstdc++-5-doc
  The following NEW packages will be installed:
    cpp-5 g++-5 gcc-5 gcc-5-base libasan2 libgcc-5-dev libisl15 libmpx0
    libstdc++-5-dev
  0 upgraded, 9 newly installed, 0 to remove and 34 not upgraded.
  Need to get 29.1 MB of archives.
  After this operation, 100 MB of additional disk space will be used.
  Get:1 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gcc-5-base amd64 5.5
  Get:2 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libisl15 amd64 0.18-
  Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 cpp-5 amd64 5.5.0-12
  Get:4 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libasan2 amd64 5.5.0
  Get:5 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libmpx0 amd64 5.5.0-
  Get:6 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libgcc-5-dev amd64 5
  Get:7 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gcc-5 amd64 5.5.0-12
  Get:8 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libstdc++-5-dev amd6
  Get:9 http://archive.ubuntu.com/ubuntu bionic/universe amd64 g++-5 amd64 5.5.0-12
  Fetched 29.1 MB in 3s (10.8 MB/s)
  Selecting previously unselected package gcc-5-base:amd64.
  (Reading database ... 160706 files and directories currently installed.)
  Preparing to unpack .../0-gcc-5-base_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking gcc-5-base:amd64 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package libisl15:amd64.
  Preparing to unpack .../1-libisl15_0.18-4_amd64.deb ...
  Unpacking libisl15:amd64 (0.18-4) ...
  Selecting previously unselected package cpp-5.
  Preparing to unpack .../2-cpp-5_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking cpp-5 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package libasan2:amd64.
  Preparing to unpack .../3-libasan2_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking libasan2:amd64 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package libmpx0:amd64.
  Preparing to unpack .../4-libmpx0_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking libmpx0:amd64 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package libgcc-5-dev:amd64.
  Preparing to unpack .../5-libgcc-5-dev_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking libgcc-5-dev:amd64 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package gcc-5.
  Preparing to unpack .../6-gcc-5_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking gcc-5 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package libstdc++-5-dev:amd64.
  Preparing to unpack .../7-libstdc++-5-dev_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking libstdc++-5-dev:amd64 (5.5.0-12ubuntu1) ...
  Selecting previously unselected package g++-5.
  Preparing to unpack .../8-g++-5_5.5.0-12ubuntu1_amd64.deb ...
  Unpacking g++-5 (5.5.0-12ubuntu1) ...
  Setting up libisl15:amd64 (0.18-4) ...
  Setting up gcc-5-base:amd64 (5.5.0-12ubuntu1) ...
  Setting up libmpx0:amd64 (5.5.0-12ubuntu1) ...
  Setting up libasan2:amd64 (5.5.0-12ubuntu1) ...
  Setting up libgcc-5-dev:amd64 (5.5.0-12ubuntu1) ...
  Setting up cpp-5 (5.5.0-12ubuntu1) ...
  Setting up libstdc++-5-dev:amd64 (5.5.0-12ubuntu1) ...
```

```
Setting up gcc-5 (5.5.0-12ubuntu1) ...
Setting up g++-5 (5.5.0-12ubuntu1) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
/sbin/ldconfig.real: /usr/local/lib/python3.7/dist-packages/ideep4py/lib/libmkldn
```

Entering darknet folder, enabling GPU and compile the entire thing.

```
%cd darknet
!sed -i 's/GPU=0/GPU=1/g' Makefile
!sed -i 's/OPENCV=0/OPENCV=1/g' Makefile
!make
```

```
/content/darknet
mkdir -p ./obj/
mkdir -p backup
chmod +x *.sh
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config
./src/image_opencv.cpp: In function ‘void draw_detections_cv_v3(void**, detection
./src/image_opencv.cpp:935:23: warning: variable ‘rgb’ set but not used [-Wunused
                float rgb[3];
                      ^
./src/image_opencv.cpp: In function ‘void cv_draw_object(image, float*, int, int,
./src/image_opencv.cpp:1433:14: warning: unused variable ‘buff’ [-Wunused-variabl
         char buff[100];
              ^
./src/image_opencv.cpp:1409:9: warning: unused variable ‘it_tb_res’ [-Wunused-var
     int it_tb_res = cv::createTrackbar(it_trackbar_name, window_name, &it_trackb
         ^
./src/image_opencv.cpp:1413:9: warning: unused variable ‘lr_tb_res’ [-Wunused-var
     int lr_tb_res = cv::createTrackbar(lr_trackbar_name, window_name, &lr_trackb
         ^
./src/image_opencv.cpp:1417:9: warning: unused variable ‘cl_tb_res’ [-Wunused-var
     int cl_tb_res = cv::createTrackbar(cl_trackbar_name, window_name, &cl_trackb
         ^
./src/image_opencv.cpp:1420:9: warning: unused variable ‘bo_tb_res’ [-Wunused-var
     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
./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]
                int n = _write(client, outputbuf, outlen);
                    ^
./src/http_stream.cpp: In member function ‘bool MJPG_sender::write(const cv::Mat&
./src/http_stream.cpp:511:113: warning: format ‘%zu’ expects argument of type ‘si
                sprintf(head, "--mjpegstream\r\nContent-Type: image/jpeg\r\nCont

./src/http_stream.cpp: In function ‘void set_track_id(detection*, int, float, flo
./src/http_stream.cpp:867:27: warning: comparison between signed and unsigned int
         for (int i = 0; i < v.size(); ++i) {
                           ^
./src/http_stream.cpp:875:33: warning: comparison between signed and unsigned int
```

```
     for (int old_id = 0; old_id < old_dets.size(); ++old_id) {
                                  ^
./src/http_stream.cpp:894:31: warning: comparison between signed and unsigned int
     for (int index = 0; index < new_dets_num*old_dets.size(); ++index) {
                                ^
./src/http_stream.cpp:930:28: warning: comparison between signed and unsigned int
     if (old_dets_dq.size() > deque_size) old_dets_dq.pop_front();
                            ^
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2> /d
./src/gemm.c: In function ‘convolution_2d’:
./src/gemm.c:2044:15: warning: unused variable ‘out_w’ [-Wunused-variable]
     const int out_w = (w + 2 * pad - ksize) / stride + 1;    // output_width=inp
               ^
./src/gemm.c:2043:15: warning: unused variable ‘out_h’ [-Wunused-variable]
     const int out_h = (h + 2 * pad - ksize) / stride + 1;    // output_height=in
               ^
gcc -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2> /d
./src/utils.c: In function ‘custom_hash’:
./src/utils.c:1045:5: warning: suggest parentheses around assignment used as trut
```

Get the YOLO Weights file

```
!wget https://pjreddie.com/media/files/yolov3.weights
!chmod a+x ./darknet
```

```
--2021-05-27 05:34:13--  https://pjreddie.com/media/files/yolov3.weights
Resolving pjreddie.com (pjreddie.com)... 128.208.4.108
Connecting to pjreddie.com (pjreddie.com)|128.208.4.108|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 248007048 (237M) [application/octet-stream]
Saving to: ‘yolov3.weights’

yolov3.weights      100%[===================>] 236.52M  72.9MB/s    in 3.2s

2021-05-27 05:34:17 (72.9 MB/s) - ‘yolov3.weights’ saved [248007048/248007048]
```

Checking the working Directory

```
!pwd
```

```
/content/darknet
```

Mounting Google Drive to Darknet folder

```
from google.colab import drive
drive.mount('/content/drive')
```

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

Optional command to update the contents if asked to

```
1 !apt-get update
```

```
Get:1 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/ InRelease [3,626 B
Ign:2 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  In
Ign:3 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu180
Get:4 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  Re
Get:5 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Hit:6 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu180
Get:7 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  Re
Hit:8 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:9 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic InRelease [15.9 kB
Get:10 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/ Packages [60.9 kB
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Ign:13 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  P
Get:13 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  P
Hit:14 http://ppa.launchpad.net/cran/libgit2/ubuntu bionic InRelease
Get:15 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Hit:16 http://ppa.launchpad.net/deadsnakes/ppa/ubuntu bionic InRelease
Get:17 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [1,
Get:18 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic InRelease [21.3 k
Get:19 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [
Get:20 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [2,152
Get:21 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [45
Get:22 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic/main Sources [1,7
Get:23 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [2,18
Get:24 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [2,584 kB
Get:25 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic/main amd64 Packag
Get:26 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic/main amd64 Packag
Fetched 13.1 MB in 4s (3,071 kB/s)
Reading package lists... Done
```

Support Libraries like OpenCV-Dev, Numpy, LibJpeg and more.

```
1 !apt install ffmpeg libopencv-dev libgtk-3-dev python-numpy python3-numpy libdc1394-22
```

```
Get:56 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 libraac-dev amd64
Get:57 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libffms2-4 amd64 2.
Get:58 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgdk-pixbuf2.0-dev am
Get:59 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 libgpac4 am
Get:60 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libgstreamer1.0
Get:61 http://archive.ubuntu.com/ubuntu bionic/main amd64 liborc-0.4-dev-bin amd6
Get:62 http://archive.ubuntu.com/ubuntu bionic/main amd64 liborc-0.4-dev amd64 1:
Get:63 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libgstreamer-pl
Get:64 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libpango1.0-dev
Get:65 http://archive.ubuntu.com/ubuntu bionic/main amd64 x11proto-xinerama-dev a
Get:66 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxinerama-dev amd64 2
Get:67 http://archive.ubuntu.com/ubuntu bionic/main amd64 x11proto-randr-dev all
Get:68 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxrandr-dev amd64 2:1
Get:69 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxcursor-dev amd64 1:
Get:70 http://archive.ubuntu.com/ubuntu bionic/main amd64 x11proto-composite-dev
```

```
Get:71 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxcomposite-dev amd64
Get:72 http://archive.ubuntu.com/ubuntu bionic/main amd64 wayland-protocols all 1
Get:73 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libxkbcommon-de
Get:74 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libgtk-3-dev am
Get:75 http://archive.ubuntu.com/ubuntu bionic/main amd64 libsys-hostname-long-pe
Get:76 http://archive.ubuntu.com/ubuntu bionic/main amd64 libmail-sendmail-perl a
Get:77 http://archive.ubuntu.com/ubuntu bionic/main amd64 libmp3lame-dev amd64 3.
Get:78 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libopencore-amrnb-d
Get:79 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libopencore-amrwb-d
Get:80 http://archive.ubuntu.com/ubuntu bionic/main amd64 libtheora-dev amd64 1.1
Get:81 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4lconvert0 amd64 1.
Get:82 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4l-0 amd64 1.14.2-1
Get:83 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4l2rds0 amd64 1.14.
Get:84 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4l-dev amd64 1.14.2
Get:85 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libxine2-bin amd64
Get:86 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libxine2-dev amd64
Get:87 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libxvidcore-dev amd
Get:88 http://archive.ubuntu.com/ubuntu bionic/main amd64 python3-numpy amd64 1:1
Get:89 http://archive.ubuntu.com/ubuntu bionic/universe amd64 v4l-utils amd64 1.1
Get:90 http://archive.ubuntu.com/ubuntu bionic/universe amd64 x264 amd64 2:0.152.
Fetched 18.8 MB in 4s (5,159 kB/s)
Extracting templates from packages: 100%
Selecting previously unselected package libopencore-amrnb0:amd64.
(Reading database ... 161706 files and directories currently installed.)
Preparing to unpack .../00-libopencore-amrnb0_0.1.3-2.1_amd64.deb ...
Unpacking libopencore-amrnb0:amd64 (0.1.3-2.1) ...
Selecting previously unselected package libopencore-amrwb0:amd64.
Preparing to unpack .../01-libopencore-amrwb0_0.1.3-2.1_amd64.deb ...
Unpacking libopencore-amrwb0:amd64 (0.1.3-2.1) ...
Selecting previously unselected package libmagic-mgc.
Preparing to unpack .../02-libmagic-mgc_1%3a5.32-2ubuntu0.4_amd64.deb ...
Unpacking libmagic-mgc (1:5.32-2ubuntu0.4) ...
Selecting previously unselected package libmagic1:amd64.
Preparing to unpack .../03-libmagic1_1%3a5.32-2ubuntu0.4_amd64.deb ...
Unpacking libmagic1:amd64 (1:5.32-2ubuntu0.4) ...
Selecting previously unselected package file.
Preparing to unpack .../04-file_1%3a5.32-2ubuntu0.4_amd64.deb ...
Unpacking file (1:5.32-2ubuntu0.4) ...
Selecting previously unselected package libcap2-bin.
Preparing to unpack .../05-libcap2-bin_1%3a2.25-1.2_amd64.deb ...
Unpacking libcap2-bin (1:2.25-1.2) ...
Selecting previously unselected package libpam-cap:amd64.
Preparing to unpack .../06-libpam-cap_1%3a2.25-1.2_amd64.deb ...
Unpacking libpam-cap:amd64 (1:2.25-1.2) ...
```

Uploading .mp4 file to Darknet folder

```
1 from google.colab import files
2
3 uploaded = files.upload()
```

Choose Files No file chosen **Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.**

```
Saving test.mp4 to test.mp4
```

Training the dataset

```
!./darknet detector demo cfg/coco.data cfg/yolov3.cfg yolov3.weights -dont_show test.mp
```

```
Objects:

traffic light: 84%
car: 99%
car: 97%
car: 97%
car: 95%
car: 90%
person: 99%
person: 98%
person: 94%
person: 91%
person: 81%

FPS:5.1          AVG_FPS:4.6

 cvWriteFrame
Objects:

traffic light: 79%
car: 99%
car: 97%
car: 97%
car: 96%
car: 94%
person: 99%
person: 96%
person: 96%
person: 95%
person: 87%
person: 81%

FPS:5.3          AVG_FPS:5.1

 cvWriteFrame
Objects:

pottedplant: 81%
car: 99%
car: 98%
car: 98%
car: 96%
car: 90%
car: 76%
person: 99%
person: 89%
person: 89%
person: 89%
person: 86%
person: 86%

FPS:5.2          AVG_FPS:5.1
```

```
 cvWriteFrame
Objects:

pottedplant: 73%
car: 98%
car: 97%
```

Downloading the converted .avi file

```
1 from google.colab import files
2 files.download('output1.avi')
```