

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

Mounted at /content/drive

```
!git clone https://github.com/ultralytics/yolov5
```

```
Cloning into 'yolov5'...
remote: Enumerating objects: 12208, done.
remote: Counting objects: 100% (13/13), done.
remote: Compressing objects: 100% (13/13), done.
remote: Total 12208 (delta 6), reused 0 (delta 0), pack-reused 12195
Receiving objects: 100% (12208/12208), 11.91 MiB | 8.58 MiB/s, done.
Resolving deltas: 100% (8450/8450), done.
```

```
cd yolov5
```

/content/yolov5

```
ls
```

```
CONTRIBUTING.md  export.py  models/      setup.cfg     utils/
data/             hubconf.py README.md     train.py      val.py
detect.py         LICENSE   requirements.txt* tutorial.ipynb
```

```
!pip install -r requirements.txt
```

```
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 11)) (
Requirement already satisfied: torch>=1.7.0 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 12)) (
Requirement already satisfied: torchvision>=0.8.1 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line
Requirement already satisfied: tqdm>=4.41.0 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 14)) (
Requirement already satisfied: protobuf<=3.20.1 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 15
Requirement already satisfied: tensorboard>=2.4.1 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line
Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 22))
Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 23))
```

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Requirement already satisfied: seaborn<0.11.0 in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 25))
Requirement already satisfied: ipython in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 35)) (5.5.0)
Requirement already satisfied: psutil in /usr/local/lib/python3.7/dist-packages (from -r requirements.txt (line 36)) (5.4.8)
Collecting thop
  Downloading thop-0.0.31.post2005241907-py3-none-any.whl (8.7 kB)
Requirement already satisfied: cyclers>=0.10 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r requirements.txt (line 25))
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r requirements.txt (line 25))
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r requirements.txt (line 25))
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r requirements.txt (line 25))
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r requirements.txt (line 36))
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r requirements.txt (line 36))
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r requirements.txt (line 36))
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r requirements.txt (line 36))
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.7/dist-packages (from torch>=1.7.0->-r requirements.txt (line 37))
Requirement already satisfied: six>=1.9 in /usr/local/lib/python3.7/dist-packages (from protobuf<=3.20.1->-r requirements.txt (line 38))
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: wheel>=0.26 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: setuptools>=41.0.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: werkzeug>=0.11.15 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: grpcio>=1.24.3 in /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r requirements.txt (line 39))
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=1.1.4->-r requirements.txt (line 40))
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->-r requirements.txt (line 41))
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->-r requirements.txt (line 41))
Requirement already satisfied: cachetools<5.0,>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->-r requirements.txt (line 41))
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.7/dist-packages (from google-auth-oauthlib>=0.4.1->-r requirements.txt (line 42))
Requirement already satisfied: importlib-metadata>=4.4 in /usr/local/lib/python3.7/dist-packages (from markdown>=2.6.8->-r requirements.txt (line 43))
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata>=4.4->-r requirements.txt (line 43))
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /usr/local/lib/python3.7/dist-packages (from pyasn1-modules>=0.2.1->-r requirements.txt (line 44))
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.7/dist-packages (from requests-oauthlib>=0.7.0->-r requirements.txt (line 45))
Requirement already satisfied: pygments in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: decorator in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: prompt-toolkit<2.0.0,>=1.0.4 in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: traitlets>=4.2 in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: simplegeneric>0.8 in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: pexpect in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: pickleshare in /usr/local/lib/python3.7/dist-packages (from ipython->-r requirements.txt (line 35))
Requirement already satisfied: wcwidth in /usr/local/lib/python3.7/dist-packages (from prompt-toolkit<2.0.0,>=1.0.4->-r requirements.txt (line 35))

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Requirement already satisfied: wheel in /usr/local/lib/python3.7/dist-packages (from prompt-toolkit<2.0.0,>=1.0.4 /python
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.7/dist-packages (from pexpect->ipython->-r requirem
Installing collected packages: thop, PyYAML
Attempting uninstall: PyYAML
  Found existing installation: PyYAML 3.13
  Uninstalling PyYAML-3.13:
    Successfully uninstalled PyYAML-3.13
Successfully installed PyYAML-6.0 thop-0.0.31.post2005241907

```

```
!python train.py --img 640 --batch 16 --epochs 50 --data "/content/yolov5/data/custom.yaml" --weights yolov5x.pt --nosave --cache
```

```

39/49   13.8G   0.03332   0.01168   0.004015   6   640: 100% 7/7 [00:07<00:00, 1.01s/it]
      Class   Images   Labels       P       R   mAP@.5 mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.73it/s]
      all      50      50      0.966      0.978      0.983      0.651

Epoch  gpu_mem    box    obj    cls  labels  img_size
40/49   13.8G   0.03332   0.01168   0.004015   6   640: 100% 7/7 [00:07<00:00, 1.01s/it]
      Class   Images   Labels       P       R   mAP@.5 mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.73it/s]
      all      50      50      0.964      0.979      0.983      0.657

Epoch  gpu_mem    box    obj    cls  labels  img_size
41/49   13.8G   0.02727   0.01059   0.003062   7   640: 100% 7/7 [00:07<00:00, 1.02s/it]
      Class   Images   Labels       P       R   mAP@.5 mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.72it/s]
      all      50      50      0.964      0.977      0.982      0.591

Epoch  gpu_mem    box    obj    cls  labels  img_size
42/49   13.8G   0.02844   0.01157   0.004727   9   640: 100% 7/7 [00:07<00:00, 1.02s/it]
      Class   Images   Labels       P       R   mAP@.5 mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.73it/s]
      all      50      50      0.964      0.963      0.983      0.66

Epoch  gpu_mem    box    obj    cls  labels  img_size
43/49   13.8G   0.02935   0.01071   0.006676   8   640: 100% 7/7 [00:07<00:00, 1.02s/it]
      Class   Images   Labels       P       R   mAP@.5 mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.72it/s]
      all      50      50      0.964      0.979      0.986      0.668

Epoch  gpu_mem    box    obj    cls  labels  img_size
44/49   13.8G   0.03153   0.01279   0.006852   8   640: 100% 7/7 [00:07<00:00, 1.01s/it]
      Class   Images   Labels       P       R   mAP@.5 mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.71it/s]
      all      50      50      0.955      0.981      0.988      0.641

```

Epoch	gpu_mem	box	obj	cls	labels	img_size	
45/49	13.8G	0.02498	0.0115	0.004265	9	640: 100% 7/7	[00:07<00:00, 1.02s/it]
	Class	Images	Labels	P	R	mAP@.5	mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.71it/s]
	all	50	50	0.954	0.981	0.994	0.675
Epoch	gpu_mem	box	obj	cls	labels	img_size	
46/49	13.8G	0.0391	0.0117	0.006859	11	640: 100% 7/7	[00:07<00:00, 1.02s/it]
	Class	Images	Labels	P	R	mAP@.5	mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.70it/s]
	all	50	50	0.971	0.984	0.995	0.672
Epoch	gpu_mem	box	obj	cls	labels	img_size	
47/49	13.8G	0.03111	0.01174	0.005225	11	640: 100% 7/7	[00:07<00:00, 1.02s/it]
	Class	Images	Labels	P	R	mAP@.5	mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.72it/s]
	all	50	50	0.981	0.987	0.995	0.691
Epoch	gpu_mem	box	obj	cls	labels	img_size	
48/49	13.8G	0.02787	0.01156	0.005452	10	640: 100% 7/7	[00:07<00:00, 1.01s/it]
	Class	Images	Labels	P	R	mAP@.5	mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.72it/s]
	all	50	50	0.981	0.986	0.995	0.699
Epoch	gpu_mem	box	obj	cls	labels	img_size	
49/49	13.8G	0.02535	0.01055	0.008414	7	640: 100% 7/7	[00:07<00:00, 1.02s/it]
	Class	Images	Labels	P	R	mAP@.5	mAP@.5:.95: 100% 2/2 [00:01<00:00, 1.71it/s]
	all	50	50	0.971	1	0.995	0.695

50 epochs completed in 0.118 hours.

Optimizer stripped from runs/train/exp2/weights/last.pt, 173.2MB

Results saved to **runs/train/exp2**

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

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True)

```
ect.py --weights runs/train/exp2/weights/last.pt --img 640 --conf 0.25 --source "/content/drive/MyDrive/Major_Project_Abhinav_Saxena,
ect.py --weights runs/train/exp2/weights/last.pt --img 640 --conf 0.25 --source "/content/drive/MyDrive/Major_Project_Abhinav_Saxena,
ect.py --weights runs/train/exp2/weights/last.pt --img 640 --conf 0.25 --source "/content/drive/MyDrive/Major_Project_Abhinav_Saxena,
```

```
ect.py --weights runs/train/exp2/weights/last.pt --img 640 --conf 0.25 --source /content/drive/MyDrive/Major_Project_Abhinav_Saxena,
ect.py --weights runs/train/exp2/weights/last.pt --img 640 --conf 0.25 --source "/content/drive/MyDrive/Major_Project_Abhinav_Saxena,
ect.py --weights runs/train/exp2/weights/last.pt --img 640 --conf 0.25 --source "/content/drive/MyDrive/Major_Project_Abhinav_Saxena,
```

detect: weights=['runs/train/exp2/weights/last.pt'], source=/content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/1.jpg, dat
YOLOv5 🚀 v6.1-247-gcf298fb Python-3.7.13 torch-1.11.0+cu113 CUDA:0 (Tesla T4, 15110MiB)

Fusing layers...

Model summary: 444 layers, 86180143 parameters, 0 gradients, 204.0 GFLOPs

image 1/1 /content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/1.jpg: 416x640 1 no_mask, Done. (0.068s)

Speed: 0.6ms pre-process, 68.2ms inference, 1.3ms NMS per image at shape (1, 3, 640, 640)

Results saved to **runs/detect/exp6**

detect: weights=['runs/train/exp2/weights/last.pt'], source=/content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/2.jpg, dat
YOLOv5 🚀 v6.1-247-gcf298fb Python-3.7.13 torch-1.11.0+cu113 CUDA:0 (Tesla T4, 15110MiB)

Fusing layers...

Model summary: 444 layers, 86180143 parameters, 0 gradients, 204.0 GFLOPs

image 1/1 /content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/2.jpg: 384x640 1 no_mask, Done. (0.045s)

Speed: 0.5ms pre-process, 44.9ms inference, 1.3ms NMS per image at shape (1, 3, 640, 640)

Results saved to **runs/detect/exp7**

detect: weights=['runs/train/exp2/weights/last.pt'], source=/content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/3.jpg, dat
YOLOv5 🚀 v6.1-247-gcf298fb Python-3.7.13 torch-1.11.0+cu113 CUDA:0 (Tesla T4, 15110MiB)

Fusing layers...

Model summary: 444 layers, 86180143 parameters, 0 gradients, 204.0 GFLOPs

image 1/1 /content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/3.jpg: 448x640 1 mask, Done. (0.053s)

Speed: 0.7ms pre-process, 52.8ms inference, 1.2ms NMS per image at shape (1, 3, 640, 640)

Results saved to **runs/detect/exp8**

detect: weights=['runs/train/exp2/weights/last.pt'], source=/content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/4.jpg, dat
YOLOv5 🚀 v6.1-247-gcf298fb Python-3.7.13 torch-1.11.0+cu113 CUDA:0 (Tesla T4, 15110MiB)

Fusing layers...

Model summary: 444 layers, 86180143 parameters, 0 gradients, 204.0 GFLOPs

image 1/1 /content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/4.jpg: 448x640 1 mask, Done. (0.057s)

Speed: 0.6ms pre-process, 56.6ms inference, 1.3ms NMS per image at shape (1, 3, 640, 640)

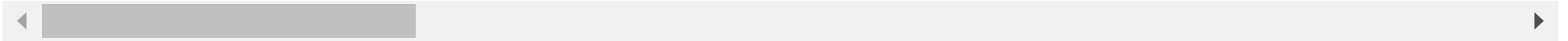
Results saved to **runs/detect/exp9**

detect: weights=['runs/train/exp2/weights/last.pt'], source=/content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/5.jpg, dat
YOLOv5 🚀 v6.1-247-gcf298fb Python-3.7.13 torch-1.11.0+cu113 CUDA:0 (Tesla T4, 15110MiB)

Fusing layers...

Model summary: 444 layers, 86180143 parameters, 0 gradients, 204.0 GFLOPs

```
image 1/1 /content/drive/MyDrive/Major_Project_Abhinav_Saxena/test/5.jpg: 448x640 1 mask, Done. (0.079s)  
Speed: 0.6ms pre-process, 78.5ms inference, 1.3ms NMS per image at shape (1, 3, 640, 640)  
Results saved to runs/detect/exp10
```



```
from google.colab import files  
files.download('runs/train/exp2/weights/last.pt')
```

✓ 0s completed at 4:09 PM

