

```

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

Mounted at /content/drive/

import os
os.chdir('/content/drive/MyDrive/Yolo_training')

ls
yolo_training.ipynb yolov5/

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

os.chdir('yolov5')

ls
benchmarks.py data_images/ infer_img/ README.md train.py
CITATION.cff data.yaml LICENSE README.zh-CN.md tutorial.ipynb
classify/ detect.py models/ requirements.txt utils/
CONTRIBUTING.md export.py __pycache__/ runs/ val.py
data/ hubconf.py pyproject.toml segment/ yolov5s.pt

!pip install -r requirements.txt
Show hidden output

```

Training YOLO v5 model

```

!python train.py --data data.yaml --cfg yolov5s.yaml --batch-size 8 --name Model --epochs 25

Creating new Ultralytics Settings v0.0.6 file ✓
View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics.com/quickstart/#ultralytics-settings.
wandb: WARNING ▲ wandb is deprecated and will be removed in a future release. See supported integrations at https://github.com/ultralytics/yolov5#integrations.
2024-11-11 09:56:25.535234: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:485] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT
2024-11-11 09:56:25.554648: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:8454] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN
2024-11-11 09:56:25.560532: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1452] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS
wandb: Using wandb-core as the SDK backend. Please refer to https://wandb.me/wandb-core for more information.
wandb: (1) Create a W&B account
wandb: (2) Use an existing W&B account
wandb: (3) Don't visualize my results
wandb: Enter your choice: (30 second timeout)
wandb: W&B disabled due to login timeout.
train: weights=yolov5s.pt, cfg=yolov5s.yaml, data=data.yaml, hyp=data/hyps/hyp.scratch-low.yaml, epochs=25, batch_size=8, imgsz=640, rect=False, resume=False, nosave
github: up to date with https://github.com/ultralytics/yolov5 ✓
YOLOv5 🚀 v7.0-383-g1435a8ee Python-3.10.12 torch-2.5.0+cu121 CUDA:0 (Tesla T4, 15102MiB)

hyperparameters: lr0=0.01, lrf=0.01, momentum=0.937, weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warmup_bias_lr=0.1, box=0.05, cls=0.5, cls_pw=1.0, obj=1.0,

```

```
Comet: run 'pip install comet_ml' to automatically track and visualize YOLOv5 🚀 runs in Comet
TensorBoard: Start with 'tensorboard --logdir runs/train', view at http://localhost:6006/
Downloading https://github.com/Ultralytics/assets/releases/download/v0.0.0/Arial.ttf to /root/.config/Ultralytics/Arial.ttf...
100% 755k/755k [00:00:00:00, 3.19MB/s]
Downloading https://github.com/Ultralytics/yolov5/releases/download/v7.0/yolov5s.pt to yolov5s.pt...
100% 14.1M/14.1M [00:00<00:00, 30.0MB/s]
```

Overriding model.yaml nc=80 with nc=3

from	n	params	module	arguments	
0	-1	1	3520	models.common.Conv	[3, 32, 6, 2, 2]
1	-1	1	18560	models.common.Conv	[32, 64, 3, 2]
2	-1	1	18816	models.common.C3	[64, 64, 1]
3	-1	1	73984	models.common.Conv	[64, 128, 3, 2]
4	-1	2	115712	models.common.C3	[128, 128, 2]
5	-1	1	295424	models.common.Conv	[128, 256, 3, 2]
6	-1	3	625152	models.common.C3	[256, 256, 3]
7	-1	1	1180672	models.common.Conv	[256, 512, 3, 2]
8	-1	1	1182720	models.common.C3	[512, 512, 1]
9	-1	1	656896	models.common.SPPF	[512, 512, 5]
10	-1	1	131584	models.common.Conv	[512, 256, 1, 1]
11	-1	1	0	torch.nn.modules.upsampling.Upsample	[None, 2, 'nearest']
12	[-1, 6]	1	0	models.common.Concat	[1]
13	-1	1	361984	models.common.C3	[512, 256, 1, False]
14	-1	1	33024	models.common.Conv	[256, 128, 1, 1]
15	-1	1	0	torch.nn.modules.upsampling.Upsample	[None, 2, 'nearest']
16	[-1, 4]	1	0	models.common.Concat	[1]
17	-1	1	90880	models.common.C3	[256, 128, 1, False]
18	-1	1	147712	models.common.Conv	[128, 128, 3, 2]
19	[-1, 14]	1	0	models.common.Concat	[1]
20	-1	1	296448	models.common.C3	[256, 256, 1, False]
21	-1	1	590336	models.common.Conv	[256, 256, 3, 2]
22	[-1, 10]	1	0	models.common.Concat	[1]
23	-1	1	1182720	models.common.C3	[512, 512, 1, False]
24	[17, 20, 23]	1	21576	models.yolo.Detect	[3, [[10, 13, 16, 30, 33, 23], [30, 61, 62, 45, 59, 119], [116, 90, 156, 198, 373, 326]], [128, 2

YOLOv5s summary: 214 layers, 7027720 parameters, 7027720 gradients, 16.0 GFLOPs

Transferred 342/349 items from yolov5s.pt

```
!python export.py --weights runs/train/Model/weights/best.pt --include onnx --simplify --opset 12
```

```
export: data=data/coco128.yaml, weights=['runs/train/Model/weights/best.pt'], imgsz=[640, 640], batch_size=1, device=cpu, half=False, inplace=False, keras=False, optimize=False
YOLOv5 🚀 v7.0-383-g1435a8ee Python-3.10.12 torch-2.4.1+cu121 CPU
```

Fusing layers...

YOLOv5s summary: 157 layers, 7018216 parameters, 0 gradients, 15.8 GFLOPs

```
PyTorch: starting from runs/train/Model/weights/best.pt with output shape (1, 25200, 8) (13.7 MB)
```

ONNX: starting export with onnx 1.17.0...

ONNX: slimming with onnxslim 0.1.37...

ONNX: export success ✅ 1.2s, saved as runs/train/Model/weights/best.onnx (27.2 MB)

```
Export complete (1.6s)
Results saved to /content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model/weights
Detect: python detect.py --weights runs/train/Model/weights/best.onnx
Validate: python val.py --weights runs/train/Model/weights/best.onnx
PyTorch Hub: model = torch.hub.load('ultralytics/yolov5', 'custom', 'runs/train/Model/weights/best.onnx')
Visualize: https://netron.app
```



```
!python val.py --weights /content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model/weights/best.pt --data data.yaml --img 640 --half
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.4.7)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (24.1)
Requirement already satisfied: pyParsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (3.2.0)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2024.2)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.4.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.10)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2.2.3)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2024.8.30)
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.16.1)
Requirement already satisfied: typing-extensions>=4.8.0 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (4.12.2)
Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.4.2)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.1.4)
Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2024.10.0)
Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from sympy==1.13.1->torch>=1.8.0->ultralytics) (1.3.0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib>=3.3.0->ultralytics) (1.16.0)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from jinja2->torch>=1.8.0->ultralytics) (3.0.2)
Downloading ultralytics-8.3.29-py3-none-any.whl (883 kB)
883.8/883.8 kB 44.7 MB/s eta 0:00:00
Downloading ultralytics_thop-2.0.11-py3-none-any.whl (26 kB)
Installing collected packages: ultralytics-thop, ultralytics
Successfully installed ultralytics-8.3.29 ultralytics-thop-2.0.11
Creating new Ultralytics Settings v0.0.6 file ✅
View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics.com/quickstart/#ultralytics-settings.
val: data=data.yaml, weights=['/content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model/weights/best.pt'], batch_size=32, imgsz=640, conf_thres=0.001, iou_thres=0.6, max_YOLOv5 🚀 v7.0-383-g1435a8ee Python-3.10.12 torch-2.5.0+cu121 CUDA:0 (Tesla T4, 15102MiB)

Fusing layers...
YOLOv5s summary: 157 layers, 7018216 parameters, 0 gradients, 15.8 GFLOPs
Downloading https://github.com/ultralytics/assets/releases/download/v0.0.0/Arial.ttf to /root/.config/Ultralytics/Arial.ttf...
100% 755k/755k [00:00<00:00, 102MB/s]
val: Scanning /content/drive/MyDrive/Yolo_training/yolov5/data_images/test.cache... 20 images, 0 backgrounds, 0 corrupt: 100% 20/20 [00:00<?, ?it/s]
```



RESULTS SAVED TO /content/yolo5/coco1

```
%load_ext tensorboard  
%tensorboard --logdir /content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model
```



TensorBoard

TIME SERIES

SCALARS

IMAGES

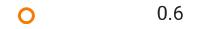
GRAPHS

INACTIVE

- Show data download links
- Ignore outliers in chart scaling

Tooltip sorting method: default ▾

Smoothing



0.6

Horizontal Axis

STEP RELATIVE WALL

Runs

Write a regex to filter runs



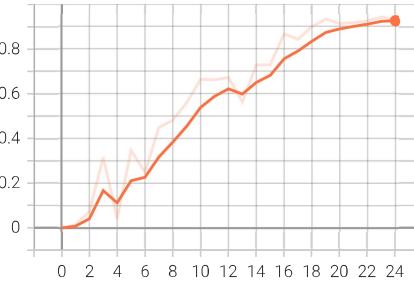
TOGGLE ALL RUNS

/content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model

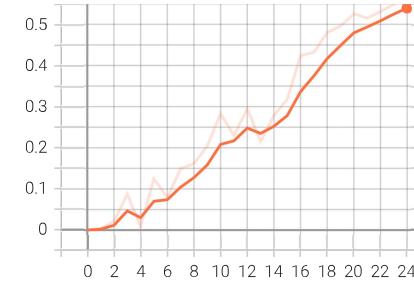
Filter tags (regular expressions supported)

metrics

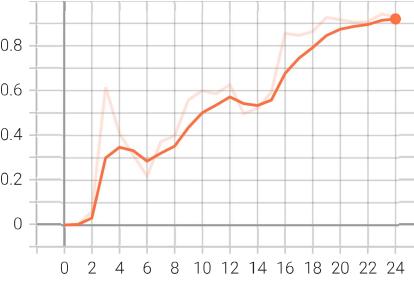
metrics/mAP_0.5
tag: metrics/mAP_0.5



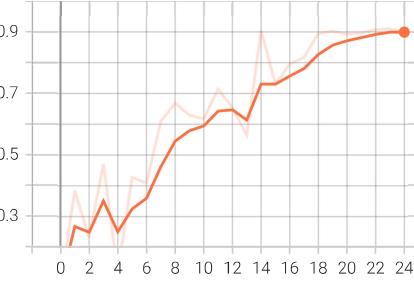
metrics/mAP_0.5:0.95
tag: metrics/mAP_0.5:0.95



metrics/precision
tag: metrics/precision



metrics/recall
tag: metrics/recall



train

```
!python detect.py --weights /content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model/weights/best.pt --img 640 --conf 0.25 --source /content/drive/MyDrive/Yolo_training/yolov5/infer_img, data=data/coco1
```

```
detect: weights=['/content/drive/MyDrive/Yolo_training/yolov5/runs/train/Model/weights/best.pt'], source=/content/drive/MyDrive/Yolo_training/yolov5/infer_img, data=data/coco1  
YOLOv5 v7.0-383-g1435a8ee Python-3.10.12 torch-2.5.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
```



```
Fusing layers...
```

```
YOLOv5s summary: 157 layers, 7018216 parameters, 0 gradients, 15.8 GFLOPs
```

```
WARNING ⚠️ NMS time limit 0.550s exceeded
```

```
image 1/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car125.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 29.0ms
image 2/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car134.jpg: 640x480 1 number_plate, 1 logo, 3 signal_lightss, 8.6ms
image 3/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car147.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.7ms
image 4/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car16.jpg: 640x480 1 number_plate, 1 signal_lights, 9.3ms
image 5/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car17.jpg: 640x480 1 number_plate, 1 logo, 3 signal_lightss, 8.6ms
image 6/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car24.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.6ms
image 7/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car3.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.6ms
image 8/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car49.jpg: 640x480 1 number_plate, 1 logo, 3 signal_lightss, 8.6ms
image 9/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car56.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 13.4ms
image 10/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car86.jpg: 640x480 1 number_plate, 2 logos, 2 signal_lightss, 8.6ms
image 11/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car97.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 12.7ms
image 12/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/Car98.jpg: 640x576 1 number_plate, 1 logo, 5 signal_lightss, 30.7ms
image 13/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car150.jpg: 640x480 1 number_plate, 1 logo, 3 signal_lightss, 8.7ms
image 14/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car157.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.7ms
image 15/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car159.jpg: 640x480 1 number_plate, 2 signal_lightss, 13.9ms
image 16/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car181.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.6ms
image 17/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car188.jpg: 640x480 1 number_plate, 1 logo, 3 signal_lightss, 8.6ms
image 18/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car192.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.6ms
image 19/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car194.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 8.7ms
image 20/20 /content/drive/MyDrive/Yolo_training/yolov5/infer_img/car198.jpg: 640x480 1 number_plate, 1 logo, 2 signal_lightss, 9.1ms
Speed: 0.6ms pre-process, 11.5ms inference, 30.7ms NMS per image at shape (1, 3, 640, 640)
Results saved to runs/detect/exp2
```

```
import os
from IPython.display import Image, display

# Path to the directory where the output images are saved
output_dir = '/content/drive/MyDrive/Yolo_training/yolov5/runs/detect/exp2'

# Get all image files in the output directory
output_images = [f for f in os.listdir(output_dir) if f.endswith('.jpg', '.png', '.jpeg')]

# Display each image
for img_file in output_images:
    display(Image(filename=os.path.join(output_dir, img_file)))
```







Start coding or [generate](#) with AI.

