

Data Initialization

```
In [1]: from torchvision.datasets import Cityscapes
import torchvision.transforms as T
from PIL import Image
from roboflow import Roboflow
from ultralytics import YOLO
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
import torch
import torchvision
import torch.nn as nn
import torch.nn.functional as F
from torchvision import transforms
import numpy as np
import cv2
```

```
In [4]: # downloading dataset in yolo format
rf = Roboflow(api_key="TbG4o6EFfJ15o6vHSJi8")
project = rf.workspace("eastsky").project("bdd100k-e3s18")
version = project.version(1)
dataset = version.download("yolov11")
```

loading Roboflow workspace...

loading Roboflow project...

Downloading Dataset Version Zip in bdd100k--1 to yolov11:: 100%|██████████| 414997/414997 [00:48<00:00, 8537.98it/s]

Extracting Dataset Version Zip to bdd100k--1 in yolov11:: 100%|██████████| 19606/19606 [00:41<00:00, 471.41it/s]

```
In [5]: # downloading dataset in coco format
rf = Roboflow(api_key="TbG4o6EFfJ15o6vHSJi8")
project = rf.workspace("eastsky").project("bdd100k-e3s18")
version = project.version(1)
dataset = version.download("coco")
```

loading Roboflow workspace...

loading Roboflow project...

```
In [13]: dspath = dataset.location
print(dspath)
```

D:\ery\School\Jupyter Notebooks\bdd100k--1

```
In [23]: # Loading some images
rand_img = mpimg.imread('bdd100k--1/test/images/b1d0a191-2ed2269e_jpg.rf.bd35938271')
plt.imshow(rand_img)
plt.axis('off')
plt.show()
```



3 model object detection benchmark

YOLO 11

```
In [4]: yolo_model = YOLO('yolo11n.pt')  
        yolo_model.train(data='bdd100k--1/data.yaml', epochs = 20, imgsz=640, batch=16)
```

New <https://pypi.org/project/ultralytics/8.3.109> available Update with 'pip install -U ultralytics'

Ultralytics 8.3.107 Python-3.10.13 torch-2.5.1 CUDA:0 (NVIDIA GeForce RTX 2060 SUPER, 8192MiB)

engine\trainer: task=detect, mode=train, model=yolo11n.pt, data=bdd100k--1/data.yaml, epochs=20, time=None, patience=100, batch=16, imgsz=640, save=True, save_period=1, cache=False, device=None, workers=8, project=None, name=train14, exist_ok=False, pretrained=True, optimizer=auto, verbose=True, seed=0, deterministic=True, single_cls=False, rect=False, cos_lr=False, close_mosaic=10, resume=False, amp=True, fraction=1.0, profile=False, freeze=None, multi_scale=False, overlap_mask=True, mask_ratio=4, dropout=0.0, val=True, split=val, save_json=False, conf=None, iou=0.7, max_det=300, half=False, dnn=False, plots=True, source=None, vid_stride=1, stream_buffer=False, visualize=False, augment=False, agnostic_nms=False, classes=None, retina_masks=False, embed=None, show=False, save_frames=False, save_txt=False, save_conf=False, save_crop=False, show_labels=True, show_conf=True, show_boxes=True, line_width=None, format=torchscript, keras=False, optimize=False, int8=False, dynamic=False, simplify=True, opset=None, workspace=None, nms=False, 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=7.5, cls=0.5, dfl=1.5, pose=12.0, kobj=1.0, nbs=64, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, flip_lr=0.5, bgr=0.0, mosaic=1.0, mixup=0.0, copy_paste=0.0, copy_paste_mode=flip, auto_augment=randaugument, erasing=0.4, crop_fraction=1.0, cfg=None, tracker=botsort.yaml, save_dir=runs\detect\train14

Overriding model.yaml nc=80 with nc=7

	from	n	params	module	a
arguments					
0	-1	1	464	ultralytics.nn.modules.conv.Conv	
[3, 16, 3, 2]					
1	-1	1	4672	ultralytics.nn.modules.conv.Conv	
[16, 32, 3, 2]					
2	-1	1	6640	ultralytics.nn.modules.block.C3k2	
[32, 64, 1, False, 0.25]					
3	-1	1	36992	ultralytics.nn.modules.conv.Conv	
[64, 64, 3, 2]					
4	-1	1	26080	ultralytics.nn.modules.block.C3k2	
[64, 128, 1, False, 0.25]					
5	-1	1	147712	ultralytics.nn.modules.conv.Conv	
[128, 128, 3, 2]					
6	-1	1	87040	ultralytics.nn.modules.block.C3k2	
[128, 128, 1, True]					
7	-1	1	295424	ultralytics.nn.modules.conv.Conv	
[128, 256, 3, 2]					
8	-1	1	346112	ultralytics.nn.modules.block.C3k2	
[256, 256, 1, True]					
9	-1	1	164608	ultralytics.nn.modules.block.SPPF	
[256, 256, 5]					
10	-1	1	249728	ultralytics.nn.modules.block.C2PSA	
[256, 256, 1]					
11	-1	1	0	torch.nn.modules.upsampling.Upsample	
[None, 2, 'nearest']					
12	[-1, 6]	1	0	ultralytics.nn.modules.conv.Concat	
[1]					
13	-1	1	111296	ultralytics.nn.modules.block.C3k2	
[384, 128, 1, False]					
14	-1	1	0	torch.nn.modules.upsampling.Upsample	

```

[None, 2, 'nearest']
15          [-1, 4] 1          0  ultralytics.nn.modules.conv.Concat
[1]
16          -1 1          32096  ultralytics.nn.modules.block.C3k2
[256, 64, 1, False]
17          -1 1          36992  ultralytics.nn.modules.conv.Conv
[64, 64, 3, 2]
18          [-1, 13] 1          0  ultralytics.nn.modules.conv.Concat
[1]
19          -1 1          86720  ultralytics.nn.modules.block.C3k2
[192, 128, 1, False]
20          -1 1          147712  ultralytics.nn.modules.conv.Conv
[128, 128, 3, 2]
21          [-1, 10] 1          0  ultralytics.nn.modules.conv.Concat
[1]
22          -1 1          378880  ultralytics.nn.modules.block.C3k2
[384, 256, 1, True]
23          [16, 19, 22] 1          432037  ultralytics.nn.modules.head.Detect
[7, [64, 128, 256]]
YOLO11n summary: 181 layers, 2,591,205 parameters, 2,591,189 gradients, 6.4 GFLOPs

```

Transferred 448/499 items from pretrained weights

TensorBoard: Start with 'tensorboard --logdir runs\detect\train14', view at <http://localhost:6006/>

Freezing layer 'model.23.dfl.conv.weight'

AMP: running Automatic Mixed Precision (AMP) checks...

AMP: checks passed

train: Scanning D:\ery\School\Jupyter Notebooks\bdd100k--1\train\labels.cache... 6857 images, 0 backgrounds, 0 corrupt: 100%|██████████| 6857/6857 [00:00<?, ?it/s]

val: Scanning D:\ery\School\Jupyter Notebooks\bdd100k--1\valid\labels.cache... 1960 images, 0 backgrounds, 0 corrupt: 100%|██████████| 1960/1960 [00:00<?, ?it/s]

Plotting labels to runs\detect\train14\labels.jpg...

optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum' automatically...

optimizer: AdamW(lr=0.000909, momentum=0.9) with parameter groups 81 weight(decay=0.0), 88 weight(decay=0.0005), 87 bias(decay=0.0)

TensorBoard: model graph visualization added

Image sizes 640 train, 640 val

Using 8 dataloader workers

Logging results to runs\detect\train14

Starting training for 20 epochs...

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
1/20	3.06G	1.587	1.892	1.178	79	640: 100% ██████████
	429/429	[01:51<00:00, 3.84it/s]				
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:21<00:00, 2.82it/s]			
	all	1960	24550	0.685	0.193	0.193
0.109						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
2/20	3.06G	1.505	1.294	1.158	173	640: 100% ██████████
	429/429	[01:36<00:00, 4.46it/s]				
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:18<00:00, 3.28it/s]			

all 1960 24550 0.386 0.24 0.199
0.107

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
3/20	3.06G	1.481	1.186	1.15	180	640: 100%
██████████ 429/429 [01:32<00:00, 4.63it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:18<00:00, 3.35it/s]			
all	1960	24550	0.478	0.22	0.228	

0.124

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
4/20	3.06G	1.475	1.138	1.147	247	640: 100%
██████████ 429/429 [01:30<00:00, 4.74it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.49it/s]			
all	1960	24550	0.515	0.243	0.24	

0.133

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
5/20	3.06G	1.447	1.078	1.132	169	640: 100%
██████████ 429/429 [01:31<00:00, 4.71it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:18<00:00, 3.37it/s]			
all	1960	24550	0.47	0.253	0.26	

0.143

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
6/20	3.06G	1.425	1.038	1.12	157	640: 100%
██████████ 429/429 [01:30<00:00, 4.73it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.49it/s]			
all	1960	24550	0.347	0.306	0.278	

0.155

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
7/20	3.06G	1.41	1.018	1.117	174	640: 100%
██████████ 429/429 [01:29<00:00, 4.77it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:18<00:00, 3.38it/s]			
all	1960	24550	0.392	0.293	0.274	

0.15

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
8/20	3.06G	1.4	1.003	1.11	152	640: 100%
██████████ 429/429 [01:30<00:00, 4.75it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.52it/s]			
all	1960	24550	0.397	0.326	0.308	

0.17

Epoch GPU_mem box_loss cls_loss df1_loss Instances Size

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          9/20      3.06G      1.375      0.9746      1.102      290      640: 100%|
██████████ | 429/429 [01:31<00:00, 4.71it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.45it/s]
          all      1960      24550      0.399      0.328      0.307
0.174

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Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
10/20      3.06G      1.367      0.9569      1.097      192      640: 100%|
██████████ | 429/429 [01:29<00:00, 4.77it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.46it/s]
          all      1960      24550      0.405      0.351      0.33
0.185
Closing dataloader mosaic

```

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Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
11/20      3.06G      1.381      0.9142      1.092      96      640: 100%|
██████████ | 429/429 [01:24<00:00, 5.05it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.49it/s]
          all      1960      24550      0.453      0.333      0.34
0.193

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
12/20      3.06G      1.373      0.8985      1.089      117      640: 100%|
██████████ | 429/429 [01:23<00:00, 5.15it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.57it/s]
          all      1960      24550      0.444      0.356      0.351
0.194

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```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
13/20      3.06G      1.361      0.8829      1.082      80      640: 100%|
██████████ | 429/429 [01:23<00:00, 5.16it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.51it/s]
          all      1960      24550      0.461      0.35      0.354
0.198

```

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Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
14/20      3.06G      1.348      0.8663      1.075      84      640: 100%|
██████████ | 429/429 [01:23<00:00, 5.14it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.54it/s]
          all      1960      24550      0.55      0.349      0.375
0.21

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
15/20      3.06G      1.338      0.8562      1.072      95      640: 100%|
██████████ | 429/429 [01:24<00:00, 5.07it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.59it/s]

```

all 1960 24550 0.485 0.364 0.37
0.211

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
16/20	3.06G	1.334	0.844	1.067	77	640: 100%
██████████ 429/429 [01:23<00:00, 5.15it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.57it/s]			
all	1960	24550	0.572	0.347	0.387	

0.218

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
17/20	3.06G	1.32	0.8286	1.062	106	640: 100%
██████████ 429/429 [01:23<00:00, 5.16it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.52it/s]			
all	1960	24550	0.585	0.341	0.382	

0.221

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
18/20	3.06G	1.312	0.818	1.058	125	640: 100%
██████████ 429/429 [01:24<00:00, 5.11it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.57it/s]			
all	1960	24550	0.516	0.365	0.384	

0.225

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
19/20	3.06G	1.304	0.8085	1.054	123	640: 100%
██████████ 429/429 [01:24<00:00, 5.07it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.54it/s]			
all	1960	24550	0.57	0.344	0.388	

0.228

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
20/20	3.06G	1.294	0.7965	1.049	127	640: 100%
██████████ 429/429 [01:24<00:00, 5.07it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.53it/s]			
all	1960	24550	0.568	0.358	0.398	

0.233

20 epochs completed in 0.629 hours.

Optimizer stripped from runs\detect\train14\weights\last.pt, 5.5MB

Optimizer stripped from runs\detect\train14\weights\best.pt, 5.5MB

Validating runs\detect\train14\weights\best.pt...

Ultralytics 8.3.107 Python-3.10.13 torch-2.5.1 CUDA:0 (NVIDIA GeForce RTX 2060 SUPER, 8192MiB)

YOLO11n summary (fused): 100 layers, 2,583,517 parameters, 0 gradients, 6.3 GFLOPs

Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:24<00:00, 2.52it/s]			

0.233	all	1960	24550	0.553	0.362	0.398	
0.136	bike	121	221	0.473	0.294	0.289	
0.318	bus	227	309	0.565	0.391	0.437	
0.44	car	1956	20327	0.704	0.659	0.719	
0.106	motor	67	90	0.63	0.151	0.223	
0.215	person	639	2626	0.563	0.428	0.462	
0.0829	rider	104	133	0.398	0.158	0.182	0.
0.332	truck	526	844	0.539	0.454	0.472	

Speed: 0.2ms preprocess, 2.0ms inference, 0.0ms loss, 1.6ms postprocess per image
Results saved to **runs\detect\train14**

228,	0.28328,	0.28428,	0.28529,	0.28629,	0.28729,	
	0.28829,	0.28929,	0.29029,	0.29129,	0.29229,	0.2932
9,	0.29429,	0.2953,	0.2963,	0.2973,	0.2983,	0.2993,
0.3003,	0.3013,	0.3023,	0.3033,	0.3043,	0.30531,	0.306
31,	0.30731,	0.30831,	0.30931,	0.31031,	0.31131,	
	0.31231,	0.31331,	0.31431,	0.31532,	0.31632,	0.3173
2,	0.31832,	0.31932,	0.32032,	0.32132,	0.32232,	0.32332,
0.32432,	0.32533,	0.32633,	0.32733,	0.32833,	0.32933,	0.33
033,	0.33133,	0.33233,	0.33333,	0.33433,	0.33534,	
	0.33634,	0.33734,	0.33834,	0.33934,	0.34034,	0.3413
4,	0.34234,	0.34334,	0.34434,	0.34535,	0.34635,	0.34735,
0.34835,	0.34935,	0.35035,	0.35135,	0.35235,	0.35335,	0.35
435,	0.35536,	0.35636,	0.35736,	0.35836,	0.35936,	
	0.36036,	0.36136,	0.36236,	0.36336,	0.36436,	0.3653
7,	0.36637,	0.36737,	0.36837,	0.36937,	0.37037,	0.37137,
0.37237,	0.37337,	0.37437,	0.37538,	0.37638,	0.37738,	0.37
838,	0.37938,	0.38038,	0.38138,	0.38238,	0.38338,	
	0.38438,	0.38539,	0.38639,	0.38739,	0.38839,	0.3893
9,	0.39039,	0.39139,	0.39239,	0.39339,	0.39439,	0.3954,
0.3964,	0.3974,	0.3984,	0.3994,	0.4004,	0.4014,	0.40
24,	0.4034,	0.4044,	0.40541,	0.40641,	0.40741,	
	0.40841,	0.40941,	0.41041,	0.41141,	0.41241,	0.4134
1,	0.41441,	0.41542,	0.41642,	0.41742,	0.41842,	0.41942,
0.42042,	0.42142,	0.42242,	0.42342,	0.42442,	0.42543,	0.42
643,	0.42743,	0.42843,	0.42943,	0.43043,	0.43143,	
	0.43243,	0.43343,	0.43443,	0.43544,	0.43644,	0.4374
4,	0.43844,	0.43944,	0.44044,	0.44144,	0.44244,	0.44344,
0.44444,	0.44545,	0.44645,	0.44745,	0.44845,	0.44945,	0.45
045,	0.45145,	0.45245,	0.45345,	0.45445,	0.45546,	
	0.45646,	0.45746,	0.45846,	0.45946,	0.46046,	0.4614
6,	0.46246,	0.46346,	0.46446,	0.46547,	0.46647,	0.46747,
0.46847,	0.46947,	0.47047,	0.47147,	0.47247,	0.47347,	0.47
447,	0.47548,	0.47648,	0.47748,	0.47848,	0.47948,	
	0.48048,	0.48148,	0.48248,	0.48348,	0.48448,	0.4854
9,	0.48649,	0.48749,	0.48849,	0.48949,	0.49049,	0.49149,
0.49249,	0.49349,	0.49449,	0.4955,	0.4965,	0.4975,	0.4
985,	0.4995,	0.5005,	0.5015,	0.5025,	0.5035,	
	0.5045,	0.50551,	0.50651,	0.50751,	0.50851,	0.5095
1,	0.51051,	0.51151,	0.51251,	0.51351,	0.51451,	0.51552,
0.51652,	0.51752,	0.51852,	0.51952,	0.52052,	0.52152,	0.52
252,	0.52352,	0.52452,	0.52553,	0.52653,	0.52753,	
	0.52853,	0.52953,	0.53053,	0.53153,	0.53253,	0.5335
3,	0.53453,	0.53554,	0.53654,	0.53754,	0.53854,	0.53954,
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```

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    0.98498,    0.98599,    0.98699,    0.98799,    0.98899,    0.9899
9,    0.99099,    0.99199,    0.99299,    0.99399,    0.99499,    0.996,
0.997,    0.998,    0.999,    1]), array([[ 0.64253,    0.64253,
0.63348, ...,    0,    0,
    [ 0.88997,    0.88997,    0.85761, ...,    0,    0,
0],
    [ 0.86939,    0.86939,    0.86575, ...,    0,    0,
0],
    ...,
    [ 0.78941,    0.78941,    0.78142, ...,    0,    0,
0],
    [ 0.58647,    0.58647,    0.57895, ...,    0,    0,
0],
    [ 0.88863,    0.88863,    0.87678, ...,    0,    0,
0]]), 'Confidence', 'Recall']]
fitness: 0.24928209358732775
keys: ['metrics/precision(B)', 'metrics/recall(B)', 'metrics/mAP50(B)', 'metrics/m
AP50-95(B)']

```

```

maps: array([ 0.13567,  0.31803,  0.44004,  0.10584,  0.21512,
 0.082854,  0.33188])
names: {0: 'bike', 1: 'bus', 2: 'car', 3: 'motor', 4: 'person', 5: 'rider', 6: 'truck'}
plot: True
results_dict: {'metrics/precision(B)': 0.5530464812207251, 'metrics/recall(B)': 0.36218608893693144, 'metrics/mAP50(B)': 0.39783847997026917, 'metrics/mAP50-95(B)': 0.2327758284336676, 'fitness': 0.24928209358732775}
save_dir: WindowsPath('runs/detect/train14')
speed: {'preprocess': 0.18187285714906912, 'inference': 1.973027040819906, 'loss': 0.0004967346823683997, 'postprocess': 1.571432704088006}
task: 'detect'

```

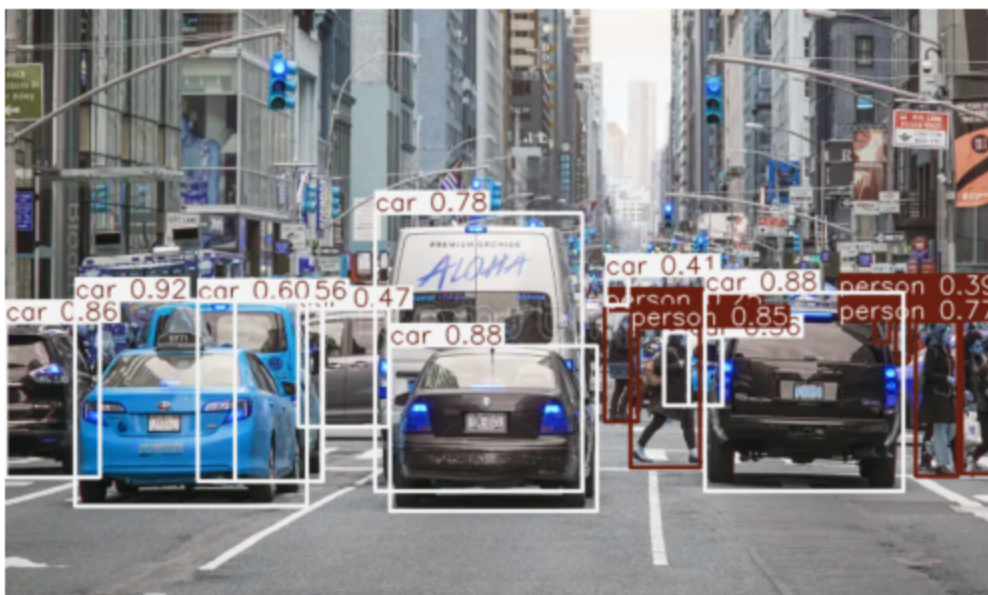
```

In [10]: pred_test = yolo_model('street-traffic-new-york-typical-street-view-manhattan-manhattan-new-york-april-92272598.webp')
plt.imshow(pred_test[0].plot())
plt.axis('off')
plt.show()

```

image 1/1 D:\very\School\Jupyter Notebooks\street-traffic-new-york-typical-street-view-manhattan-manhattan-new-york-april-92272598.webp: 384x640 11 cars, 6 persons, 69.1 ms

Speed: 3.3ms preprocess, 69.1ms inference, 2.4ms postprocess per image at shape (1, 3, 384, 640)



```

In [11]: # saving the model in onnx
yolo_model.export(format='onnx')

```

Ultralytics 8.3.107 Python-3.10.13 torch-2.5.1 CPU (AMD Ryzen 5 2600 Six-Core Processor)

PyTorch: starting from 'runs\detect\train14\weights\best.pt' with input shape (1, 3, 640, 640) BCHW and output shape(s) (1, 11, 8400) (5.2 MB)

ONNX: starting export with onnx 1.17.0 opset 19...

ONNX: slimming with onnxslim 0.1.50...

ONNX: export success 6.0s, saved as 'runs\detect\train14\weights\best.onnx' (10.1 MB)

Export complete (7.0s)

Results saved to D:\ery\School\Jupyter Notebooks\runs\detect\train14\weights

Predict: yolo predict task=detect model=runs\detect\train14\weights\best.onnx
x imgsz=640

Validate: yolo val task=detect model=runs\detect\train14\weights\best.onnx
imgsz=640 data=bdd100k--1\data.yaml

Visualize: <https://netron.app>

Out[11]: 'runs\\detect\\train14\\weights\\best.onnx'

In [12]: dataset.location

Out[12]: 'D:\\ery\\School\\Jupyter Notebooks\\bdd100k--1'

YOLOv8

In [4]: yolo_v8_model = YOLO('yolov8n.yaml')
yolo_v8_model.train(data='bdd100k--1\data.yaml', epochs=50, imgsz=640, batch=16)

New <https://pypi.org/project/ultralytics/8.3.109> available Update with 'pip install -U ultralytics'

Ultralytics 8.3.107 Python-3.10.13 torch-2.5.1 CUDA:0 (NVIDIA GeForce RTX 2060 SUPER, 8192MiB)

engine\trainer: task=detect, mode=train, model=yolov8n.yaml, data=bdd100k--1/data.yaml, epochs=50, time=None, patience=100, batch=16, imgsz=640, save=True, save_period=-1, cache=False, device=None, workers=8, project=None, name=train18, exist_ok=False, pretrained=True, optimizer=auto, verbose=True, seed=0, deterministic=True, single_cls=False, rect=False, cos_lr=False, close_mosaic=10, resume=False, amp=True, fraction=1.0, profile=False, freeze=None, multi_scale=False, overlap_mask=True, mask_ratio=4, dropout=0.0, val=True, split=val, save_json=False, conf=None, iou=0.7, max_det=300, half=False, dnn=False, plots=True, source=None, vid_stride=1, stream_buffer=False, visualize=False, augment=False, agnostic_nms=False, classes=None, retina_masks=False, embed=None, show=False, save_frames=False, save_txt=False, save_conf=False, save_crop=False, show_labels=True, show_conf=True, show_boxes=True, line_width=None, format=torchscript, keras=False, optimize=False, int8=False, dynamic=False, simplify=True, opset=None, workspace=None, nms=False, 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=7.5, cls=0.5, dfl=1.5, pose=12.0, kobj=1.0, nbs=64, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, flip_lr=0.5, bgr=0.0, mosaic=1.0, mixup=0.0, copy_paste=0.0, copy_paste_mode=flip, auto_augment=randaugment, erasing=0.4, crop_fraction=1.0, cfg=None, tracker=botsort.yaml, save_dir=runs\detect\train18

Overriding model.yaml nc=80 with nc=7

	from	n	params	module	a
arguments					
0	-1	1	464	ultralytics.nn.modules.conv.Conv	
[3, 16, 3, 2]					
1	-1	1	4672	ultralytics.nn.modules.conv.Conv	
[16, 32, 3, 2]					
2	-1	1	7360	ultralytics.nn.modules.block.C2f	
[32, 32, 1, True]					
3	-1	1	18560	ultralytics.nn.modules.conv.Conv	
[32, 64, 3, 2]					
4	-1	2	49664	ultralytics.nn.modules.block.C2f	
[64, 64, 2, True]					
5	-1	1	73984	ultralytics.nn.modules.conv.Conv	
[64, 128, 3, 2]					
6	-1	2	197632	ultralytics.nn.modules.block.C2f	
[128, 128, 2, True]					
7	-1	1	295424	ultralytics.nn.modules.conv.Conv	
[128, 256, 3, 2]					
8	-1	1	460288	ultralytics.nn.modules.block.C2f	
[256, 256, 1, True]					
9	-1	1	164608	ultralytics.nn.modules.block.SPPF	
[256, 256, 5]					
10	-1	1	0	torch.nn.modules.upsampling.Upsample	
[None, 2, 'nearest']					
11	[-1, 6]	1	0	ultralytics.nn.modules.conv.Concat	
[1]					
12	-1	1	148224	ultralytics.nn.modules.block.C2f	
[384, 128, 1]					
13	-1	1	0	torch.nn.modules.upsampling.Upsample	
[None, 2, 'nearest']					
14	[-1, 4]	1	0	ultralytics.nn.modules.conv.Concat	


```

[1]
 15                -1  1    37248  ultralytics.nn.modules.block.C2f
[192, 64, 1]
 16                -1  1    36992  ultralytics.nn.modules.conv.Conv
[64, 64, 3, 2]
 17      [-1, 12]  1          0  ultralytics.nn.modules.conv.Concat
[1]
 18                -1  1   123648  ultralytics.nn.modules.block.C2f
[192, 128, 1]
 19                -1  1   147712  ultralytics.nn.modules.conv.Conv
[128, 128, 3, 2]
 20      [-1, 9]  1          0  ultralytics.nn.modules.conv.Concat
[1]
 21                -1  1   493056  ultralytics.nn.modules.block.C2f
[384, 256, 1]
 22      [15, 18, 21]  1    752677  ultralytics.nn.modules.head.Detect
[7, [64, 128, 256]]
YOLOv8n summary: 129 layers, 3,012,213 parameters, 3,012,197 gradients, 8.2 GFLOPs

```

TensorBoard: Start with 'tensorboard --logdir runs\detect\train18', view at <http://localhost:6006/>

Freezing layer 'model.22.dfl.conv.weight'

AMP: running Automatic Mixed Precision (AMP) checks...

AMP: checks passed

train: Scanning D:\ery\School\Jupyter Notebooks\bdd100k--1\train\labels.cache... 6857 images, 0 backgrounds, 0 corrupt: 100%|██████████| 6857/6857 [00:00<?, ?it/s]

val: Scanning D:\ery\School\Jupyter Notebooks\bdd100k--1\valid\labels.cache... 1960 images, 0 backgrounds, 0 corrupt: 100%|██████████| 1960/1960 [00:00<?, ?it/s]

Plotting labels to runs\detect\train18\labels.jpg...

optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum' automatically...

optimizer: AdamW(lr=0.000909, momentum=0.9) with parameter groups 57 weight(decay=0.0), 64 weight(decay=0.0005), 63 bias(decay=0.0)

TensorBoard: model graph visualization added

Image sizes 640 train, 640 val













Using 8 dataloader workers

Logging results to runs\detect\train18

Starting training for 50 epochs...

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
1/50	2.83G	3.63	3.819	3.478	79	640: 100% ██████████ 429/429 [02:16<00:00, 3.14it/s]
		Class	Images	Instances	Box(P	R
		-95): 100% ██████████	62/62	[00:21<00:00, 2.91it/s]		mAP50 mAP50
		all	1960	24550	0.879	0.0184 0.0115 0.00369

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
2/50	2.85G	2.707	2.414	2.143	173	640: 100% ██████████ 429/429 [01:24<00:00, 5.06it/s]
		Class	Images	Instances	Box(P	R
		-95): 100% ██████████	62/62	[00:19<00:00, 3.22it/s]		mAP50 mAP50

	all	1960	24550	0.629	0.0449	0.0498	0.
0208							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	3/50	2.85G	2.248	1.918	1.738	180	640: 100%
	 429/429	[01:22<00:00, 5.23it/s]					
	Class	Images	Instances	Box(P	R	mAP50	mAP50
	-95): 100%	 62/62	[00:19<00:00, 3.25it/s]				
	all	1960	24550	0.546	0.0916	0.0745	0.
0343							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	4/50	2.85G	2.067	1.719	1.602	247	640: 100%
	 429/429	[01:20<00:00, 5.30it/s]					
	Class	Images	Instances	Box(P	R	mAP50	mAP50
	-95): 100%	 62/62	[00:19<00:00, 3.21it/s]				
	all	1960	24550	0.577	0.124	0.103	0.
0503							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	5/50	2.85G	1.946	1.568	1.52	169	640: 100%
	 429/429	[01:19<00:00, 5.37it/s]					
	Class	Images	Instances	Box(P	R	mAP50	mAP50
	-95): 100%	 62/62	[00:18<00:00, 3.27it/s]				
	all	1960	24550	0.468	0.141	0.124	0.
0608							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	6/50	2.85G	1.858	1.46	1.46	157	640: 100%
	 429/429	[01:20<00:00, 5.36it/s]					
	Class	Images	Instances	Box(P	R	mAP50	mAP50
	-95): 100%	 62/62	[00:19<00:00, 3.14it/s]				
	all	1960	24550	0.463	0.149	0.135	0.
0681							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	7/50	2.85G	1.8	1.409	1.427	174	640: 100%
	 429/429	[01:22<00:00, 5.22it/s]					
	Class	Images	Instances	Box(P	R	mAP50	mAP50
	-95): 100%	 62/62	[00:18<00:00, 3.27it/s]				
	all	1960	24550	0.482	0.165	0.146	0.
0723							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	8/50	2.85G	1.745	1.351	1.387	152	640: 100%
	 429/429	[01:21<00:00, 5.24it/s]					
	Class	Images	Instances	Box(P	R	mAP50	mAP50
	-95): 100%	 62/62	[00:18<00:00, 3.28it/s]				
	all	1960	24550	0.376	0.197	0.158	
0.081							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size

9/50	2.85G	1.698	1.297	1.362	290	640: 100%	
██████████	429/429	[01:19<00:00,	5.38it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:18<00:00,	3.31it/s]			
	all	1960	24550	0.528	0.184	0.168	0.
0866							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
10/50	2.85G	1.663	1.261	1.338	192	640: 100%	
██████████	429/429	[01:23<00:00,	5.13it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:18<00:00,	3.34it/s]			
	all	1960	24550	0.336	0.219	0.178	
0.091							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
11/50	2.85G	1.651	1.242	1.325	173	640: 100%	
██████████	429/429	[01:18<00:00,	5.48it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:17<00:00,	3.45it/s]			
	all	1960	24550	0.545	0.195	0.18	0.
0942							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
12/50	2.85G	1.616	1.2	1.304	229	640: 100%	
██████████	429/429	[01:18<00:00,	5.49it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:17<00:00,	3.51it/s]			
	all	1960	24550	0.593	0.187	0.191	0.
0989							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
13/50	2.85G	1.61	1.187	1.299	167	640: 100%	
██████████	429/429	[01:17<00:00,	5.50it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:17<00:00,	3.48it/s]			
	all	1960	24550	0.454	0.213	0.196	
0.102							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
14/50	2.85G	1.584	1.172	1.287	162	640: 100%	
██████████	429/429	[01:17<00:00,	5.56it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:17<00:00,	3.47it/s]			
	all	1960	24550	0.377	0.226	0.197	
0.103							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
15/50	2.85G	1.582	1.169	1.278	118	640: 100%	
██████████	429/429	[01:17<00:00,	5.55it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50	
-95): 100%	██████████	62/62	[00:17<00:00,	3.47it/s]			

all 1960 24550 0.396 0.219 0.208
0.107

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
16/50	2.85G	1.574	1.148	1.265	174	640: 100%
██████████ 429/429 [01:17<00:00, 5.53it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.53it/s]			
all	1960	24550	0.3	0.222	0.205	

0.108

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
17/50	2.85G	1.557	1.128	1.255	97	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.47it/s]			
all	1960	24550	0.313	0.227	0.211	

0.112

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
18/50	2.85G	1.543	1.117	1.246	188	640: 100%
██████████ 429/429 [01:17<00:00, 5.52it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.51it/s]			
all	1960	24550	0.337	0.237	0.215	

0.116

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
19/50	2.85G	1.545	1.115	1.241	161	640: 100%
██████████ 429/429 [01:17<00:00, 5.55it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.53it/s]			
all	1960	24550	0.337	0.257	0.214	

0.116

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
20/50	2.85G	1.533	1.099	1.235	115	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.49it/s]			
all	1960	24550	0.363	0.228	0.218	

0.117

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
21/50	2.85G	1.521	1.098	1.235	152	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:18<00:00, 3.42it/s]			
all	1960	24550	0.293	0.28	0.226	

0.12

Epoch GPU_mem box_loss cls_loss df1_loss Instances Size

22/50	2.85G	1.512	1.079	1.223	136	640: 100%
██████████	429/429 [01:17<00:00,	5.54it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.56it/s]			
	all	1960	24550	0.315	0.259	0.224
0.12						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
23/50	2.85G	1.495	1.066	1.212	196	640: 100%
██████████	429/429 [01:17<00:00,	5.53it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.54it/s]			
	all	1960	24550	0.348	0.263	0.234
0.125						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
24/50	2.85G	1.497	1.067	1.215	190	640: 100%
██████████	429/429 [01:17<00:00,	5.53it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.57it/s]			
	all	1960	24550	0.32	0.279	0.233
0.124						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
25/50	2.85G	1.489	1.057	1.207	251	640: 100%
██████████	429/429 [01:16<00:00,	5.58it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.53it/s]			
	all	1960	24550	0.335	0.285	0.236
0.126						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
26/50	2.85G	1.484	1.052	1.203	191	640: 100%
██████████	429/429 [01:17<00:00,	5.53it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.50it/s]			
	all	1960	24550	0.345	0.268	0.239
0.129						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
27/50	2.85G	1.487	1.047	1.201	137	640: 100%
██████████	429/429 [01:17<00:00,	5.51it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.53it/s]			
	all	1960	24550	0.373	0.298	0.25
0.134						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
28/50	2.85G	1.469	1.038	1.197	162	640: 100%
██████████	429/429 [01:18<00:00,	5.50it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.59it/s]			

all 1960 24550 0.382 0.288 0.248
0.133

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
29/50	2.85G	1.459	1.026	1.192	192	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.58it/s]			
all	1960	24550	0.359	0.291	0.251	

0.138

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
30/50	2.85G	1.458	1.02	1.187	115	640: 100%
██████████ 429/429 [01:17<00:00, 5.53it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.53it/s]			
all	1960	24550	0.355	0.285	0.258	

0.141

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
31/50	2.85G	1.457	1.019	1.187	169	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.54it/s]			
all	1960	24550	0.347	0.299	0.253	

0.135

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
32/50	2.85G	1.446	1.011	1.181	186	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.55it/s]			
all	1960	24550	0.376	0.289	0.261	

0.142

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
33/50	2.85G	1.442	1.005	1.174	142	640: 100%
██████████ 429/429 [01:17<00:00, 5.55it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.58it/s]			
all	1960	24550	0.383	0.306	0.267	

0.144

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
34/50	2.85G	1.442	1.007	1.18	160	640: 100%
██████████ 429/429 [01:17<00:00, 5.54it/s]						
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.55it/s]			
all	1960	24550	0.352	0.311	0.266	

0.145

Epoch GPU_mem box_loss cls_loss df1_loss Instances Size

```

35/50      2.85G      1.433      0.9914      1.17      196      640: 100%|
██████████ | 429/429 [01:17<00:00, 5.53it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.58it/s]
          all      1960      24550      0.365      0.296      0.266
0.145

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
36/50      2.85G      1.425      0.9922      1.171      80      640: 100%|
██████████ | 429/429 [01:17<00:00, 5.55it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.57it/s]
          all      1960      24550      0.385      0.306      0.273
0.147

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
37/50      2.85G      1.42      0.9817      1.167      152      640: 100%|
██████████ | 429/429 [01:17<00:00, 5.55it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.62it/s]
          all      1960      24550      0.363      0.318      0.276
0.149

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
38/50      2.85G      1.42      0.9774      1.164      148      640: 100%|
██████████ | 429/429 [01:17<00:00, 5.53it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.60it/s]
          all      1960      24550      0.393      0.294      0.271
0.149

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
39/50      2.85G      1.414      0.9732      1.162      214      640: 100%|
██████████ | 429/429 [01:17<00:00, 5.52it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.58it/s]
          all      1960      24550      0.378      0.299      0.271
0.148

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
40/50      2.85G      1.416      0.9698      1.162      133      640: 100%|
██████████ | 429/429 [01:17<00:00, 5.54it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.60it/s]
          all      1960      24550      0.367      0.319      0.278
0.15

```

Closing dataloader mosaic

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
41/50      2.85G      1.407      0.9134      1.152      75      640: 100%|
██████████ | 429/429 [01:12<00:00, 5.94it/s]
          Class      Images      Instances      Box(P          R      mAP50      mAP50
-95): 100%|██████████| 62/62 [00:17<00:00, 3.54it/s]

```

all 1960 24550 0.367 0.323 0.282
0.153

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
42/50	2.85G	1.401	0.9022	1.145	101	640: 100%
██████████ 429/429 [01:11<00:00, 5.96it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.51it/s]			
all	1960	24550	0.371	0.323	0.285	

0.157

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
43/50	2.85G	1.398	0.8976	1.145	126	640: 100%
██████████ 429/429 [01:12<00:00, 5.93it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.56it/s]			
all	1960	24550	0.411	0.305	0.29	

0.16

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
44/50	2.85G	1.396	0.8954	1.143	115	640: 100%
██████████ 429/429 [01:11<00:00, 5.99it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.58it/s]			
all	1960	24550	0.379	0.328	0.287	

0.157

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
45/50	2.85G	1.394	0.8929	1.14	101	640: 100%
██████████ 429/429 [01:11<00:00, 5.98it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.61it/s]			
all	1960	24550	0.373	0.326	0.29	

0.159

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
46/50	2.85G	1.385	0.8846	1.139	101	640: 100%
██████████ 429/429 [01:11<00:00, 5.96it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.53it/s]			
all	1960	24550	0.376	0.329	0.292	

0.159

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
47/50	2.85G	1.382	0.88	1.137	100	640: 100%
██████████ 429/429 [01:11<00:00, 5.96it/s]						
	Class	Images	Instances	Box(P	R	mAP50 mAP50
-95): 100%	██████████	62/62	[00:17<00:00, 3.61it/s]			
all	1960	24550	0.388	0.313	0.291	

0.159

Epoch GPU_mem box_loss cls_loss df1_loss Instances Size

48/50	2.85G	1.38	0.8775	1.134	94	640: 100%
██████████	429/429 [01:12<00:00,	5.94it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.61it/s]			
	all	1960	24550	0.383	0.333	0.295
0.161						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
49/50	2.85G	1.378	0.8749	1.135	102	640: 100%
██████████	429/429 [01:11<00:00,	5.97it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.55it/s]			
	all	1960	24550	0.372	0.334	0.295
0.161						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
50/50	2.85G	1.373	0.8701	1.132	90	640: 100%
██████████	429/429 [01:11<00:00,	5.97it/s]				
Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:17<00:00,	3.53it/s]			
	all	1960	24550	0.367	0.339	0.295
0.161						

50 epochs completed in 1.381 hours.
Optimizer stripped from runs\detect\train18\weights\last.pt, 6.3MB
Optimizer stripped from runs\detect\train18\weights\best.pt, 6.3MB

Validating runs\detect\train18\weights\best.pt...
Ultralytics 8.3.107 Python-3.10.13 torch-2.5.1 CUDA:0 (NVIDIA GeForce RTX 2060 SUPER, 8192MiB)
YOLOv8n summary (fused): 72 layers, 3,007,013 parameters, 0 gradients, 8.1 GFLOPs

Class	Images	Instances	Box(P	R	mAP50	mAP50
-95): 100%	██████████	62/62 [00:23<00:00,	2.59it/s]			
all	1960	24550	0.367	0.337	0.295	
0.161						
bike	121	221	0.335	0.167	0.146	0.
0526						
bus	227	309	0.297	0.385	0.233	
0.16						
car	1956	20327	0.555	0.681	0.685	
0.412						
motor	67	90	0.332	0.132	0.13	0.
0543						
person	639	2626	0.353	0.407	0.352	
0.148						
rider	104	133	0.289	0.138	0.129	
0.046						
truck	526	844	0.407	0.451	0.392	
0.257						
Speed: 0.2ms preprocess, 2.0ms inference, 0.0ms loss, 1.6ms postprocess per image						
Results saved to runs\detect\train18						

228,	0.28328,	0.28428,	0.28529,	0.28629,	0.28729,	
	0.28829,	0.28929,	0.29029,	0.29129,	0.29229,	0.2932
9,	0.29429,	0.2953,	0.2963,	0.2973,	0.2983,	0.2993,
0.3003,	0.3013,	0.3023,	0.3033,	0.3043,	0.30531,	0.306
31,	0.30731,	0.30831,	0.30931,	0.31031,	0.31131,	
	0.31231,	0.31331,	0.31431,	0.31532,	0.31632,	0.3173
2,	0.31832,	0.31932,	0.32032,	0.32132,	0.32232,	0.32332,
0.32432,	0.32533,	0.32633,	0.32733,	0.32833,	0.32933,	0.33
033,	0.33133,	0.33233,	0.33333,	0.33433,	0.33534,	
	0.33634,	0.33734,	0.33834,	0.33934,	0.34034,	0.3413
4,	0.34234,	0.34334,	0.34434,	0.34535,	0.34635,	0.34735,
0.34835,	0.34935,	0.35035,	0.35135,	0.35235,	0.35335,	0.35
435,	0.35536,	0.35636,	0.35736,	0.35836,	0.35936,	
	0.36036,	0.36136,	0.36236,	0.36336,	0.36436,	0.3653
7,	0.36637,	0.36737,	0.36837,	0.36937,	0.37037,	0.37137,
0.37237,	0.37337,	0.37437,	0.37538,	0.37638,	0.37738,	0.37
838,	0.37938,	0.38038,	0.38138,	0.38238,	0.38338,	
	0.38438,	0.38539,	0.38639,	0.38739,	0.38839,	0.3893
9,	0.39039,	0.39139,	0.39239,	0.39339,	0.39439,	0.3954,
0.3964,	0.3974,	0.3984,	0.3994,	0.4004,	0.4014,	0.40
24,	0.4034,	0.4044,	0.40541,	0.40641,	0.40741,	
	0.40841,	0.40941,	0.41041,	0.41141,	0.41241,	0.4134
1,	0.41441,	0.41542,	0.41642,	0.41742,	0.41842,	0.41942,
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643,	0.42743,	0.42843,	0.42943,	0.43043,	0.43143,	
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045,	0.45145,	0.45245,	0.45345,	0.45445,	0.45546,	
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6,	0.46246,	0.46346,	0.46446,	0.46547,	0.46647,	0.46747,
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447,	0.47548,	0.47648,	0.47748,	0.47848,	0.47948,	
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985,	0.4995,	0.5005,	0.5015,	0.5025,	0.5035,	
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1,	0.51051,	0.51151,	0.51251,	0.51351,	0.51451,	0.51552,
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252,	0.52352,	0.52452,	0.52553,	0.52653,	0.52753,	
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459,	0.5956,	0.5966,	0.5976,	0.5986,	0.5996,	
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fitness: 0.1747544493089012
keys: ['metrics/precision(B)', 'metrics/recall(B)', 'metrics/mAP50(B)', 'metrics/m
AP50-95(B)']

```

```

maps: array([ 0.052563,  0.15961,  0.41154,  0.054297,  0.14828,
 0.045995,  0.25722])
names: {0: 'bike', 1: 'bus', 2: 'car', 3: 'motor', 4: 'person', 5: 'rider', 6: 'truck'}
plot: True
results_dict: {'metrics/precision(B)': 0.36682696683544125, 'metrics/recall(B)':
0.3373418069088779, 'metrics/mAP50(B)': 0.2953229422494526, 'metrics/mAP50-95(B)':
0.16135795009328435, 'fitness': 0.1747544493089012}
save_dir: WindowsPath('runs/detect/train18')
speed: {'preprocess': 0.18735515306839168, 'inference': 1.9962698469480158, 'loss':
0.0005832653038609982, 'postprocess': 1.552517499970106}
task: 'detect'

```

```

In [6]: predv8_test = yolov8_model('street-traffic-new-york-typical-street-view-manhattan-m
plt.imshow(predv8_test[0].plot())
plt.axis('off')
plt.show()

```

image 1/1 D:\ery\School\Jupyter Notebooks\street-traffic-new-york-typical-street-view-manhattan-manhattan-new-york-april-92272598.webp: 384x640 7 cars, 1 person, 176.6ms

Speed: 10.5ms preprocess, 176.6ms inference, 30.6ms postprocess per image at shape (1, 3, 384, 640)



```

In [5]: yolov8_model.export(format='onnx')

```

Ultralytics 8.3.107 Python-3.10.13 torch-2.5.1 CPU (AMD Ryzen 5 2600 Six-Core Processor)

YOLOv8n summary (fused): 72 layers, 3,007,013 parameters, 0 gradients, 8.1 GFLOPs

PyTorch: starting from 'runs\detect\train18\weights\best.pt' with input shape (1, 3, 640, 640) BCHW and output shape(s) (1, 11, 8400) (6.0 MB)

ONNX: starting export with onnx 1.17.0 opset 19...

ONNX: slimming with onnxslim 0.1.50...

ONNX: export success 5.0s, saved as 'runs\detect\train18\weights\best.onnx' (11.7 MB)

Export complete (6.3s)

Results saved to D:\ery\School\Jupyter Notebooks\runs\detect\train18\weights

Predict: yolo predict task=detect model=runs\detect\train18\weights\best.onnx
x imgsz=640

Validate: yolo val task=detect model=runs\detect\train18\weights\best.onnx imgsz=640 data=bdd100k--1/data.yaml

Visualize: <https://netron.app>

Out[5]: 'runs\\detect\\train18\\weights\\best.onnx'

faster rcnn

In []: