

Estudo_Dentes

June 17, 2025

```
[1]: !pip install ultralytics
```

Collecting ultralytics

Downloading ultralytics-8.3.155-py3-none-any.whl.metadata (37 kB)

Requirement already satisfied: numpy>=1.23.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (2.0.2)

Requirement already satisfied: matplotlib>=3.3.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (3.10.0)

Requirement already satisfied: opencv-python>=4.6.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (4.11.0.86)

Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (11.2.1)

Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (6.0.2)

Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (2.32.3)

Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (1.15.3)

Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (2.6.0+cu124)

Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (0.21.0+cu124)

Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (4.67.1)

Requirement already satisfied: psutil in /usr/local/lib/python3.11/dist-packages (from ultralytics) (5.9.5)

Requirement already satisfied: py-cpuinfo in /usr/local/lib/python3.11/dist-packages (from ultralytics) (9.0.0)

Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.11/dist-packages (from ultralytics) (2.2.2)

Collecting ultralytics-thop>=2.0.0 (from ultralytics)

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Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.3.2)

Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.11/dist-packages (from matplotlib>=3.3.0->ultralytics) (0.12.1)

Requirement already satisfied: fonttools>=4.22.0 in

/usr/local/lib/python3.11/dist-packages (from matplotlib>=3.3.0->ultralytics)
(4.58.2)

Requirement already satisfied: kiwisolver>=1.3.1 in
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(1.4.8)

Requirement already satisfied: packaging>=20.0 in
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(24.2)

Requirement already satisfied: pyparsing>=2.3.1 in
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Requirement already satisfied: python-dateutil>=2.7 in
/usr/local/lib/python3.11/dist-packages (from matplotlib>=3.3.0->ultralytics)
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Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/dist-
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Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-
packages (from pandas>=1.1.4->ultralytics) (2025.2)

Requirement already satisfied: charset-normalizer<4,>=2 in
/usr/local/lib/python3.11/dist-packages (from requests>=2.23.0->ultralytics)
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Requirement already satisfied: urllib3<3,>=1.21.1 in
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Requirement already satisfied: certifi>=2017.4.17 in
/usr/local/lib/python3.11/dist-packages (from requests>=2.23.0->ultralytics)
(2025.4.26)

Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-
packages (from torch>=1.8.0->ultralytics) (3.18.0)

Requirement already satisfied: typing-extensions>=4.10.0 in
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(4.14.0)

Requirement already satisfied: networkx in /usr/local/lib/python3.11/dist-
packages (from torch>=1.8.0->ultralytics) (3.5)

Requirement already satisfied: jinja2 in /usr/local/lib/python3.11/dist-packages
(from torch>=1.8.0->ultralytics) (3.1.6)

Requirement already satisfied: fsspec in /usr/local/lib/python3.11/dist-packages
(from torch>=1.8.0->ultralytics) (2025.3.2)

Collecting nvidia-cuda-nvrtc-cu12==12.4.127 (from torch>=1.8.0->ultralytics)
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manylinux2014_x86_64.whl.metadata (1.5 kB)

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manylinux2014_x86_64.whl.metadata (1.5 kB)

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manylinux2014_x86_64.whl.metadata (1.6 kB)
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manylinux2014_x86_64.whl.metadata (1.6 kB)
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(2.21.5)
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in
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Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.11/dist-
packages (from torch>=1.8.0->ultralytics) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in
/usr/local/lib/python3.11/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/python3.11/dist-
packages (from python-dateutil>=2.7->matplotlib>=3.3.0->ultralytics) (1.17.0)
Requirement already satisfied: MarkupSafe>=2.0 in
/usr/local/lib/python3.11/dist-packages (from jinja2->torch>=1.8.0->ultralytics)
(3.0.2)
Downloading ultralytics-8.3.155-py3-none-any.whl (1.0 MB)
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Downloading nvidia_cublas_cu12-12.4.5.8-py3-none-manylinux2014_x86_64.whl
(363.4 MB)
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Downloading nvidia_cuda_runtime_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl (883 kB)

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Downloading nvidia_cudnn_cu12-9.1.0.70-py3-none-manylinux2014_x86_64.whl (664.8 MB)

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WARNING: Retrying (Retry(total=4, connect=None, read=None, redirect=None, status=None)) after connection broken by

'ProtocolError('Connection aborted.', RemoteDisconnected('Remote end closed connection without response'))': /packages/ff/ff/847841bacfbefc97a00036e0fce5a0f

086b640756dc38caea5e1bb002655/nvidia_nvjitlink_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl

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21.1/21.1 MB

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Downloading ultralytics_thop-2.0.14-py3-none-any.whl (26 kB)

Installing collected packages: nvidia-nvjitlink-cu12, nvidia-curand-cu12, nvidia-cufft-cu12, nvidia-cuda-runtime-cu12, nvidia-cuda-nvrtc-cu12, nvidia-cuda-cupti-cu12, nvidia-cublas-cu12, nvidia-cusparse-cu12, nvidia-cudnn-cu12, nvidia-cusolver-cu12, ultralytics-thop, ultralytics

Attempting uninstall: nvidia-nvjitlink-cu12
 Found existing installation: nvidia-nvjitlink-cu12 12.5.82
 Uninstalling nvidia-nvjitlink-cu12-12.5.82:
 Successfully uninstalled nvidia-nvjitlink-cu12-12.5.82

Attempting uninstall: nvidia-curand-cu12
 Found existing installation: nvidia-curand-cu12 10.3.6.82
 Uninstalling nvidia-curand-cu12-10.3.6.82:
 Successfully uninstalled nvidia-curand-cu12-10.3.6.82

Attempting uninstall: nvidia-cufft-cu12
 Found existing installation: nvidia-cufft-cu12 11.2.3.61
 Uninstalling nvidia-cufft-cu12-11.2.3.61:
 Successfully uninstalled nvidia-cufft-cu12-11.2.3.61

Attempting uninstall: nvidia-cuda-runtime-cu12
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 Uninstalling nvidia-cuda-runtime-cu12-12.5.82:
 Successfully uninstalled nvidia-cuda-runtime-cu12-12.5.82

Attempting uninstall: nvidia-cuda-nvrtc-cu12
 Found existing installation: nvidia-cuda-nvrtc-cu12 12.5.82
 Uninstalling nvidia-cuda-nvrtc-cu12-12.5.82:
 Successfully uninstalled nvidia-cuda-nvrtc-cu12-12.5.82

Attempting uninstall: nvidia-cuda-cupti-cu12
 Found existing installation: nvidia-cuda-cupti-cu12 12.5.82
 Uninstalling nvidia-cuda-cupti-cu12-12.5.82:
 Successfully uninstalled nvidia-cuda-cupti-cu12-12.5.82

Attempting uninstall: nvidia-cublas-cu12
 Found existing installation: nvidia-cublas-cu12 12.5.3.2
 Uninstalling nvidia-cublas-cu12-12.5.3.2:
 Successfully uninstalled nvidia-cublas-cu12-12.5.3.2

Attempting uninstall: nvidia-cusparse-cu12
 Found existing installation: nvidia-cusparse-cu12 12.5.1.3
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 Successfully uninstalled nvidia-cusparse-cu12-12.5.1.3

Attempting uninstall: nvidia-cudnn-cu12
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Attempting uninstall: nvidia-cusolver-cu12
 Found existing installation: nvidia-cusolver-cu12 11.6.3.83
 Uninstalling nvidia-cusolver-cu12-11.6.3.83:
 Successfully uninstalled nvidia-cusolver-cu12-11.6.3.83

Successfully installed nvidia-cublas-cu12-12.4.5.8 nvidia-cuda-cupti-cu12-12.4.127 nvidia-cuda-nvrtc-cu12-12.4.127 nvidia-cuda-runtime-cu12-12.4.127 nvidia-cudnn-cu12-9.1.0.70 nvidia-cufft-cu12-11.2.1.3 nvidia-curand-cu12-10.3.5.147 nvidia-cusolver-cu12-11.6.1.9 nvidia-cusparse-cu12-12.3.1.170

nvidia-nvjitlink-cu12-12.4.127 ultralytics-8.3.155 ultralytics-thop-2.0.14

```
[2]: from ultralytics import YOLO
```

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>.

```
[3]: model = YOLO("yolo12n.pt") # Versão do modelo YOLO
```

Downloading
<https://github.com/ultralytics/assets/releases/download/v8.3.0/yolo12n.pt> to
'yolo12n.pt'...

100%| | 5.34M/5.34M [00:00<00:00, 66.3MB/s]

```
[4]: !unzip dentex_yolo12n.zip
```

Archive: dentex_yolo12n.zip
creating: dentex_yolo12n/
inflating: dentex_yolo12n/data.yaml
creating: dentex_yolo12n/images/
creating: dentex_yolo12n/images/train/
inflating: dentex_yolo12n/images/train/train_0.png
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inflating: dentex_yolo12n/labels/val/train_703.txt
inflating: dentex_yolo12n/labels/val/train_704.txt
```

```
[5]: # Realizando treino
results = model.train(
    data="/content/dentex_yolo12n/data.yaml",
    epochs=80,
    imgsz=640,
    batch=16,
```

```

name='dentex_train'
)

```

```

Ultralytics 8.3.155 Python-3.11.13 torch-2.6.0+cu124 CUDA:0 (Tesla T4,
15095MiB)
engine/trainer: agnostic_nms=False, amp=True, augment=False,
auto_augment=randaugument, batch=16, bgr=0.0, box=7.5, cache=False, cfg=None,
classes=None, close_mosaic=10, cls=0.5, conf=None, copy_paste=0.0,
copy_paste_mode=flip, cos_lr=False, cutmix=0.0,
data=/content/dentex_yolo12n/data.yaml, degrees=0.0, deterministic=True,
device=None, dfl=1.5, dnn=False, dropout=0.0, dynamic=False, embed=None,
epochs=80, erasing=0.4, exist_ok=False, flipplr=0.5, flipud=0.0,
format=torchscript, fraction=1.0, freeze=None, half=False, hsv_h=0.015,
hsv_s=0.7, hsv_v=0.4, imgsz=640, int8=False, iou=0.7, keras=False, kobj=1.0,
line_width=None, lr0=0.01, lrf=0.01, mask_ratio=4, max_det=300, mixup=0.0,
mode=train, model=yolo12n.pt, momentum=0.937, mosaic=1.0, multi_scale=False,
name=dentex_train, nbs=64, nms=False, opset=None, optimize=False,
optimizer=auto, overlap_mask=True, patience=100, perspective=0.0, plots=True,
pose=12.0, pretrained=True, profile=False, project=None, rect=False,
resume=False, retina_masks=False, save=True, save_conf=False, save_crop=False,
save_dir=runs/detect/dentex_train, save_frames=False, save_json=False,
save_period=-1, save_txt=False, scale=0.5, seed=0, shear=0.0, show=False,
show_boxes=True, show_conf=True, show_labels=True, simplify=True,
single_cls=False, source=None, split=val, stream_buffer=False, task=detect,
time=None, tracker=botsort.yaml, translate=0.1, val=True, verbose=True,
vid_stride=1, visualize=False, warmup_bias_lr=0.1, warmup_epochs=3.0,
warmup_momentum=0.8, weight_decay=0.0005, workers=8, workspace=None
Downloading https://ultralytics.com/assets/Arial.ttf to
'/root/.config/Ultralytics/Arial.ttf'...

```

```
100%|      | 755k/755k [00:00<00:00, 12.9MB/s]
```

```
Overriding model.yaml nc=80 with nc=97
```

	from	n	params	module
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  2    180864 ultralytics.nn.modules.block.A2C2f
[128, 128, 2, True, 4]
  7          -1  1    295424 ultralytics.nn.modules.conv.Conv
[128, 256, 3, 2]
  8          -1  2    689408 ultralytics.nn.modules.block.A2C2f
[256, 256, 2, True, 1]
  9          -1  1         0 torch.nn.modules.upsampling.Upsample
[None, 2, 'nearest']
 10         [-1, 6]  1         0 ultralytics.nn.modules.conv.Concat
[1]
 11          -1  1     86912 ultralytics.nn.modules.block.A2C2f
[384, 128, 1, False, -1]
 12          -1  1         0 torch.nn.modules.upsampling.Upsample
[None, 2, 'nearest']
 13         [-1, 4]  1         0 ultralytics.nn.modules.conv.Concat
[1]
 14          -1  1     24000 ultralytics.nn.modules.block.A2C2f
[256, 64, 1, False, -1]
 15          -1  1    36992 ultralytics.nn.modules.conv.Conv
[64, 64, 3, 2]
 16         [-1, 11]  1         0 ultralytics.nn.modules.conv.Concat
[1]
 17          -1  1    74624 ultralytics.nn.modules.block.A2C2f
[192, 128, 1, False, -1]
 18          -1  1   147712 ultralytics.nn.modules.conv.Conv
[128, 128, 3, 2]
 19         [-1, 8]  1         0 ultralytics.nn.modules.conv.Concat
[1]
 20          -1  1   378880 ultralytics.nn.modules.block.C3k2
[384, 256, 1, True]
 21        [14, 17, 20]  1   491398 ultralytics.nn.modules.head.Detect
[97, [64, 128, 256]]
YOLOv12n summary: 272 layers, 2,628,774 parameters, 2,628,758 gradients, 6.8
GFLOPs

```

Transferred 640/691 items from pretrained weights

Freezing layer 'model.21.dfl.conv.weight'

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

Downloading

<https://github.com/ultralytics/assets/releases/download/v8.3.0/yolo11n.pt> to
'yolo11n.pt'...

100%| | 5.35M/5.35M [00:00<00:00, 61.4MB/s]

AMP: checks passed

train: Fast image access (ping: 0.0±0.0 ms, read: 1636.9±981.8
MB/s, size: 3941.7 KB)

train: Scanning /content/dentex_yolo12n/labels/train... 542 images,
0 backgrounds, 0 corrupt: 100%| | 542/542 [00:06<00:00, 82.38it/s]

train: /content/dentex_yolo12n/images/train/train_377.png: 1
duplicate labels removed

train: New cache created:
/content/dentex_yolo12n/labels/train.cache

augmentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01,
blur_limit=(3, 7)), ToGray(p=0.01, method='weighted_average',
num_output_channels=3), CLAHE(p=0.01, clip_limit=(1.0, 4.0), tile_grid_size=(8,
8))

val: Fast image access (ping: 0.0±0.0 ms, read: 1767.9±1313.2
MB/s, size: 3425.3 KB)

val: Scanning /content/dentex_yolo12n/labels/val... 136 images, 0
backgrounds, 0 corrupt: 100%| | 136/136 [00:02<00:00, 64.94it/s]

val: New cache created: /content/dentex_yolo12n/labels/val.cache

Plotting labels to runs/detect/dentex_train/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=9.9e-05, momentum=0.9) with parameter groups
113 weight(decay=0.0), 120 weight(decay=0.0005), 119 bias(decay=0.0)
Image sizes 640 train, 640 val

Using 2 dataloader workers

Logging results to runs/detect/dentex_train

Starting training for 80 epochs...

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
1/80	3.56G	2.141	6.021	1.677	150	640:
100%	34/34	[00:47<00:00, 1.39s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5	[00:03<00:00, 1.65it/s]			
	all	136	690	0	0	0
0						

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
2/80	4.02G	1.523	5.614	1.207	153	640:
100%	34/34	[00:45<00:00, 1.33s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5	[00:03<00:00, 1.38it/s]			

0	all	136	690	0	0	0
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Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
3/80	4.03G	1.399	5.423	1.094	176	640:
100%	34/34	[00:45<00:00,	1.34s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:05<00:00,	1.14s/it]			
	all	136	690	0.00115	0.03	0.00247
0.00115						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
4/80	4.04G	1.393	5.22	1.075	129	640:
100%	34/34	[00:45<00:00,	1.33s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00,	1.56it/s]			
	all	136	690	0.00447	0.118	0.0117
0.00675						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
5/80	4.06G	1.361	5.005	1.061	124	640:
100%	34/34	[00:46<00:00,	1.36s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.68it/s]			
	all	136	690	0.00678	0.211	0.0157
0.00933						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
6/80	4.08G	1.365	4.796	1.065	183	640:
100%	34/34	[00:46<00:00,	1.37s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00,	1.58it/s]			
	all	136	690	0.353	0.147	0.0238
0.0146						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
7/80	4.09G	1.338	4.534	1.054	119	640:
100%	34/34	[00:46<00:00,	1.35s/it]			

	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.86it/s]			
	all	136	690	0.702	0.0699	0.0337
0.0206						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
8/80	4.11G	1.338	4.312	1.058	114	640:
100%	34/34	[00:45<00:00,	1.35s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.94it/s]			
	all	136	690	0.756	0.0672	0.043
0.0263						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
9/80	4.12G	1.335	4.117	1.05	113	640:
100%	34/34	[00:46<00:00,	1.37s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.91it/s]			
	all	136	690	0.709	0.0868	0.0446
0.0285						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
10/80	4.14G	1.304	3.979	1.047	151	640:
100%	34/34	[00:46<00:00,	1.37s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.86it/s]			
	all	136	690	0.63	0.0918	0.0503
0.0318						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
11/80	4.15G	1.302	3.825	1.048	120	640:
100%	34/34	[00:47<00:00,	1.39s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.96it/s]			
	all	136	690	0.662	0.101	0.0535
0.0345						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
12/80	4.17G	1.264	3.744	1.043	121	640:
100%	34/34	[00:46<00:00,	1.37s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	2.12it/s]			

	all	136	690	0.578	0.0979	0.0552
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0.0363

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
13/80	4.18G	1.287	3.583	1.036	140	640:
100%	34/34	[00:47<00:00, 1.41s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.94it/s]				
	all	136	690	0.576	0.104	0.0581

0.0378

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
14/80	4.2G	1.256	3.523	1.037	116	640:
100%	34/34	[00:46<00:00, 1.37s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 2.19it/s]				
	all	136	690	0.557	0.107	0.0582

0.0383

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
15/80	4.21G	1.255	3.403	1.056	112	640:
100%	34/34	[00:44<00:00, 1.32s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.32it/s]				
	all	136	690	0.523	0.122	0.0628

0.0408

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
16/80	4.23G	1.234	3.353	1.031	105	640:
100%	34/34	[00:45<00:00, 1.33s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.52it/s]				
	all	136	690	0.514	0.127	0.067

0.0436

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
17/80	4.24G	1.222	3.291	1.031	143	640:
100%	34/34	[00:44<00:00, 1.32s/it]				

	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.96it/s]			
	all	136	690	0.517	0.117	0.0662
0.0429						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
18/80	4.26G	1.216	3.227	1.034	133	640:
100%	34/34	[00:47<00:00,	1.39s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.99it/s]			
	all	136	690	0.495	0.119	0.068
0.0456						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
19/80	4.27G	1.212	3.149	1.038	131	640:
100%	34/34	[00:46<00:00,	1.36s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.83it/s]			
	all	136	690	0.466	0.142	0.0673
0.0437						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
20/80	4.29G	1.212	3.098	1.044	124	640:
100%	34/34	[00:47<00:00,	1.39s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.93it/s]			
	all	136	690	0.437	0.133	0.07
0.0454						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
21/80	4.3G	1.204	3.126	1.027	133	640:
100%	34/34	[00:46<00:00,	1.36s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.94it/s]			
	all	136	690	0.434	0.121	0.0716
0.0458						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
22/80	4.32G	1.198	3.017	1.039	103	640:
100%	34/34	[00:47<00:00,	1.39s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.96it/s]			

	all	136	690	0.448	0.15	0.0728
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0.0477

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
23/80	4.33G	1.175	2.972	1.021	190	640:
100%	34/34	[00:45<00:00, 1.34s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.85it/s]				

	all	136	690	0.45	0.141	0.0737
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0.0476

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
24/80	4.35G	1.177	2.923	1.037	120	640:
100%	34/34	[00:46<00:00, 1.36s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.40it/s]				

	all	136	690	0.426	0.15	0.0767
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0.0493

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
25/80	4.36G	1.182	2.943	1.027	118	640:
100%	34/34	[00:45<00:00, 1.33s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.51it/s]				

	all	136	690	0.444	0.148	0.0728
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0.0477

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
26/80	4.38G	1.153	2.838	1.029	111	640:
100%	34/34	[00:46<00:00, 1.36s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.86it/s]				

	all	136	690	0.405	0.152	0.0761
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0.0509

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
27/80	4.39G	1.171	2.884	1.032	143	640:
100%	34/34	[00:45<00:00, 1.34s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.92it/s]				

	all	136	690	0.426	0.139	0.0736
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0.0485

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
28/80	4.41G	1.155	2.766	1.021	118	640:
100%	34/34	[00:45<00:00, 1.35s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.85it/s]				

	all	136	690	0.429	0.148	0.0742
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0.0487

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
29/80	4.42G	1.145	2.769	1.031	138	640:
100%	34/34	[00:45<00:00, 1.33s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.89it/s]				

	all	136	690	0.435	0.14	0.0761
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0.0503

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
30/80	4.44G	1.153	2.791	1.019	182	640:
100%	34/34	[00:47<00:00, 1.40s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.96it/s]				

	all	136	690	0.406	0.153	0.0783
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0.0511

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
31/80	4.46G	1.106	2.736	1.016	131	640:
100%	34/34	[00:46<00:00, 1.36s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.96it/s]				

	all	136	690	0.428	0.148	0.0816
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0.054

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
32/80	4.47G	1.145	2.725	1.02	138	640:
100%	34/34	[00:45<00:00, 1.34s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.43it/s]				

	all	136	690	0.381	0.157	0.0836	
0.0544							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	33/80	4.48G	1.115	2.726	1.015	159	640:
100%	34/34	[00:44<00:00, 1.30s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:03<00:00, 1.53it/s]					
	all	136	690	0.416	0.16	0.0794	
0.0529							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	34/80	4.5G	1.111	2.68	1.01	76	640:
100%	34/34	[00:45<00:00, 1.33s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 2.09it/s]					
	all	136	690	0.383	0.149	0.0788	
0.0526							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	35/80	4.51G	1.133	2.664	1.029	141	640:
100%	34/34	[00:46<00:00, 1.38s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 2.02it/s]					
	all	136	690	0.391	0.163	0.0814	
0.053							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	36/80	4.53G	1.12	2.635	1.005	129	640:
100%	34/34	[00:45<00:00, 1.34s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 1.92it/s]					
	all	136	690	0.385	0.147	0.0819	
0.0542							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	37/80	4.54G	1.109	2.616	1.015	157	640:
100%	34/34	[00:46<00:00, 1.38s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 2.13it/s]					
	all	136	690	0.409	0.157	0.0852	
0.0554							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
38/80	4.56G	1.089	2.614	1.01	89	640:
100%	34/34	[00:47<00:00, 1.40s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.87it/s]				
	all	136	690	0.415	0.161	0.0886
0.0577						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
39/80	4.57G	1.103	2.582	1.01	130	640:
100%	34/34	[00:46<00:00, 1.38s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.92it/s]				
	all	136	690	0.366	0.168	0.0862
0.0561						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
40/80	4.59G	1.092	2.579	1.008	152	640:
100%	34/34	[00:47<00:00, 1.39s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.94it/s]				
	all	136	690	0.377	0.152	0.0873
0.0574						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
41/80	4.61G	1.079	2.608	1.017	105	640:
100%	34/34	[00:46<00:00, 1.38s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 2.13it/s]				
	all	136	690	0.384	0.164	0.0899
0.0597						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
42/80	4.62G	1.099	2.551	1.007	109	640:
100%	34/34	[00:46<00:00, 1.37s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.56it/s]				
	all	136	690	0.354	0.151	0.0908
0.0588						

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
43/80	4.63G	1.07	2.514	1.002	137	640:
100%	34/34	[00:45<00:00, 1.34s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.29it/s]				
	all	136	690	0.435	0.162	0.0954
0.0621						

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
44/80	4.65G	1.073	2.515	0.993	147	640:
100%	34/34	[00:45<00:00, 1.33s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.47it/s]				
	all	136	690	0.4	0.149	0.0893
0.0583						

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
45/80	4.67G	1.072	2.497	0.9959	190	640:
100%	34/34	[00:45<00:00, 1.34s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 2.11it/s]				
	all	136	690	0.431	0.153	0.0904
0.0593						

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
46/80	4.68G	1.068	2.522	1.001	141	640:
100%	34/34	[00:51<00:00, 1.52s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:04<00:00, 1.07it/s]				
	all	136	690	0.372	0.171	0.0905
0.0592						

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
47/80	4.7G	1.065	2.477	0.9991	94	640:
100%	34/34	[00:56<00:00, 1.66s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.62it/s]				
	all	136	690	0.404	0.172	0.0944
0.0616						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
48/80	4.71G	1.067	2.501	0.9941	154	640:
100%	34/34	[00:56<00:00, 1.65s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5 [00:03<00:00, 1.51it/s]				
	all	136	690	0.374	0.172	0.0974
0.0625						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
49/80	4.73G	1.055	2.47	1.002	134	640:
100%	34/34	[00:47<00:00, 1.39s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5 [00:02<00:00, 1.99it/s]				
	all	136	690	0.411	0.165	0.0911
0.0593						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
50/80	4.74G	1.054	2.456	0.9898	147	640:
100%	34/34	[00:46<00:00, 1.36s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5 [00:02<00:00, 2.02it/s]				
	all	136	690	0.438	0.148	0.0954
0.0627						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
51/80	4.76G	1.04	2.418	0.9908	117	640:
100%	34/34	[00:47<00:00, 1.39s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5 [00:02<00:00, 1.88it/s]				
	all	136	690	0.382	0.166	0.094
0.0614						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
52/80	4.77G	1.073	2.401	1.002	160	640:
100%	34/34	[00:46<00:00, 1.36s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95):	100%	5/5 [00:02<00:00, 1.90it/s]				
	all	136	690	0.429	0.151	0.0976
0.0635						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
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```

53/80      4.79G      1.035      2.432      0.9847      205      640:
100%|      | 34/34 [00:46<00:00, 1.38s/it]
          Class      Images  Instances      Box(P          R      mAP50
mAP50-95): 100%|      | 5/5 [00:02<00:00, 1.83it/s]
          all          136          690          0.46          0.17          0.0933
0.0607

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
54/80      4.8G      1.043      2.398      0.9901          99      640:
100%|      | 34/34 [00:45<00:00, 1.35s/it]
          Class      Images  Instances      Box(P          R      mAP50
mAP50-95): 100%|      | 5/5 [00:03<00:00, 1.61it/s]
          all          136          690          0.397          0.152          0.0929
0.0597

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
55/80      4.82G      1.039      2.403      0.9958          177      640:
100%|      | 34/34 [00:44<00:00, 1.32s/it]
          Class      Images  Instances      Box(P          R      mAP50
mAP50-95): 100%|      | 5/5 [00:03<00:00, 1.26it/s]
          all          136          690          0.394          0.168          0.0933
0.0606

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
56/80      4.83G      1.023      2.391      0.9907          89      640:
100%|      | 34/34 [00:46<00:00, 1.35s/it]
          Class      Images  Instances      Box(P          R      mAP50
mAP50-95): 100%|      | 5/5 [00:03<00:00, 1.61it/s]
          all          136          690          0.421          0.172          0.0954
0.062

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
57/80      4.85G      1.04      2.365      0.9906          168      640:
100%|      | 34/34 [00:44<00:00, 1.31s/it]
          Class      Images  Instances      Box(P          R      mAP50
mAP50-95): 100%|      | 5/5 [00:02<00:00, 2.01it/s]
          all          136          690          0.384          0.162          0.0912
0.0587

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
58/80      4.86G      1.044      2.363      0.9942          193      640:
100%|      | 34/34 [00:46<00:00, 1.36s/it]

```


	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.89it/s]			
	all	136	690	0.454	0.165	0.0934
0.0595						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
59/80	4.88G	1.008	2.346	0.9797	165	640:
100%	34/34	[00:47<00:00,	1.40s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.96it/s]			
	all	136	690	0.343	0.171	0.0921
0.059						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
60/80	4.89G	1.042	2.328	0.9937	175	640:
100%	34/34	[00:46<00:00,	1.38s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.95it/s]			
	all	136	690	0.443	0.149	0.094
0.0616						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
61/80	4.91G	1.017	2.328	0.9758	114	640:
100%	34/34	[00:45<00:00,	1.35s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	2.03it/s]			
	all	136	690	0.397	0.17	0.0947
0.0619						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
62/80	4.92G	1.036	2.363	0.9883	110	640:
100%	34/34	[00:46<00:00,	1.38s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00,	1.97it/s]			
	all	136	690	0.401	0.16	0.0973
0.0636						
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
63/80	4.94G	1.021	2.352	0.985	160	640:
100%	34/34	[00:45<00:00,	1.34s/it]			
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00,	1.43it/s]			

	all	136	690	0.422	0.164	0.0995	
0.0645							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	64/80	4.95G	1.016	2.33	0.9799	114	640:
100%	34/34	[00:45<00:00, 1.33s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:03<00:00, 1.36it/s]					
	all	136	690	0.418	0.169	0.0958	
0.0617							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	65/80	4.97G	1.027	2.314	0.984	132	640:
100%	34/34	[00:45<00:00, 1.33s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 2.01it/s]					
	all	136	690	0.409	0.16	0.1	
0.065							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	66/80	4.98G	1.019	2.33	0.9811	131	640:
100%	34/34	[00:44<00:00, 1.31s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 1.96it/s]					
	all	136	690	0.414	0.17	0.1	
0.0643							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	67/80	5G	1.01	2.28	0.972	152	640:
100%	34/34	[00:46<00:00, 1.37s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 1.91it/s]					
	all	136	690	0.401	0.164	0.0969	
0.0625							
	Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
	68/80	5.01G	1.01	2.325	0.9845	151	640:
100%	34/34	[00:46<00:00, 1.37s/it]					
	Class	Images	Instances	Box(P	R	mAP50	
mAP50-95): 100%	5/5	[00:02<00:00, 2.10it/s]					
	all	136	690	0.425	0.162	0.0999	
0.0644							

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
69/80	5.03G	1.02	2.321	0.9776	161	640:
100%	34/34	[00:45<00:00, 1.33s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.53it/s]				
	all	136	690	0.398	0.167	0.0978
0.0633						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
70/80	5.04G	1.022	2.31	0.9812	103	640:
100%	34/34	[00:45<00:00, 1.34s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:03<00:00, 1.32it/s]				
	all	136	690	0.436	0.162	0.0989
0.064						

Closing dataloader mosaic

augmentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01, method='weighted_average', num_output_channels=3), CLAHE(p=0.01, clip_limit=(1.0, 4.0), tile_grid_size=(8, 8))

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
71/80	5.06G	1.016	2.586	1.012	102	640:
100%	34/34	[00:49<00:00, 1.45s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.83it/s]				
	all	136	690	0.369	0.177	0.0907
0.0577						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
72/80	5.07G	1.002	2.477	0.9965	68	640:
100%	34/34	[00:46<00:00, 1.37s/it]				
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	5/5	[00:02<00:00, 1.85it/s]				
	all	136	690	0.406	0.169	0.0879
0.0547						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
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```

73/80      5.09G      0.9784      2.393      0.9826      61      640:
100%|      | 34/34 [00:44<00:00, 1.31s/it]
          Class      Images  Instances      Box(P      R      mAP50
mAP50-95): 100%|      | 5/5 [00:03<00:00, 1.41it/s]
          all      136      690      0.461      0.157      0.0861
0.054

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
74/80      5.1G      0.97      2.368      0.9888      59      640:
100%|      | 34/34 [00:45<00:00, 1.34s/it]
          Class      Images  Instances      Box(P      R      mAP50
mAP50-95): 100%|      | 5/5 [00:03<00:00, 1.32it/s]
          all      136      690      0.42      0.173      0.0873
0.0554

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
75/80      5.12G      0.9518      2.35      0.9817      73      640:
100%|      | 34/34 [00:43<00:00, 1.29s/it]
          Class      Images  Instances      Box(P      R      mAP50
mAP50-95): 100%|      | 5/5 [00:02<00:00, 1.91it/s]
          all      136      690      0.45      0.152      0.0886
0.057

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
76/80      5.13G      0.9521      2.35      0.9729      66      640:
100%|      | 34/34 [00:45<00:00, 1.34s/it]
          Class      Images  Instances      Box(P      R      mAP50
mAP50-95): 100%|      | 5/5 [00:02<00:00, 1.97it/s]
          all      136      690      0.477      0.152      0.0919
0.0584

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
77/80      5.15G      0.9458      2.317      0.9807      82      640:
100%|      | 34/34 [00:45<00:00, 1.35s/it]
          Class      Images  Instances      Box(P      R      mAP50
mAP50-95): 100%|      | 5/5 [00:02<00:00, 1.93it/s]
          all      136      690      0.478      0.15      0.0916
0.0584

```

```

Epoch      GPU_mem      box_loss      cls_loss      dfl_loss      Instances      Size
78/80      5.16G      0.9502      2.323      0.9798      65      640:
100%|      | 34/34 [00:46<00:00, 1.37s/it]

```

	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%		5/5	[00:02<00:00,	1.83it/s]		
	all	136	690	0.459	0.156	0.0919

0.0587

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
79/80	5.18G	0.9358	2.334	0.9711	47	640:
100%		34/34	[00:44<00:00,	1.31s/it]		
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%		5/5	[00:03<00:00,	1.43it/s]		
	all	136	690	0.463	0.155	0.0919

0.0588

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
80/80	5.19G	0.9468	2.312	0.974	92	640:
100%		34/34	[00:44<00:00,	1.31s/it]		
	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%		5/5	[00:03<00:00,	1.62it/s]		
	all	136	690	0.46	0.157	0.0921

0.0588

80 epochs completed in 1.143 hours.

Optimizer stripped from runs/detect/dentex_train/weights/last.pt, 5.6MB

Optimizer stripped from runs/detect/dentex_train/weights/best.pt, 5.6MB

Validating runs/detect/dentex_train/weights/best.pt...

Ultralytics 8.3.155 Python-3.11.13 torch-2.6.0+cu124 CUDA:0 (Tesla T4, 15095MiB)

YOLOv12n summary (fused): 159 layers, 2,617,157 parameters, 0 gradients, 6.6 GFLOPs

	Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%		5/5	[00:07<00:00,	1.50s/it]		
	all	136	690	0.409	0.16	0.0972
0.0627						
	11_Carie	1	1	0	0	0
0						
	11_Lesao_Periapical	1	1	1	0	0
0						
	12_Carie	7	7	0	0	0.0306
0.0204						
	12_Carie_Profunda	1	1	1	0	0
0						
	13_Carie	2	2	1	0	0
0						

0	13_Carie_Profunda	1	1	0	0	0
0.0451	14_Carie	8	8	0.16	0.125	0.0695
0.0321	14_Carie_Profunda	2	2	1	0	0.107
0.0669	15_Carie	13	13	0.209	0.231	0.11
0	15_Carie_Profunda	2	2	1	0	0
0	15_Lesao_Periapical	1	1	0	0	0
0.126	16_Carie	29	29	0.183	0.379	0.182
0.0595	16_Carie_Profunda	9	9	0	0	0.103
0	16_Lesao_Periapical	1	1	0	0	0
0.0543	17_Carie	30	30	0.0662	0.1	0.0769
0.0506	17_Carie_Profunda	9	10	0.443	0.1	0.144
0	17_Lesao_Periapical	1	1	0	0	0
0.0281	18_Carie	11	11	0.0571	0.0909	0.0394
0.108	18_Carie_Profunda	7	7	0.174	0.143	0.16
0.323	18_Impactado	26	26	0.376	0.885	0.557
0.0056	21_Carie	3	3	1	0	0.008
0	21_Lesao_Periapical	1	1	1	0	0
0.0104	22_Carie	7	7	0	0	0.0139
0	22_Carie_Profunda	1	1	1	0	0
0	22_Lesao_Periapical	1	1	1	0	0
0	23_Carie	1	1	0	0	0
0.00449	24_Carie	2	2	0	0	0.00562
0.153	24_Carie_Profunda	4	4	1	0	0.254
0	24_Lesao_Periapical	1	1	0	0	0

0.0866	25_Carie	15	15	0.0792	0.133	0.132
0.174	25_Carie_Profunda	2	2	1	0	0.248
0.147	26_Carie	26	26	0.191	0.577	0.185
0.0412	26_Carie_Profunda	5	5	0	0	0.0731
0	26_Lesao_Periapical	1	1	1	0	0
0.0507	27_Carie	22	22	0.0749	0.182	0.0795
0.0293	27_Carie_Profunda	6	6	1	0	0.0442
0.0442	28_Carie	8	8	0.0532	0.125	0.0742
0.0247	28_Carie_Profunda	7	7	0	0	0.0324
0.255	28_Impactado	21	21	0.353	1	0.54
0	31_Carie	1	1	0	0	0
0	31_Lesao_Periapical	1	1	0	0	0
0	32_Carie	1	1	0	0	0
0	32_Lesao_Periapical	1	1	0	0	0
0	33_Carie	3	3	1	0	0
0	33_Carie_Profunda	1	1	1	0	0
0.0567	34_Carie	14	14	0.159	0.214	0.0881
0.00912	34_Carie_Profunda	5	5	1	0	0.0181
0.158	35_Carie	19	19	0.149	0.579	0.227
0.0121	35_Carie_Profunda	6	6	0	0	0.018
0.0383	35_Lesao_Periapical	1	1	1	0	0.0765
0.134	36_Carie	23	23	0.137	0.739	0.17
0.289	36_Carie_Profunda	17	17	0.226	0.603	0.44
0.0278	36_Lesao_Periapical	6	6	0.0462	0.167	0.0426

0.157	37_Carie	34	34	0.15	0.647	0.212
0.055	37_Carie_Profunda	6	6	0	0	0.0688
0.0489	37_Lesao_Periapical	2	2	1	0	0.0785
0.0645	38_Carie	9	9	0.0616	0.222	0.0845
0.00855	38_Carie_Profunda	3	3	1	0	0.0194
0.486	38_Impactado	41	41	0.394	0.976	0.703
0	41_Carie	2	2	1	0	0
0	41_Lesao_Periapical	3	3	0	0	0
0	42_Carie	3	3	1	0	0
0	42_Lesao_Periapical	1	1	1	0	0
0	43_Carie	2	2	1	0	0
0.112	44_Carie	13	13	0.183	0.154	0.161
0.141	45_Carie	16	16	0.103	0.375	0.184
0.0686	45_Carie_Profunda	4	4	0.247	0.25	0.0794
0	45_Lesao_Periapical	1	1	1	0	0
0.159	46_Carie	35	35	0.209	0.8	0.214
0.101	46_Carie_Profunda	13	13	0.136	0.158	0.146
0.037	46_Lesao_Periapical	6	6	1	0	0.0816
0.18	47_Carie	39	39	0.164	0.744	0.237
0.0661	47_Carie_Profunda	6	6	0.0752	0.167	0.0995
0	47_Lesao_Periapical	1	1	1	0	0
0.0843	48_Carie	17	17	0.0925	0.294	0.115
0.0993	48_Carie_Profunda	6	6	0.289	0.167	0.162
0.296	48_Impactado	31	31	0.258	0.968	0.49

Speed: 0.1ms preprocess, 4.0ms inference, 0.0ms loss, 2.5ms postprocess per image

Results saved to runs/detect/dentex_train

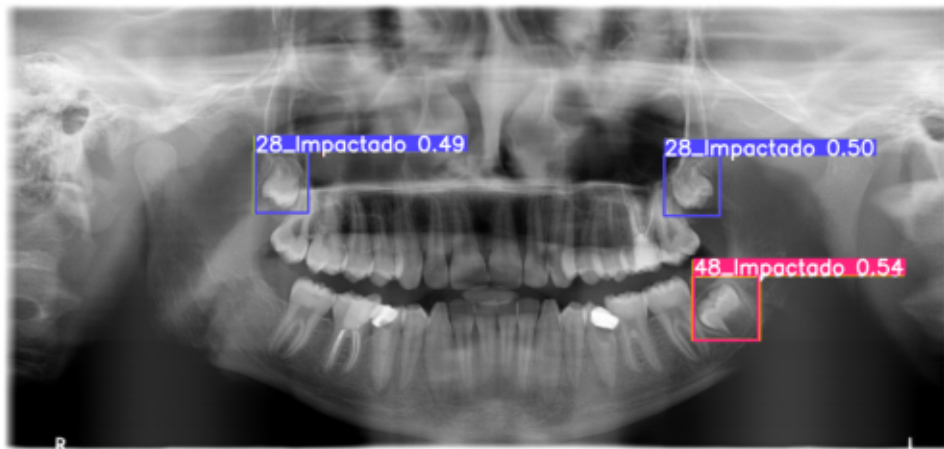
```
[7]: results = model.predict(  
    source="/content/dentex_yolo12n/images/val/train_655.png",  
    conf=0.25,  
    iou=0.7,  
    save=True,  
    save_crop=True,  
    save_txt=True  
)
```

image 1/1 /content/dentex_yolo12n/images/val/train_655.png: 320x640 2
18_Impactados, 2 28_Impactados, 1 38_Impactado, 1 48_Impactado, 98.1ms
Speed: 4.9ms preprocess, 98.1ms inference, 6.5ms postprocess per image at shape
(1, 3, 320, 640)

Results saved to runs/detect/dentex_train2

1 label saved to runs/detect/dentex_train2/labels

```
[8]: import matplotlib.pyplot as plt  
  
plt.imshow(results[0].plot())  
plt.axis('off')  
plt.show()
```



```
[14]: !unzip validation_data.zip
```

Archive: validation_data.zip

creating: validation_data/

creating: validation_data/quadrant_enumeration_disease/

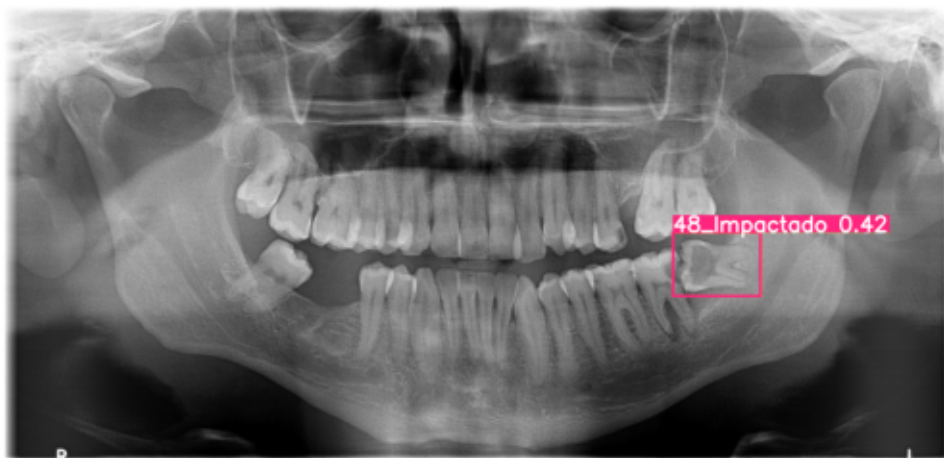

```
inflating: validation_data/quadrant_enumeration_disease/xrays/val_8.png
inflating: validation_data/quadrant_enumeration_disease/xrays/val_38.png
inflating: validation_data/quadrant_enumeration_disease/xrays/val_39.png
inflating: validation_data/quadrant_enumeration_disease/xrays/val_0.png
inflating: validation_data/quadrant_enumeration_disease/xrays/val_19.png
inflating: validation_data/quadrant_enumeration_disease/xrays/val_42.png
inflating: validation_data/quadrant_enumeration_disease/xrays/val_43.png
```

```
[15]: results = model.predict(
        source="/content/validation_data/quadrant_enumeration_disease/xrays/val_14.
        ↪png", # Caminho novo
        conf=0.25,
        iou=0.7,
        save=True,
        save_crop=True,
        save_txt=True
    )
```

```
image 1/1
/content/validation_data/quadrant_enumeration_disease/xrays/val_14.png: 320x640
1 38_Impactado, 1 48_Impactado, 16.9ms
Speed: 3.5ms preprocess, 16.9ms inference, 2.2ms postprocess per image at shape
(1, 3, 320, 640)
Results saved to runs/detect/dentex_train3
1 label saved to runs/detect/dentex_train3/labels
```

```
[16]: import matplotlib.pyplot as plt

plt.imshow(results[0].plot())
plt.axis('off')
plt.show()
```



```
[17]: resultados = model.val()
```

```
Ultralytics 8.3.155 Python-3.11.13 torch-2.6.0+cu124 CUDA:0 (Tesla T4,
15095MiB)
```

```
val: Fast image access (ping: 0.0±0.0 ms, read: 2924.1±585.8
MB/s, size: 4206.3 KB)
```

```
val: Scanning /content/dentex_yolo12n/labels/val.cache... 136
```

```
images, 0 backgrounds, 0 corrupt: 100%|      | 136/136 [00:00<?, ?it/s]
```

```
Class      Images  Instances  Box(P          R      mAP50
mAP50-95): 100%|      | 9/9 [00:11<00:00, 1.25s/it]
```

	all	136	690	0.412	0.162	0.103
0.0667						
	11_Carie	1	1	0	0	0
0						
	11_Lesao_Periapical	1	1	1	0	0
0						
	12_Carie	7	7	0	0	0.0323
0.0222						
	12_Carie_Profunda	1	1	1	0	0
0						
	13_Carie	2	2	1	0	0
0						
	13_Carie_Profunda	1	1	0	0	0
0						
	14_Carie	8	8	0.16	0.125	0.0693
0.0463						
	14_Carie_Profunda	2	2	1	0	0.108
0.0216						
	15_Carie	13	13	0.224	0.231	0.115
0.0739						
	15_Carie_Profunda	2	2	1	0	0
0						
	15_Lesao_Periapical	1	1	0	0	0
0						
	16_Carie	29	29	0.178	0.379	0.187
0.129						
	16_Carie_Profunda	9	9	0.148	0.0821	0.135
0.074						
	16_Lesao_Periapical	1	1	0	0	0
0						
	17_Carie	30	30	0.0797	0.124	0.0821
0.0585						
	17_Carie_Profunda	9	10	0.452	0.1	0.139
0.0504						
	17_Lesao_Periapical	1	1	0	0	0

0						
	18_Carie	11	11	0.0545	0.0909	0.0419
0.0288						
	18_Carie_Profunda	7	7	0.147	0.143	0.166
0.112						
	18_Impactado	26	26	0.376	0.885	0.556
0.313						
	21_Carie	3	3	1	0	0.00818
0.00572						
	21_Lesao_Periapical	1	1	1	0	0
0						
	22_Carie	7	7	0	0	0.0142
0.0106						
	22_Carie_Profunda	1	1	1	0	0
0						
	22_Lesao_Periapical	1	1	1	0	0
0						
	23_Carie	1	1	0	0	0
0						
	24_Carie	2	2	0	0	0.00548
0.00439						
	24_Carie_Profunda	4	4	1	0	0.254
0.153						
	24_Lesao_Periapical	1	1	0	0	0
0						
	25_Carie	15	15	0.0796	0.133	0.139
0.09						
	25_Carie_Profunda	2	2	1	0	0.496
0.347						
	26_Carie	26	26	0.194	0.577	0.188
0.149						
	26_Carie_Profunda	5	5	0	0	0.071
0.0392						
	26_Lesao_Periapical	1	1	1	0	0
0						
	27_Carie	22	22	0.0686	0.182	0.0757
0.0486						
	27_Carie_Profunda	6	6	1	0	0.0448
0.0304						
	28_Carie	8	8	0.0534	0.125	0.0685
0.0431						
	28_Carie_Profunda	7	7	0.0354	0.0304	0.0453
0.0346						
	28_Impactado	21	21	0.353	1	0.539
0.263						
	31_Carie	1	1	0	0	0
0						
	31_Lesao_Periapical	1	1	0	0	0

0						
	32_Carie	1	1	0	0	0
0						
	32_Lesao_Periapical	1	1	0	0	0
0						
	33_Carie	3	3	1	0	0
0						
	33_Carie_Profunda	1	1	1	0	0
0						
	34_Carie	14	14	0.189	0.214	0.0973
0.063						
	34_Carie_Profunda	5	5	1	0	0.0181
0.00914						
	35_Carie	19	19	0.157	0.579	0.246
0.177						
	35_Carie_Profunda	6	6	0	0	0.0181
0.0122						
	35_Lesao_Periapical	1	1	1	0	0.0765
0.0383						
	36_Carie	23	23	0.137	0.739	0.184
0.146						
	36_Carie_Profunda	17	17	0.222	0.604	0.424
0.287						
	36_Lesao_Periapical	6	6	0.0452	0.167	0.0429
0.028						
	37_Carie	34	34	0.149	0.647	0.232
0.169						
	37_Carie_Profunda	6	6	0	0	0.0715
0.0568						
	37_Lesao_Periapical	2	2	1	0	0.0791
0.0493						
	38_Carie	9	9	0.0613	0.222	0.0837
0.0649						
	38_Carie_Profunda	3	3	1	0	0.0194
0.00856						
	38_Impactado	41	41	0.394	0.976	0.716
0.499						
	41_Carie	2	2	1	0	0
0						
	41_Lesao_Periapical	3	3	0	0	0
0						
	42_Carie	3	3	1	0	0
0						
	42_Lesao_Periapical	1	1	1	0	0
0						
	43_Carie	2	2	1	0	0
0						
	44_Carie	13	13	0.188	0.154	0.172

0.121	45_Carie	16	16	0.102	0.375	0.18
0.141	45_Carie_Profunda	4	4	0.247	0.25	0.0794
0.0686	45_Lesao_Periapical	1	1	1	0	0
0	46_Carie	35	35	0.205	0.8	0.228
0.17	46_Carie_Profunda	13	13	0.132	0.153	0.14
0.097	46_Lesao_Periapical	6	6	1	0	0.0829
0.0377	47_Carie	39	39	0.164	0.751	0.235
0.178	47_Carie_Profunda	6	6	0.0754	0.167	0.0996
0.0661	47_Lesao_Periapical	1	1	1	0	0
0	48_Carie	17	17	0.0923	0.294	0.113
0.0823	48_Carie_Profunda	6	6	0.289	0.167	0.162
0.101	48_Impactado	31	31	0.261	0.981	0.528

0.316

Speed: 1.4ms preprocess, 8.2ms inference, 0.0ms loss, 2.9ms postprocess per image

Results saved to runs/detect/dentex_train4

```
[18]: print("Métricas globais:")
      print(f'mAP50:      {resultados.box.map50:.3f}')
      print(f'mAP50-95:  {resultados.box.map:.3f}')
```

Métricas globais:

mAP50: 0.103

mAP50-95: 0.067

```
[19]: !zip -r runs.zip runs/
```

```
adding: runs/ (stored 0%)
adding: runs/detect/ (stored 0%)
adding: runs/detect/dentex_train2/ (stored 0%)
adding: runs/detect/dentex_train2/train_655.jpg (deflated 1%)
adding: runs/detect/dentex_train2/labels/ (stored 0%)
adding: runs/detect/dentex_train2/labels/train_655.txt (deflated 49%)
adding: runs/detect/dentex_train2/crops/ (stored 0%)
adding: runs/detect/dentex_train2/crops/28_Impactado/ (stored 0%)
adding: runs/detect/dentex_train2/crops/28_Impactado/train_655.jpg (deflated 3%)
```

adding: runs/detect/dentex_train2/crops/28_Impactado/train_6552.jpg (deflated 3%)
 adding: runs/detect/dentex_train2/crops/38_Impactado/ (stored 0%)
 adding: runs/detect/dentex_train2/crops/38_Impactado/train_655.jpg (deflated 3%)
 adding: runs/detect/dentex_train2/crops/18_Impactado/ (stored 0%)
 adding: runs/detect/dentex_train2/crops/18_Impactado/train_655.jpg (deflated 3%)
 adding: runs/detect/dentex_train2/crops/18_Impactado/train_6552.jpg (deflated 3%)
 adding: runs/detect/dentex_train2/crops/48_Impactado/ (stored 0%)
 adding: runs/detect/dentex_train2/crops/48_Impactado/train_655.jpg (deflated 3%)
 adding: runs/detect/dentex_train/ (stored 0%)
 adding: runs/detect/dentex_train/labels_correlogram.jpg (deflated 37%)
 adding: runs/detect/dentex_train/train_batch2381.jpg (deflated 14%)
 adding: runs/detect/dentex_train/labels.jpg (deflated 32%)
 adding: runs/detect/dentex_train/val_batch0_pred.jpg (deflated 11%)
 adding: runs/detect/dentex_train/train_batch2380.jpg (deflated 16%)
 adding: runs/detect/dentex_train/val_batch1_pred.jpg (deflated 12%)
 adding: runs/detect/dentex_train/weights/ (stored 0%)
 adding: runs/detect/dentex_train/weights/best.pt (deflated 11%)
 adding: runs/detect/dentex_train/weights/last.pt (deflated 11%)
 adding: runs/detect/dentex_train/F1_curve.png (deflated 12%)
 adding: runs/detect/dentex_train/train_batch0.jpg (deflated 8%)
 adding: runs/detect/dentex_train/val_batch2_pred.jpg (deflated 11%)
 adding: runs/detect/dentex_train/val_batch2_labels.jpg (deflated 10%)
 adding: runs/detect/dentex_train/P_curve.png (deflated 8%)
 adding: runs/detect/dentex_train/val_batch0_labels.jpg (deflated 10%)
 adding: runs/detect/dentex_train/R_curve.png (deflated 11%)
 adding: runs/detect/dentex_train/confusion_matrix_normalized.png (deflated 25%)
 adding: runs/detect/dentex_train/train_batch2382.jpg (deflated 20%)
 adding: runs/detect/dentex_train/val_batch1_labels.jpg (deflated 11%)
 adding: runs/detect/dentex_train/results.png (deflated 8%)
 adding: runs/detect/dentex_train/train_batch1.jpg (deflated 8%)
 adding: runs/detect/dentex_train/confusion_matrix.png (deflated 24%)
 adding: runs/detect/dentex_train/results.csv (deflated 61%)
 adding: runs/detect/dentex_train/args.yaml (deflated 53%)
 adding: runs/detect/dentex_train/PR_curve.png (deflated 11%)
 adding: runs/detect/dentex_train/train_batch2.jpg (deflated 6%)
 adding: runs/detect/dentex_train3/ (stored 0%)
 adding: runs/detect/dentex_train3/val_14.jpg (deflated 0%)
 adding: runs/detect/dentex_train3/labels/ (stored 0%)
 adding: runs/detect/dentex_train3/labels/val_14.txt (deflated 32%)
 adding: runs/detect/dentex_train3/crops/ (stored 0%)
 adding: runs/detect/dentex_train3/crops/38_Impactado/ (stored 0%)
 adding: runs/detect/dentex_train3/crops/38_Impactado/val_14.jpg (deflated 2%)


```
adding: runs/detect/dentex_train3/crops/48_Impactado/ (stored 0%)
adding: runs/detect/dentex_train3/crops/48_Impactado/val_14.jpg (deflated 2%)
adding: runs/detect/dentex_train4/ (stored 0%)
adding: runs/detect/dentex_train4/val_batch0_pred.jpg (deflated 11%)
adding: runs/detect/dentex_train4/val_batch1_pred.jpg (deflated 11%)
adding: runs/detect/dentex_train4/F1_curve.png (deflated 12%)
adding: runs/detect/dentex_train4/val_batch2_pred.jpg (deflated 12%)
adding: runs/detect/dentex_train4/val_batch2_labels.jpg (deflated 11%)
adding: runs/detect/dentex_train4/P_curve.png (deflated 8%)
adding: runs/detect/dentex_train4/val_batch0_labels.jpg (deflated 10%)
adding: runs/detect/dentex_train4/R_curve.png (deflated 11%)
adding: runs/detect/dentex_train4/confusion_matrix_normalized.png (deflated
25%)
adding: runs/detect/dentex_train4/val_batch1_labels.jpg (deflated 10%)
adding: runs/detect/dentex_train4/confusion_matrix.png (deflated 24%)
adding: runs/detect/dentex_train4/PR_curve.png (deflated 11%)
```

```
[20]: from google.colab import files
files.download("runs.zip")
```

<IPython.core.display.Javascript object>

<IPython.core.display.Javascript object>