YoloV8 Based Plastic Detection and Prediction

Setting Variables

```python
import os
HOME = os.getcwd()
print(HOME)

c:\Users\spamy\OneDrive\Desktop\project
```

Install YOLOv8

```python
# Pip install method (recommended)

!pip install ultralytics==8.0.20

from IPython import display
display.clear_output()

import ultralytics
ultralytics.checks()

Ultralytics YOLOv8.1.27 🚀 Python-3.12.0 torch-2.2.1+cpu CPU (AMD
Ryzen 7 7840HS w/ Radeon 780M Graphics)
Setup complete ⊘ (16 CPUs, 15.3 GB RAM, 96.5/377.5 GB disk)

from ultralytics import YOLO
from IPython.display import display, Image
```

Preparing a custom dataset

```python
# !mkdir {HOME}/datasets
%cd {HOME}/datasets

from roboflow import Roboflow
rf = Roboflow(api_key="sozCru7PBpxEKc4I6K5w")
project = rf.workspace("nurina-kurnia-idmpn").project("plastic-waste-
vd6dj")
version = project.version(20)
dataset = version.download("yolov8")

C:\Users\spamy\AppData\Roaming\Python\Python312\site-packages\IPython\
core\magics\osm.py:417: UserWarning: This is now an optional IPython
functionality, setting dhist requires you to install the `pickleshare`
library.
  self.shell.db['dhist'] = compress_dhist(dhist)[-100:]
```

```
c:\Users\spamy\OneDrive\Desktop\project\datasets
loading Roboflow workspace...
loading Roboflow project...
Dependency ultralytics==8.0.196 is required but found version=8.1.27,
to fix: `pip install ultralytics==8.0.196`
```

Custom Training

```
%cd {HOME}

!yolo task=detect mode=train model=yolov8s.pt
data={dataset.location}/data.yaml epochs=3 imgsz=800 plots=True

c:\Users\spamy\OneDrive\Desktop\project
^C

Ultralytics YOLOv8.1.27 🚀 Python-3.12.0 torch-2.2.1+cpu CPU (AMD
Ryzen 7 7840HS w/ Radeon 780M Graphics)
engine\trainer: task=detect, mode=train, model=yolov8s.pt, data=c:\
Users\spamy\OneDrive\Desktop\project\datasets\Plastic-Waste-20/
data.yaml, epochs=3, time=None, patience=100, batch=16, imgsz=800,
save=True, save_period=-1, cache=False, device=None, workers=8,
project=None, name=train10, 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, save_hybrid=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=False, opset=None, workspace=4,
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, label_smoothing=0.0, 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, fliplr=0.5,
mosaic=1.0, mixup=0.0, copy_paste=0.0, auto_augment=randaugment,
erasing=0.4, crop_fraction=1.0, cfg=None, tracker=botsort.yaml,
save_dir=runs\detect\train10
Overriding model.yaml nc=80 with nc=6

                    from  n    params  module
arguments
  0                   -1  1       928  ultralytics.nn.modules.conv.Conv
[3, 32, 3, 2]
  1                   -1  1     18560  ultralytics.nn.modules.conv.Conv
```

```
                                          [32, 64, 3, 2]
  2                -1  1      29056  ultralytics.nn.modules.block.C2f
[64, 64, 1, True]
  3                -1  1      73984  ultralytics.nn.modules.conv.Conv
[64, 128, 3, 2]
  4                -1  2     197632  ultralytics.nn.modules.block.C2f
[128, 128, 2, True]
  5                -1  1     295424  ultralytics.nn.modules.conv.Conv
[128, 256, 3, 2]
  6                -1  2     788480  ultralytics.nn.modules.block.C2f
[256, 256, 2, True]
  7                -1  1    1180672  ultralytics.nn.modules.conv.Conv
[256, 512, 3, 2]
  8                -1  1    1838080  ultralytics.nn.modules.block.C2f
[512, 512, 1, True]
  9                -1  1     656896
ultralytics.nn.modules.block.SPPF                [512, 512, 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     591360  ultralytics.nn.modules.block.C2f
[768, 256, 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     148224  ultralytics.nn.modules.block.C2f
[384, 128, 1]
 16                -1  1     147712  ultralytics.nn.modules.conv.Conv
[128, 128, 3, 2]
 17           [-1, 12]  1          0
ultralytics.nn.modules.conv.Concat               [1]

 18                -1  1     493056  ultralytics.nn.modules.block.C2f
[384, 256, 1]
 19                -1  1     590336  ultralytics.nn.modules.conv.Conv
[256, 256, 3, 2]
 20            [-1, 9]  1          0
ultralytics.nn.modules.conv.Concat               [1]

 21                -1  1    1969152  ultralytics.nn.modules.block.C2f
[768, 512, 1]
 22        [15, 18, 21]  1    2118370
ultralytics.nn.modules.head.Detect               [6, [128, 256, 512]]
```

Model summary: 225 layers, 11137922 parameters, 11137906 gradients

Transferred 349/355 items from pretrained weights
Freezing layer 'model.22.dfl.conv.weight'
WARNING ⚠ Box and segment counts should be equal, but got
len(segments) = 24, len(boxes) = 6985. To resolve this only boxes will
be used and all segments will be removed. To avoid this please supply
either a detect or segment dataset, not a detect-segment mixed
dataset.
Plotting labels to runs\detect\train10\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=0.001, momentum=0.9) with parameter groups 57
weight(decay=0.0), 64 weight(decay=0.0005), 63 bias(decay=0.0)
Image sizes 800 train, 800 val
Using 0 dataloader workers
Logging results to runs\detect\train10
Starting training for 3 epochs...

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
	all	100	240	0.117	0.275	
0.104	0.05					

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
	all	100	240	0.152	0.201	
0.117	0.0452					

train: Scanning C:\Users\spamy\OneDrive\Desktop\project\datasets\
Plastic-Waste-20\train\labels.cache... 2146 images, 2 backgrounds, 0
corrupt: 100%|██████████| 2146/2146 [00:00<?, ?it/s]
train: Scanning C:\Users\spamy\OneDrive\Desktop\project\datasets\
Plastic-Waste-20\train\labels.cache... 2146 images, 2 backgrounds, 0
corrupt: 100%|██████████| 2146/2146 [00:00<?, ?it/s]

val: Scanning C:\Users\spamy\OneDrive\Desktop\project\datasets\
Plastic-Waste-20\valid\labels.cache... 100 images, 0 backgrounds, 0
corrupt: 100%|██████████| 100/100 [00:00<?, ?it/s]
val: Scanning C:\Users\spamy\OneDrive\Desktop\project\datasets\
Plastic-Waste-20\valid\labels.cache... 100 images, 0 backgrounds, 0
corrupt: 100%|██████████| 100/100 [00:00<?, ?it/s]

```
  0%|          | 0/135 [00:00<?, ?it/s]
        1/3        0G      1.684      8.585      1.938        80
800:   0%|          | 0/135 [00:13<?, ?it/s]
        1/3        0G      1.684      8.585      1.938        80
```

```
800:   1%|              | 1/135 [00:13<30:00, 13.44s/it]
        1/3        0G      1.838      9.765      2.104            64
800:   1%|              | 1/135 [00:25<30:00, 13.44s/it]
        1/3        0G      1.838      9.765      2.104            64
800:   1%||             | 2/135 [00:25<28:07, 12.69s/it]
        1/3        0G      1.807      8.979      2.062           116
800:   1%||             | 2/135 [00:37<28:07, 12.69s/it]
        1/3        0G      1.807      8.979      2.062           116
800:   2%||             | 3/135 [00:37<27:25, 12.47s/it]
        1/3        0G      1.733      8.521       2.01            96
800:   2%||             | 3/135 [00:50<27:25, 12.47s/it]
        1/3        0G      1.733      8.521       2.01            96
800:   3%||             | 4/135 [00:50<27:06, 12.42s/it]
        1/3        0G       1.71      8.197      1.978           115
800:   3%||             | 4/135 [01:02<27:06, 12.42s/it]
        1/3        0G       1.71      8.197      1.978           115
800:   4%||             | 5/135 [01:02<26:53, 12.41s/it]
        1/3        0G      1.697      7.757      1.946           161
800:   4%||             | 5/135 [01:15<26:53, 12.41s/it]
        1/3        0G      1.697      7.757      1.946           161
800:   4%||             | 6/135 [01:15<26:53, 12.51s/it]
        1/3        0G      1.671      7.551      1.929            92
800:   4%||             | 6/135 [01:27<26:53, 12.51s/it]
        1/3        0G      1.671      7.551      1.929            92
800:   5%||             | 7/135 [01:27<26:36, 12.47s/it]
        1/3        0G      1.674      7.333      1.914           104
800:   5%||             | 7/135 [01:39<26:36, 12.47s/it]
        1/3        0G      1.674      7.333      1.914           104
800:   6%||             | 8/135 [01:39<26:17, 12.42s/it]
        1/3        0G      1.665      7.157      1.919            72
800:   6%||             | 8/135 [01:52<26:17, 12.42s/it]
        1/3        0G      1.665      7.157      1.919            72
800:   7%||             | 9/135 [01:52<26:05, 12.42s/it]
        1/3        0G      1.633      6.933      1.896            85
800:   7%||             | 9/135 [02:04<26:05, 12.42s/it]
        1/3        0G      1.633      6.933      1.896            85
800:   7%||             | 10/135 [02:04<25:45, 12.37s/it]
        1/3        0G      1.599      6.697      1.862           103
800:   7%||             | 10/135 [02:17<25:45, 12.37s/it]
        1/3        0G      1.599      6.697      1.862           103
800:   8%||             | 11/135 [02:17<25:33, 12.37s/it]
        1/3        0G      1.571      6.521       1.84            96
800:   8%||             | 11/135 [02:29<25:33, 12.37s/it]
        1/3        0G      1.571      6.521       1.84            96
800:   9%||             | 12/135 [02:29<25:24, 12.40s/it]
        1/3        0G       1.57      6.388      1.847            65
800:   9%||             | 12/135 [02:41<25:24, 12.40s/it]
        1/3        0G       1.57      6.388      1.847            65
800:  10%||             | 13/135 [02:41<25:10, 12.38s/it]
```

```
         1/3              0G        1.566         6.243         1.844            76
800:  10%|█             | 13/135 [02:54<25:10, 12.38s/it]
         1/3              0G        1.566         6.243         1.844            76
800:  10%|█             | 14/135 [02:54<24:59, 12.39s/it]
         1/3              0G        1.558         6.134         1.84             74
800:  10%|█             | 14/135 [03:06<24:59, 12.39s/it]
         1/3              0G        1.558         6.134         1.84             74
800:  11%|█             | 15/135 [03:06<24:38, 12.32s/it]
         1/3              0G        1.567         6.031         1.835            92
800:  11%|█             | 15/135 [03:21<24:38, 12.32s/it]
         1/3              0G        1.567         6.031         1.835            92
800:  12%|█             | 16/135 [03:21<26:01, 13.12s/it]
         1/3              0G        1.557         5.907         1.821           127
800:  12%|█             | 16/135 [03:34<26:01, 13.12s/it]
         1/3              0G        1.557         5.907         1.821           127
800:  13%|█             | 17/135 [03:34<25:33, 12.99s/it]
         1/3              0G        1.559         5.812         1.825            80
800:  13%|█             | 17/135 [03:46<25:33, 12.99s/it]
         1/3              0G        1.559         5.812         1.825            80
800:  13%|█             | 18/135 [03:46<24:54, 12.77s/it]
         1/3              0G        1.541         5.7           1.81             89
800:  13%|█             | 18/135 [03:58<24:54, 12.77s/it]
         1/3              0G        1.541         5.7           1.81             89
800:  14%|█             | 19/135 [03:58<24:30, 12.68s/it]
         1/3              0G        1.535         5.595         1.801           141
800:  14%|█             | 19/135 [04:11<24:30, 12.68s/it]
         1/3              0G        1.535         5.595         1.801           141
800:  15%|█             | 20/135 [04:11<24:15, 12.66s/it]
         1/3              0G        1.524         5.513         1.788            79
800:  15%|█             | 20/135 [04:23<24:15, 12.66s/it]
         1/3              0G        1.524         5.513         1.788            79
800:  16%|█             | 21/135 [04:23<23:52, 12.56s/it]
         1/3              0G        1.519         5.422         1.781           110
800:  16%|█             | 21/135 [04:36<23:52, 12.56s/it]
         1/3              0G        1.519         5.422         1.781           110
800:  16%|█             | 22/135 [04:36<23:37, 12.55s/it]
         1/3              0G        1.503         5.336         1.767            99
800:  16%|█             | 22/135 [04:48<23:37, 12.55s/it]
         1/3              0G        1.503         5.336         1.767            99
800:  17%|█             | 23/135 [04:48<23:22, 12.52s/it]
         1/3              0G        1.484         5.254         1.751            95
800:  17%|█             | 23/135 [05:01<23:22, 12.52s/it]
         1/3              0G        1.484         5.254         1.751            95
800:  18%|█             | 24/135 [05:01<23:04, 12.48s/it]
         1/3              0G        1.477         5.182         1.741           137
800:  18%|█             | 24/135 [05:13<23:04, 12.48s/it]
         1/3              0G        1.477         5.182         1.741           137
800:  19%|█             | 25/135 [05:13<22:55, 12.51s/it]
         1/3              0G        1.472         5.112         1.737           101
```

```
800:   19%|■           | 25/135 [05:26<22:55, 12.51s/it]
        1/3        0G      1.472      5.112      1.737       101
800:   19%|■           | 26/135 [05:26<22:39, 12.48s/it]
        1/3        0G      1.468      5.058      1.732        73
800:   19%|■           | 26/135 [05:38<22:39, 12.48s/it]
        1/3        0G      1.468      5.058      1.732        73
800:   20%|■           | 27/135 [05:38<22:21, 12.42s/it]
        1/3        0G      1.459      5.004      1.729        59
800:   20%|■           | 27/135 [05:50<22:21, 12.42s/it]
        1/3        0G      1.459      5.004      1.729        59
800:   21%|■           | 28/135 [05:50<22:10, 12.43s/it]
        1/3        0G      1.457      4.948      1.729        64
800:   21%|■           | 28/135 [06:03<22:10, 12.43s/it]
        1/3        0G      1.457      4.948      1.729        64
800:   21%|■           | 29/135 [06:03<21:51, 12.38s/it]
        1/3        0G      1.443      4.885      1.721        79
800:   21%|■           | 29/135 [06:15<21:51, 12.38s/it]
        1/3        0G      1.443      4.885      1.721        79
800:   22%|■           | 30/135 [06:15<21:45, 12.43s/it]
        1/3        0G      1.446      4.839      1.718       128
800:   22%|■           | 30/135 [06:28<21:45, 12.43s/it]
        1/3        0G      1.446      4.839      1.718       128
800:   23%|■           | 31/135 [06:28<21:42, 12.53s/it]
        1/3        0G      1.447      4.792      1.719       111
800:   23%|■           | 31/135 [06:40<21:42, 12.53s/it]
        1/3        0G      1.447      4.792      1.719       111
800:   24%|■           | 32/135 [06:40<21:29, 12.52s/it]
        1/3        0G      1.448      4.749      1.715       100
800:   24%|■           | 32/135 [06:53<21:29, 12.52s/it]
        1/3        0G      1.448      4.749      1.715       100
800:   24%|■           | 33/135 [06:53<21:22, 12.57s/it]
        1/3        0G      1.453      4.701      1.712       192
800:   24%|■           | 33/135 [07:06<21:22, 12.57s/it]
        1/3        0G      1.453      4.701      1.712       192
800:   25%|■           | 34/135 [07:06<21:18, 12.66s/it]
        1/3        0G      1.449      4.655      1.708       136
800:   25%|■           | 34/135 [07:18<21:18, 12.66s/it]
        1/3        0G      1.449      4.655      1.708       136
800:   26%|■           | 35/135 [07:18<21:02, 12.62s/it]
        1/3        0G      1.447      4.615      1.704       127
800:   26%|■           | 35/135 [07:31<21:02, 12.62s/it]
        1/3        0G      1.447      4.615      1.704       127
800:   27%|■           | 36/135 [07:31<20:48, 12.62s/it]
        1/3        0G       1.45      4.585      1.705        90
800:   27%|■           | 36/135 [07:43<20:48, 12.62s/it]
        1/3        0G       1.45      4.585      1.705        90
800:   27%|■           | 37/135 [07:43<20:29, 12.55s/it]
        1/3        0G      1.448      4.535      1.702        94
800:   27%|■           | 37/135 [07:56<20:29, 12.55s/it]
```

```
        1/3          0G      1.448       4.535       1.702          94
800:  28%|██         | 38/135 [07:56<20:18, 12.56s/it]
        1/3          0G      1.446       4.502        1.7           88
800:  28%|██         | 38/135 [08:08<20:18, 12.56s/it]
        1/3          0G      1.446       4.502        1.7           88
800:  29%|██         | 39/135 [08:08<19:58, 12.49s/it]
        1/3          0G      1.436       4.468       1.698          58
800:  29%|██         | 39/135 [08:21<19:58, 12.49s/it]
        1/3          0G      1.436       4.468       1.698          58
800:  30%|██         | 40/135 [08:21<19:41, 12.44s/it]
        1/3          0G      1.434       4.429       1.692         116
800:  30%|██         | 40/135 [08:33<19:41, 12.44s/it]
        1/3          0G      1.434       4.429       1.692         116
800:  30%|██         | 41/135 [08:33<19:21, 12.36s/it]
        1/3          0G      1.427       4.389       1.688         101
800:  30%|██         | 41/135 [08:45<19:21, 12.36s/it]
        1/3          0G      1.427       4.389       1.688         101
800:  31%|██         | 42/135 [08:45<19:04, 12.31s/it]
        1/3          0G      1.424       4.35        1.682         107
800:  31%|██         | 42/135 [08:57<19:04, 12.31s/it]
        1/3          0G      1.424       4.35        1.682         107
800:  32%|██         | 43/135 [08:57<18:50, 12.28s/it]
        1/3          0G      1.421       4.317       1.679          94
800:  32%|██         | 43/135 [09:10<18:50, 12.28s/it]
        1/3          0G      1.421       4.317       1.679          94
800:  33%|██         | 44/135 [09:10<18:40, 12.31s/it]
        1/3          0G      1.42        4.284       1.678         109
800:  33%|██         | 44/135 [09:22<18:40, 12.31s/it]
        1/3          0G      1.42        4.284       1.678         109
800:  33%|██         | 45/135 [09:22<18:29, 12.33s/it]
        1/3          0G      1.421       4.255       1.68           93
800:  33%|██         | 45/135 [09:34<18:29, 12.33s/it]
        1/3          0G      1.421       4.255       1.68           93
800:  34%|██         | 46/135 [09:34<18:16, 12.31s/it]
        1/3          0G      1.416       4.224       1.678          77
800:  34%|██         | 46/135 [09:47<18:16, 12.31s/it]
        1/3          0G      1.416       4.224       1.678          77
800:  35%|██         | 47/135 [09:47<18:02, 12.30s/it]
        1/3          0G      1.412       4.191       1.676         109
800:  35%|██         | 47/135 [09:59<18:02, 12.30s/it]
        1/3          0G      1.412       4.191       1.676         109
800:  36%|██         | 48/135 [09:59<17:46, 12.26s/it]
        1/3          0G      1.413       4.173       1.676          94
800:  36%|██         | 48/135 [10:11<17:46, 12.26s/it]
        1/3          0G      1.413       4.173       1.676          94
800:  36%|██         | 49/135 [10:11<17:36, 12.29s/it]
        1/3          0G      1.41        4.147       1.676          89
800:  36%|██         | 49/135 [10:24<17:36, 12.29s/it]
        1/3          0G      1.41        4.147       1.676          89
```

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800:  37%|███  | 50/135 [10:24<17:28, 12.34s/it]
      1/3       0G      1.407      4.118      1.674        105
800:  37%|███  | 50/135 [10:36<17:28, 12.34s/it]
      1/3       0G      1.407      4.118      1.674        105
800:  38%|███  | 51/135 [10:36<17:16, 12.34s/it]
      1/3       0G      1.405      4.091      1.673         79
800:  38%|███  | 51/135 [10:48<17:16, 12.34s/it]
      1/3       0G      1.405      4.091      1.673         79
800:  39%|███  | 52/135 [10:48<17:02, 12.32s/it]
      1/3       0G      1.401      4.061      1.667        141
800:  39%|███  | 52/135 [11:01<17:02, 12.32s/it]
      1/3       0G      1.401      4.061      1.667        141
800:  39%|███  | 53/135 [11:01<16:55, 12.38s/it]
      1/3       0G      1.396      4.035      1.667         69
800:  39%|███  | 53/135 [11:13<16:55, 12.38s/it]
      1/3       0G      1.396      4.035      1.667         69
800:  40%|███  | 54/135 [11:13<16:37, 12.32s/it]
      1/3       0G      1.393       4.01      1.665         84
800:  40%|███  | 54/135 [11:25<16:37, 12.32s/it]
      1/3       0G      1.393       4.01      1.665         84
800:  41%|███  | 55/135 [11:25<16:29, 12.37s/it]
      1/3       0G      1.393      3.988      1.667         77
800:  41%|███  | 55/135 [11:38<16:29, 12.37s/it]
      1/3       0G      1.393      3.988      1.667         77
800:  41%|███  | 56/135 [11:38<16:16, 12.37s/it]
      1/3       0G      1.388      3.962      1.663        101
800:  41%|███  | 56/135 [11:50<16:16, 12.37s/it]
      1/3       0G      1.388      3.962      1.663        101
800:  42%|███  | 57/135 [11:50<16:03, 12.36s/it]
      1/3       0G      1.383      3.935      1.661         90
800:  42%|███  | 57/135 [12:02<16:03, 12.36s/it]
      1/3       0G      1.383      3.935      1.661         90
800:  43%|███  | 58/135 [12:02<15:48, 12.31s/it]
      1/3       0G      1.379      3.911      1.658         92
800:  43%|███  | 58/135 [12:15<15:48, 12.31s/it]
      1/3       0G      1.379      3.911      1.658         92
800:  44%|███  | 59/135 [12:15<15:37, 12.34s/it]
      1/3       0G      1.375      3.889      1.657         61
800:  44%|███  | 59/135 [12:27<15:37, 12.34s/it]
      1/3       0G      1.375      3.889      1.657         61
800:  44%|███  | 60/135 [12:27<15:26, 12.35s/it]
      1/3       0G      1.371      3.862      1.654         90
800:  44%|███  | 60/135 [12:39<15:26, 12.35s/it]
      1/3       0G      1.371      3.862      1.654         90
800:  45%|███  | 61/135 [12:39<15:15, 12.37s/it]
      1/3       0G      1.368      3.838      1.652        104
800:  45%|███  | 61/135 [12:52<15:15, 12.37s/it]
      1/3       0G      1.368      3.838      1.652        104
800:  46%|███  | 62/135 [12:52<15:06, 12.42s/it]
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        1/3              0G      1.368       3.816       1.653          81
800:  46%|███           | 62/135 [13:04<15:06, 12.42s/it]
        1/3              0G      1.368       3.816       1.653          81
800:  47%|███           | 63/135 [13:04<14:52, 12.40s/it]
        1/3              0G      1.367       3.798       1.653          87
800:  47%|███           | 63/135 [13:16<14:52, 12.40s/it]
        1/3              0G      1.367       3.798       1.653          87
800:  47%|███           | 64/135 [13:16<14:30, 12.26s/it]
        1/3              0G      1.365       3.775        1.65         120
800:  47%|███           | 64/135 [13:27<14:30, 12.26s/it]
        1/3              0G      1.365       3.775        1.65         120
800:  48%|███           | 65/135 [13:27<13:49, 11.85s/it]
        1/3              0G      1.366       3.754       1.648         152
800:  48%|███           | 65/135 [13:38<13:49, 11.85s/it]
        1/3              0G      1.366       3.754       1.648         152
800:  49%|███           | 66/135 [13:38<13:22, 11.63s/it]
        1/3              0G      1.367       3.735       1.647         109
800:  49%|███           | 66/135 [13:49<13:22, 11.63s/it]
        1/3              0G      1.367       3.735       1.647         109
800:  50%|███           | 67/135 [13:49<12:56, 11.43s/it]
        1/3              0G      1.366       3.719       1.647          96
800:  50%|███           | 67/135 [14:00<12:56, 11.43s/it]
        1/3              0G      1.366       3.719       1.647          96
800:  50%|███           | 68/135 [14:00<12:37, 11.30s/it]
        1/3              0G      1.366       3.702       1.646         159
800:  50%|███           | 68/135 [14:11<12:37, 11.30s/it]
        1/3              0G      1.366       3.702       1.646         159
800:  51%|███           | 69/135 [14:11<12:21, 11.23s/it]
        1/3              0G       1.36        3.68       1.642          97
800:  51%|███           | 69/135 [14:23<12:21, 11.23s/it]
        1/3              0G       1.36        3.68       1.642          97
800:  52%|███           | 70/135 [14:23<12:14, 11.29s/it]
        1/3              0G      1.362       3.664       1.641         139
800:  52%|███           | 70/135 [14:34<12:14, 11.29s/it]
        1/3              0G      1.362       3.664       1.641         139
800:  53%|███           | 71/135 [14:34<12:00, 11.26s/it]
        1/3              0G      1.363       3.654       1.641          90
800:  53%|███           | 71/135 [14:45<12:00, 11.26s/it]
        1/3              0G      1.363       3.654       1.641          90
800:  53%|███           | 72/135 [14:45<11:45, 11.20s/it]
        1/3              0G      1.362       3.639       1.639          96
800:  53%|███           | 72/135 [14:56<11:45, 11.20s/it]
        1/3              0G      1.362       3.639       1.639          96
800:  54%|███           | 73/135 [14:56<11:30, 11.14s/it]
        1/3              0G       1.36        3.622       1.636         146
800:  54%|███           | 73/135 [15:07<11:30, 11.14s/it]
        1/3              0G       1.36        3.622       1.636         146
800:  55%|███           | 74/135 [15:07<11:22, 11.20s/it]
        1/3              0G      1.357       3.604       1.633          96
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800:  55%|███████     | 74/135 [15:18<11:22, 11.20s/it]
        1/3          0G        1.357        3.604        1.633              96
800:  56%|███████     | 75/135 [15:18<11:09, 11.16s/it]
        1/3          0G        1.358        3.591        1.634              87
800:  56%|███████     | 75/135 [15:30<11:09, 11.16s/it]
        1/3          0G        1.358        3.591        1.634              87
800:  56%|███████     | 76/135 [15:30<11:02, 11.24s/it]
        1/3          0G        1.357        3.576        1.633             102
800:  56%|███████     | 76/135 [15:41<11:02, 11.24s/it]
        1/3          0G        1.357        3.576        1.633             102
800:  57%|███████     | 77/135 [15:41<10:49, 11.21s/it]
        1/3          0G        1.356        3.562        1.632              88
800:  57%|███████     | 77/135 [15:53<10:49, 11.21s/it]
        1/3          0G        1.356        3.562        1.632              88
800:  58%|███████     | 78/135 [15:53<10:46, 11.34s/it]
        1/3          0G        1.356        3.552        1.631              83
800:  58%|███████     | 78/135 [16:04<10:46, 11.34s/it]
        1/3          0G        1.356        3.552        1.631              83
800:  59%|███████     | 79/135 [16:04<10:37, 11.39s/it]
        1/3          0G        1.356        3.538        1.632             103
800:  59%|███████     | 79/135 [16:16<10:37, 11.39s/it]
        1/3          0G        1.356        3.538        1.632             103
800:  59%|███████     | 80/135 [16:16<10:33, 11.52s/it]
        1/3          0G        1.356        3.524        1.631             107
800:  59%|███████     | 80/135 [16:27<10:33, 11.52s/it]
        1/3          0G        1.356        3.524        1.631             107
800:  60%|███████     | 81/135 [16:27<10:21, 11.52s/it]
        1/3          0G        1.352        3.508        1.629              85
800:  60%|███████     | 81/135 [16:39<10:21, 11.52s/it]
        1/3          0G        1.352        3.508        1.629              85
800:  61%|███████     | 82/135 [16:39<10:15, 11.61s/it]
        1/3          0G         1.35        3.493        1.627              82
800:  61%|███████     | 82/135 [16:51<10:15, 11.61s/it]
        1/3          0G         1.35        3.493        1.627              82
800:  61%|███████     | 83/135 [16:51<10:01, 11.57s/it]
        1/3          0G        1.348         3.48        1.625             106
800:  61%|███████     | 83/135 [17:03<10:01, 11.57s/it]
        1/3          0G        1.348         3.48        1.625             106
800:  62%|███████     | 84/135 [17:03<10:00, 11.77s/it]
        1/3          0G        1.349        3.468        1.623             131
800:  62%|███████     | 84/135 [17:15<10:00, 11.77s/it]
        1/3          0G        1.349        3.468        1.623             131
800:  63%|███████     | 85/135 [17:15<09:46, 11.74s/it]
        1/3          0G        1.348        3.454        1.623              91
800:  63%|███████     | 85/135 [17:26<09:46, 11.74s/it]
        1/3          0G        1.348        3.454        1.623              91
800:  64%|███████     | 86/135 [17:26<09:35, 11.74s/it]
        1/3          0G        1.349        3.443        1.622             166
800:  64%|███████     | 86/135 [17:38<09:35, 11.74s/it]
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        1/3              0G        1.349       3.443       1.622             166
800:  64%|██████    | 87/135 [17:38<09:27, 11.81s/it]
        1/3              0G        1.349       3.433       1.622              85
800:  64%|██████    | 87/135 [17:50<09:27, 11.81s/it]
        1/3              0G        1.349       3.433       1.622              85
800:  65%|██████    | 88/135 [17:50<09:14, 11.80s/it]
        1/3              0G        1.347       3.424       1.621              75
800:  65%|██████    | 88/135 [18:02<09:14, 11.80s/it]
        1/3              0G        1.347       3.424       1.621              75
800:  66%|██████    | 89/135 [18:02<08:58, 11.70s/it]
        1/3              0G        1.345       3.412        1.62              70
800:  66%|██████    | 89/135 [18:13<08:58, 11.70s/it]
        1/3              0G        1.345       3.412        1.62              70
800:  67%|██████    | 90/135 [18:13<08:48, 11.74s/it]
        1/3              0G        1.346       3.404       1.623              56
800:  67%|██████    | 90/135 [18:25<08:48, 11.74s/it]
        1/3              0G        1.346       3.404       1.623              56
800:  67%|██████    | 91/135 [18:25<08:31, 11.62s/it]
        1/3              0G        1.345       3.393       1.623              84
800:  67%|██████    | 91/135 [18:36<08:31, 11.62s/it]
        1/3              0G        1.345       3.393       1.623              84
800:  68%|██████    | 92/135 [18:36<08:20, 11.65s/it]
        1/3              0G        1.346       3.382       1.624              78
800:  68%|██████    | 92/135 [18:48<08:20, 11.65s/it]
        1/3              0G        1.346       3.382       1.624              78
800:  69%|██████    | 93/135 [18:48<08:09, 11.64s/it]
        1/3              0G        1.347       3.372       1.625              81
800:  69%|██████    | 93/135 [19:00<08:09, 11.64s/it]
        1/3              0G        1.347       3.372       1.625              81
800:  70%|██████    | 94/135 [19:00<07:58, 11.67s/it]
        1/3              0G        1.347       3.363       1.625              76
800:  70%|██████    | 94/135 [19:11<07:58, 11.67s/it]
        1/3              0G        1.347       3.363       1.625              76
800:  70%|██████    | 95/135 [19:11<07:44, 11.62s/it]
        1/3              0G        1.349       3.353       1.626              77
800:  70%|██████    | 95/135 [19:23<07:44, 11.62s/it]
        1/3              0G        1.349       3.353       1.626              77
800:  71%|███████   | 96/135 [19:23<07:36, 11.70s/it]
        1/3              0G        1.348       3.343       1.625             101
800:  71%|███████   | 96/135 [19:35<07:36, 11.70s/it]
        1/3              0G        1.348       3.343       1.625             101
800:  72%|███████   | 97/135 [19:35<07:23, 11.66s/it]
        1/3              0G        1.346       3.332       1.625              84
800:  72%|███████   | 97/135 [19:46<07:23, 11.66s/it]
        1/3              0G        1.346       3.332       1.625              84
800:  73%|███████   | 98/135 [19:46<07:10, 11.63s/it]
        1/3              0G        1.348       3.324       1.624             122
800:  73%|███████   | 98/135 [19:58<07:10, 11.63s/it]
        1/3              0G        1.348       3.324       1.624             122
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800:  73%|███████    | 99/135 [19:58<06:59, 11.65s/it]
       1/3         0G      1.348      3.316      1.624              86
800:  73%|███████    | 99/135 [20:10<06:59, 11.65s/it]
       1/3         0G      1.348      3.316      1.624              86
800:  74%|███████    | 100/135 [20:10<06:47, 11.63s/it]
       1/3         0G      1.349      3.307      1.624              86
800:  74%|███████    | 100/135 [20:21<06:47, 11.63s/it]
       1/3         0G      1.349      3.307      1.624              86
800:  75%|███████    | 101/135 [20:21<06:34, 11.61s/it]
       1/3         0G      1.349      3.299      1.625              66
800:  75%|███████    | 101/135 [20:33<06:34, 11.61s/it]
       1/3         0G      1.349      3.299      1.625              66
800:  76%|███████    | 102/135 [20:33<06:23, 11.63s/it]
       1/3         0G      1.348      3.291      1.624              81
800:  76%|███████    | 102/135 [20:44<06:23, 11.63s/it]
       1/3         0G      1.348      3.291      1.624              81
800:  76%|███████    | 103/135 [20:44<06:10, 11.59s/it]
       1/3         0G       1.35      3.284      1.627              70
800:  76%|███████    | 103/135 [20:56<06:10, 11.59s/it]
       1/3         0G       1.35      3.284      1.627              70
800:  77%|███████    | 104/135 [20:56<06:00, 11.64s/it]
       1/3         0G      1.351      3.275      1.625             147
800:  77%|███████    | 104/135 [21:08<06:00, 11.64s/it]
       1/3         0G      1.351      3.275      1.625             147
800:  78%|███████    | 105/135 [21:08<05:50, 11.67s/it]
       1/3         0G      1.354      3.273      1.629             102
800:  78%|███████    | 105/135 [21:19<05:50, 11.67s/it]
       1/3         0G      1.354      3.273      1.629             102
800:  79%|███████    | 106/135 [21:19<05:37, 11.64s/it]
       1/3         0G      1.353      3.263      1.628              96
800:  79%|███████    | 106/135 [21:31<05:37, 11.64s/it]
       1/3         0G      1.353      3.263      1.628              96
800:  79%|███████    | 107/135 [21:31<05:28, 11.72s/it]
       1/3         0G      1.354      3.256       1.63              80
800:  79%|███████    | 107/135 [21:43<05:28, 11.72s/it]
       1/3         0G      1.354      3.256       1.63              80
800:  80%|███████    | 108/135 [21:43<05:15, 11.70s/it]
       1/3         0G      1.353      3.247      1.631              81
800:  80%|███████    | 108/135 [21:55<05:15, 11.70s/it]
       1/3         0G      1.353      3.247      1.631              81
800:  81%|███████    | 109/135 [21:55<05:04, 11.69s/it]
       1/3         0G      1.355      3.243      1.634              53
800:  81%|███████    | 109/135 [22:06<05:04, 11.69s/it]
       1/3         0G      1.355      3.243      1.634              53
800:  81%|███████    | 110/135 [22:06<04:52, 11.71s/it]
       1/3         0G      1.355      3.236      1.633              65
800:  81%|███████    | 110/135 [22:18<04:52, 11.71s/it]
       1/3         0G      1.355      3.236      1.633              65
800:  82%|███████    | 111/135 [22:18<04:39, 11.65s/it]
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          1/3              0G        1.355          3.228          1.633              98
800:   82%|███████| 111/135 [22:30<04:39, 11.65s/it]
          1/3              0G        1.355          3.228          1.633              98
800:   83%|███████| 112/135 [22:30<04:27, 11.64s/it]
          1/3              0G        1.356          3.221          1.633              98
800:   83%|███████| 112/135 [22:41<04:27, 11.64s/it]
          1/3              0G        1.356          3.221          1.633              98
800:   84%|███████| 113/135 [22:41<04:15, 11.63s/it]
          1/3              0G        1.354          3.213          1.632              89
800:   84%|███████| 113/135 [22:53<04:15, 11.63s/it]
          1/3              0G        1.354          3.213          1.632              89
800:   84%|███████| 114/135 [22:53<04:04, 11.66s/it]
          1/3              0G        1.354          3.21           1.632             105
800:   84%|███████| 114/135 [23:05<04:04, 11.66s/it]
          1/3              0G        1.354          3.21           1.632             105
800:   85%|███████| 115/135 [23:05<03:54, 11.71s/it]
          1/3              0G        1.353          3.204          1.632              80
800:   85%|███████| 115/135 [23:16<03:54, 11.71s/it]
          1/3              0G        1.353          3.204          1.632              80
800:   86%|███████| 116/135 [23:16<03:41, 11.68s/it]
          1/3              0G        1.354          3.201          1.631             141
800:   86%|███████| 116/135 [23:28<03:41, 11.68s/it]
          1/3              0G        1.354          3.201          1.631             141
800:   87%|███████| 117/135 [23:28<03:30, 11.69s/it]
          1/3              0G        1.356          3.197          1.631             168
800:   87%|███████| 117/135 [23:40<03:30, 11.69s/it]
          1/3              0G        1.356          3.197          1.631             168
800:   87%|███████| 118/135 [23:40<03:21, 11.86s/it]
          1/3              0G        1.356          3.192          1.63              169
800:   87%|███████| 118/135 [23:52<03:21, 11.86s/it]
          1/3              0G        1.356          3.192          1.63              169
800:   88%|███████| 119/135 [23:52<03:10, 11.90s/it]
          1/3              0G        1.357          3.186          1.631              88
800:   88%|███████| 119/135 [24:04<03:10, 11.90s/it]
          1/3              0G        1.357          3.186          1.631              88
800:   89%|███████| 120/135 [24:04<02:57, 11.84s/it]
          1/3              0G        1.358          3.18           1.63              186
800:   89%|███████| 120/135 [24:16<02:57, 11.84s/it]
          1/3              0G        1.358          3.18           1.63              186
800:   90%|███████| 121/135 [24:16<02:46, 11.88s/it]
          1/3              0G        1.358          3.173          1.628             151
800:   90%|███████| 121/135 [24:28<02:46, 11.88s/it]
          1/3              0G        1.358          3.173          1.628             151
800:   90%|███████| 122/135 [24:28<02:34, 11.88s/it]
          1/3              0G        1.357          3.165          1.626             181
800:   90%|███████| 122/135 [24:40<02:34, 11.88s/it]
          1/3              0G        1.357          3.165          1.626             181
800:   91%|███████| 123/135 [24:40<02:22, 11.85s/it]
          1/3              0G        1.359          3.158          1.626             201
800:   91%|███████| 123/135 [24:52<02:22, 11.85s/it]
```

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        1/3            0G         1.359       3.158       1.626            201
800:  92%|████████| 124/135 [24:52<02:10, 11.91s/it]
        1/3            0G         1.358       3.154       1.626             86
800:  92%|████████| 124/135 [25:03<02:10, 11.91s/it]
        1/3            0G         1.358       3.154       1.626             86
800:  93%|████████| 125/135 [25:03<01:58, 11.81s/it]
        1/3            0G         1.36        3.15        1.625            174
800:  93%|████████| 125/135 [25:15<01:58, 11.81s/it]
        1/3            0G         1.36        3.15        1.625            174
800:  93%|████████| 126/135 [25:15<01:46, 11.86s/it]
        1/3            0G         1.36        3.144       1.624            149
800:  93%|████████| 126/135 [25:27<01:46, 11.86s/it]
        1/3            0G         1.36        3.144       1.624            149
800:  94%|████████| 127/135 [25:27<01:34, 11.84s/it]
        1/3            0G         1.359       3.136       1.622            144
800:  94%|████████| 127/135 [25:39<01:34, 11.84s/it]
        1/3            0G         1.359       3.136       1.622            144
800:  95%|████████| 128/135 [25:39<01:22, 11.82s/it]
        1/3            0G         1.36        3.127       1.621            147
800:  95%|████████| 128/135 [25:51<01:22, 11.82s/it]
        1/3            0G         1.36        3.127       1.621            147
800:  96%|████████| 129/135 [25:51<01:11, 11.87s/it]
        1/3            0G         1.361       3.12        1.621            167
800:  96%|████████| 129/135 [26:03<01:11, 11.87s/it]
        1/3            0G         1.361       3.12        1.621            167
800:  96%|████████| 130/135 [26:03<00:59, 11.83s/it]
        1/3            0G         1.361       3.111       1.619            180
800:  96%|████████| 130/135 [26:15<00:59, 11.83s/it]
        1/3            0G         1.361       3.111       1.619            180
800:  97%|████████| 131/135 [26:15<00:47, 11.89s/it]
        1/3            0G         1.361       3.106       1.618            146
800:  97%|████████| 131/135 [26:26<00:47, 11.89s/it]
        1/3            0G         1.361       3.106       1.618            146
800:  98%|████████| 132/135 [26:26<00:35, 11.90s/it]
        1/3            0G         1.361       3.101       1.617            159
800:  98%|████████| 132/135 [26:38<00:35, 11.90s/it]
        1/3            0G         1.361       3.101       1.617            159
800:  99%|████████| 133/135 [26:38<00:23, 11.85s/it]
        1/3            0G         1.361       3.097       1.616            117
800:  99%|████████| 133/135 [26:50<00:23, 11.85s/it]
        1/3            0G         1.361       3.097       1.616            117
800:  99%|████████| 134/135 [26:50<00:11, 11.80s/it]
        1/3            0G         1.36        3.092       1.616             11
800:  99%|████████| 134/135 [26:51<00:11, 11.80s/it]
        1/3            0G         1.36        3.092       1.616             11
800: 100%|████████| 135/135 [26:51<00:00,  8.67s/it]
        1/3            0G         1.36        3.092       1.616             11
800: 100%|████████| 135/135 [26:51<00:00, 11.94s/it]
```

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                 Class      Images   Instances      Box(P          R
mAP50   mAP50-95):    0%|              | 0/4 [00:00<?, ?it/s]
                 Class      Images   Instances      Box(P          R
mAP50   mAP50-95):   25%|█            | 1/4 [00:07<00:22,  7.57s/it]
                 Class      Images   Instances      Box(P          R
mAP50   mAP50-95):   50%|███          | 2/4 [00:17<00:17,  8.73s/it]
                 Class      Images   Instances      Box(P          R
mAP50   mAP50-95):   75%|█████        | 3/4 [00:27<00:09,  9.40s/it]
                 Class      Images   Instances      Box(P          R
mAP50   mAP50-95):  100%|███████      | 4/4 [00:28<00:00,  6.04s/it]
                 Class      Images   Instances      Box(P          R
mAP50   mAP50-95):  100%|███████      | 4/4 [00:28<00:00,  7.05s/it]

   0%|             | 0/135 [00:00<?, ?it/s]
        2/3          0G      1.454       2.264       1.584        147
800:   0%|            | 0/135 [00:11<?, ?it/s]
        2/3          0G      1.454       2.264       1.584        147
800:   1%|            | 1/135 [00:11<25:49, 11.56s/it]
        2/3          0G      1.466       2.204       1.616        115
800:   1%|            | 1/135 [00:23<25:49, 11.56s/it]
        2/3          0G      1.466       2.204       1.616        115
800:   1%||           | 2/135 [00:23<26:09, 11.80s/it]
        2/3          0G      1.404       2.231       1.602         86
800:   1%||           | 2/135 [00:35<26:09, 11.80s/it]
        2/3          0G      1.404       2.231       1.602         86
800:   2%||           | 3/135 [00:35<25:53, 11.77s/it]
        2/3          0G      1.361       2.234       1.562        127
800:   2%||           | 3/135 [00:47<25:53, 11.77s/it]
        2/3          0G      1.361       2.234       1.562        127
800:   3%||           | 4/135 [00:47<25:45, 11.80s/it]
        2/3          0G      1.337       2.299       1.597         74
800:   3%||           | 4/135 [00:59<25:45, 11.80s/it]
        2/3          0G      1.337       2.299       1.597         74
800:   4%||           | 5/135 [00:59<25:40, 11.85s/it]
        2/3          0G      1.339       2.292       1.605        100
800:   4%||           | 5/135 [01:10<25:40, 11.85s/it]
        2/3          0G      1.339       2.292       1.605        100
800:   4%||           | 6/135 [01:10<25:22, 11.80s/it]
        2/3          0G      1.335       2.293       1.612         79
800:   4%||           | 6/135 [01:22<25:22, 11.80s/it]
        2/3          0G      1.335       2.293       1.612         79
800:   5%||           | 7/135 [01:22<25:08, 11.78s/it]
        2/3          0G      1.334       2.291       1.603        106
800:   5%||           | 7/135 [01:34<25:08, 11.78s/it]
        2/3          0G      1.334       2.291       1.603        106
800:   6%||           | 8/135 [01:34<24:50, 11.74s/it]
        2/3          0G      1.338       2.309       1.602        112
800:   6%||           | 8/135 [01:46<24:50, 11.74s/it]
        2/3          0G      1.338       2.309       1.602        112
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800:    7%|█             | 9/135 [01:46<24:54, 11.86s/it]
        2/3          0G      1.348      2.318      1.609          90
800:    7%|█             | 9/135 [01:57<24:54, 11.86s/it]
        2/3          0G      1.348      2.318      1.609          90
800:    7%|█             | 10/135 [01:57<24:32, 11.78s/it]
        2/3          0G      1.353      2.325      1.621          90
800:    7%|█             | 10/135 [02:09<24:32, 11.78s/it]
        2/3          0G      1.353      2.325      1.621          90
800:    8%|█             | 11/135 [02:09<24:22, 11.80s/it]
        2/3          0G      1.351      2.318      1.605         154
800:    8%|█             | 11/135 [02:21<24:22, 11.80s/it]
        2/3          0G      1.351      2.318      1.605         154
800:    9%|█             | 12/135 [02:21<24:03, 11.74s/it]
        2/3          0G      1.331      2.301      1.589         108
800:    9%|█             | 12/135 [02:33<24:03, 11.74s/it]
        2/3          0G      1.331      2.301      1.589         108
800:   10%|█             | 13/135 [02:33<23:51, 11.73s/it]
        2/3          0G      1.344      2.307      1.596          80
800:   10%|█             | 13/135 [02:44<23:51, 11.73s/it]
        2/3          0G      1.344      2.307      1.596          80
800:   10%|█             | 14/135 [02:44<23:36, 11.71s/it]
        2/3          0G      1.334      2.305      1.603          59
800:   10%|█             | 14/135 [02:56<23:36, 11.71s/it]
        2/3          0G      1.334      2.305      1.603          59
800:   11%|█             | 15/135 [02:56<23:24, 11.71s/it]
        2/3          0G      1.324      2.313      1.597         101
800:   11%|█             | 15/135 [03:08<23:24, 11.71s/it]
        2/3          0G      1.324      2.313      1.597         101
800:   12%|█             | 16/135 [03:08<23:11, 11.69s/it]
        2/3          0G      1.329      2.325      1.605          87
800:   12%|█             | 16/135 [03:19<23:11, 11.69s/it]
        2/3          0G      1.329      2.325      1.605          87
800:   13%|█             | 17/135 [03:19<23:01, 11.71s/it]
        2/3          0G      1.323      2.309      1.607          69
800:   13%|█             | 17/135 [03:31<23:01, 11.71s/it]
        2/3          0G      1.323      2.309      1.607          69
800:   13%|█             | 18/135 [03:31<22:45, 11.67s/it]
        2/3          0G      1.312      2.309        1.6          63
800:   13%|█             | 18/135 [03:42<22:45, 11.67s/it]
        2/3          0G      1.312      2.309        1.6          63
800:   14%|█             | 19/135 [03:42<22:24, 11.59s/it]
        2/3          0G      1.315      2.311      1.608          86
800:   14%|█             | 19/135 [03:54<22:24, 11.59s/it]
        2/3          0G      1.315      2.311      1.608          86
800:   15%|█             | 20/135 [03:54<22:09, 11.56s/it]
        2/3          0G      1.322      2.308      1.618          76
800:   15%|█             | 20/135 [04:05<22:09, 11.56s/it]
        2/3          0G      1.322      2.308      1.618          76
800:   16%|█             | 21/135 [04:05<21:55, 11.54s/it]
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        2/3              0G         1.321          2.302          1.623              71
800:   16%|■           | 21/135 [04:17<21:55, 11.54s/it]
        2/3              0G         1.321          2.302          1.623              71
800:   16%|■           | 22/135 [04:17<21:37, 11.48s/it]
        2/3              0G         1.312          2.295          1.617              85
800:   16%|■           | 22/135 [04:28<21:37, 11.48s/it]
        2/3              0G         1.312          2.295          1.617              85
800:   17%|■           | 23/135 [04:28<21:21, 11.44s/it]
        2/3              0G         1.307          2.299          1.619              62
800:   17%|■           | 23/135 [04:39<21:21, 11.44s/it]
        2/3              0G         1.307          2.299          1.619              62
800:   18%|■           | 24/135 [04:39<21:02, 11.37s/it]
        2/3              0G         1.309          2.306          1.627              51
800:   18%|■           | 24/135 [04:51<21:02, 11.37s/it]
        2/3              0G         1.309          2.306          1.627              51
800:   19%|■           | 25/135 [04:51<20:50, 11.37s/it]
        2/3              0G         1.306          2.292          1.622             116
800:   19%|■           | 25/135 [05:02<20:50, 11.37s/it]
        2/3              0G         1.306          2.292          1.622             116
800:   19%|■           | 26/135 [05:02<20:44, 11.42s/it]
        2/3              0G         1.299          2.289           1.62             81
800:   19%|■           | 26/135 [05:14<20:44, 11.42s/it]
        2/3              0G         1.299          2.289           1.62             81
800:   20%|■           | 27/135 [05:14<20:39, 11.48s/it]
        2/3              0G         1.297          2.285          1.615            144
800:   20%|■           | 27/135 [05:25<20:39, 11.48s/it]
        2/3              0G         1.297          2.285          1.615            144
800:   21%|■           | 28/135 [05:25<20:34, 11.53s/it]
        2/3              0G         1.294          2.274          1.613             77
800:   21%|■           | 28/135 [05:37<20:34, 11.53s/it]
        2/3              0G         1.294          2.274          1.613             77
800:   21%|■           | 29/135 [05:37<20:25, 11.56s/it]
        2/3              0G         1.299           2.29          1.613             99
800:   21%|■           | 29/135 [05:49<20:25, 11.56s/it]
        2/3              0G         1.299           2.29          1.613             99
800:   22%|■           | 30/135 [05:49<20:16, 11.59s/it]
        2/3              0G         1.306          2.294          1.613            152
800:   22%|■           | 30/135 [06:01<20:16, 11.59s/it]
        2/3              0G         1.306          2.294          1.613            152
800:   23%|■           | 31/135 [06:01<20:18, 11.71s/it]
        2/3              0G           1.3          2.294          1.609             60
800:   23%|■           | 31/135 [06:12<20:18, 11.71s/it]
        2/3              0G           1.3          2.294          1.609             60
800:   24%|■           | 32/135 [06:12<20:01, 11.67s/it]
        2/3              0G         1.304          2.301           1.61            101
800:   24%|■           | 32/135 [06:24<20:01, 11.67s/it]
        2/3              0G         1.304          2.301           1.61            101
800:   24%|■           | 33/135 [06:24<19:53, 11.70s/it]
        2/3              0G         1.309          2.311          1.607            156
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800:   24%|██        | 33/135 [06:36<19:53, 11.70s/it]
        2/3        0G       1.309       2.311       1.607          156
800:   25%|██        | 34/135 [06:36<19:41, 11.70s/it]
        2/3        0G       1.313       2.314       1.612           82
800:   25%|██        | 34/135 [06:47<19:41, 11.70s/it]
        2/3        0G       1.313       2.314       1.612           82
800:   26%|██        | 35/135 [06:47<19:31, 11.71s/it]
        2/3        0G       1.315       2.311       1.613          101
800:   26%|██        | 35/135 [06:59<19:31, 11.71s/it]
        2/3        0G       1.315       2.311       1.613          101
800:   27%|██        | 36/135 [06:59<19:20, 11.72s/it]
        2/3        0G       1.319       2.313       1.615           73
800:   27%|██        | 36/135 [07:13<19:20, 11.72s/it]
        2/3        0G       1.319       2.313       1.615           73
800:   27%|██        | 37/135 [07:13<20:16, 12.41s/it]
        2/3        0G       1.317       2.312       1.615           71
800:   27%|██        | 37/135 [07:31<20:16, 12.41s/it]
        2/3        0G       1.317       2.312       1.615           71
800:   28%|██        | 38/135 [07:31<22:43, 14.06s/it]
        2/3        0G       1.319       2.315       1.615          107
800:   28%|██        | 38/135 [07:43<22:43, 14.06s/it]
        2/3        0G       1.319       2.315       1.615          107
800:   29%|██        | 39/135 [07:43<21:38, 13.52s/it]
        2/3        0G       1.323       2.319       1.616           81
800:   29%|██        | 39/135 [07:55<21:38, 13.52s/it]
        2/3        0G       1.323       2.319       1.616           81
800:   30%|███       | 40/135 [07:55<20:43, 13.09s/it]
        2/3        0G       1.333       2.328       1.615          196
800:   30%|███       | 40/135 [08:08<20:43, 13.09s/it]
        2/3        0G       1.333       2.328       1.615          196
800:   30%|███       | 41/135 [08:08<20:12, 12.90s/it]
        2/3        0G       1.336       2.335       1.615          135
800:   30%|███       | 41/135 [08:20<20:12, 12.90s/it]
        2/3        0G       1.336       2.335       1.615          135
800:   31%|███       | 42/135 [08:20<19:35, 12.64s/it]
        2/3        0G       1.345       2.338       1.618          121
800:   31%|███       | 42/135 [08:32<19:35, 12.64s/it]
        2/3        0G       1.345       2.338       1.618          121
800:   32%|███       | 43/135 [08:32<18:59, 12.38s/it]
        2/3        0G       1.345       2.339       1.615          114
800:   32%|███       | 43/135 [08:43<18:59, 12.38s/it]
        2/3        0G       1.345       2.339       1.615          114
800:   33%|███       | 44/135 [08:43<18:24, 12.14s/it]
        2/3        0G       1.345       2.337       1.615          101
800:   33%|███       | 44/135 [08:58<18:24, 12.14s/it]
        2/3        0G       1.345       2.337       1.615          101
800:   33%|███       | 45/135 [08:58<19:11, 12.79s/it]
        2/3        0G       1.343       2.336       1.61           130
800:   33%|███       | 45/135 [09:13<19:11, 12.79s/it]
```

```
        2/3             0G      1.343       2.336         1.61        130
800:  34%|██|        | 46/135 [09:13<20:16, 13.67s/it]
        2/3             0G      1.336       2.332        1.604        137
800:  34%|██|        | 46/135 [09:25<20:16, 13.67s/it]
        2/3             0G      1.336       2.332        1.604        137
800:  35%|██|        | 47/135 [09:25<19:09, 13.07s/it]
        2/3             0G      1.334       2.331        1.601        105
800:  35%|██|        | 47/135 [09:36<19:09, 13.07s/it]
        2/3             0G      1.334       2.331        1.601        105
800:  36%|██|        | 48/135 [09:36<18:07, 12.50s/it]
        2/3             0G      1.336       2.334        1.602        106
800:  36%|██|        | 48/135 [09:47<18:07, 12.50s/it]
        2/3             0G      1.336       2.334        1.602        106
800:  36%|██|        | 49/135 [09:47<17:23, 12.13s/it]
        2/3             0G      1.336       2.332        1.602        132
800:  36%|██|        | 49/135 [09:59<17:23, 12.13s/it]
        2/3             0G      1.336       2.332        1.602        132
800:  37%|██|        | 50/135 [09:59<16:47, 11.85s/it]
        2/3             0G      1.338       2.327          1.6        150
800:  37%|██|        | 50/135 [10:10<16:47, 11.85s/it]
        2/3             0G      1.338       2.327          1.6        150
800:  38%|██|        | 51/135 [10:10<16:21, 11.68s/it]
        2/3             0G      1.338       2.325        1.602        112
800:  38%|██|        | 51/135 [10:21<16:21, 11.68s/it]
        2/3             0G      1.338       2.325        1.602        112
800:  39%|██|        | 52/135 [10:21<15:57, 11.54s/it]
        2/3             0G      1.338       2.323        1.599        123
800:  39%|██|        | 52/135 [10:32<15:57, 11.54s/it]
        2/3             0G      1.338       2.323        1.599        123
800:  39%|██|        | 53/135 [10:32<15:40, 11.47s/it]
        2/3             0G      1.337        2.32        1.597        124
800:  39%|██|        | 53/135 [10:43<15:40, 11.47s/it]
        2/3             0G      1.337        2.32        1.597        124
800:  40%|██|        | 54/135 [10:43<15:20, 11.36s/it]
        2/3             0G      1.333       2.326        1.598         79
800:  40%|██|        | 54/135 [10:55<15:20, 11.36s/it]
        2/3             0G      1.333       2.326        1.598         79
800:  41%|██|        | 55/135 [10:55<15:02, 11.28s/it]
        2/3             0G      1.332       2.318        1.594        130
800:  41%|██|        | 55/135 [11:06<15:02, 11.28s/it]
        2/3             0G      1.332       2.318        1.594        130
800:  41%|██|        | 56/135 [11:06<14:47, 11.23s/it]
        2/3             0G       1.33       2.316        1.596         82
800:  41%|██|        | 56/135 [11:17<14:47, 11.23s/it]
        2/3             0G       1.33       2.316        1.596         82
800:  42%|██|        | 57/135 [11:17<14:30, 11.16s/it]
        2/3             0G       1.33       2.315        1.596        117
800:  42%|██|        | 57/135 [11:28<14:30, 11.16s/it]
        2/3             0G       1.33       2.315        1.596        117
```

```
800:  43%|███      | 58/135 [11:28<14:18, 11.15s/it]
        2/3        0G      1.329      2.313      1.595          78
800:  43%|███      | 58/135 [11:39<14:18, 11.15s/it]
        2/3        0G      1.329      2.313      1.595          78
800:  44%|███      | 59/135 [11:39<14:03, 11.10s/it]
        2/3        0G      1.329      2.311      1.595         124
800:  44%|███      | 59/135 [11:50<14:03, 11.10s/it]
        2/3        0G      1.329      2.311      1.595         124
800:  44%|███      | 60/135 [11:50<13:50, 11.07s/it]
        2/3        0G      1.329      2.309      1.594         130
800:  44%|███      | 60/135 [12:01<13:50, 11.07s/it]
        2/3        0G      1.329      2.309      1.594         130
800:  45%|███      | 61/135 [12:01<13:40, 11.09s/it]
        2/3        0G       1.33      2.307      1.592         120
800:  45%|███      | 61/135 [12:12<13:40, 11.09s/it]
        2/3        0G       1.33      2.307      1.592         120
800:  46%|███      | 62/135 [12:12<13:29, 11.09s/it]
        2/3        0G      1.328      2.299      1.588         132
800:  46%|███      | 62/135 [12:23<13:29, 11.09s/it]
        2/3        0G      1.328      2.299      1.588         132
800:  47%|███      | 63/135 [12:23<13:21, 11.13s/it]
        2/3        0G      1.328      2.301       1.59          85
800:  47%|███      | 63/135 [12:34<13:21, 11.13s/it]
        2/3        0G      1.328      2.301       1.59          85
800:  47%|███      | 64/135 [12:34<13:02, 11.03s/it]
        2/3        0G      1.328      2.304      1.591          79
800:  47%|███      | 64/135 [12:45<13:02, 11.03s/it]
        2/3        0G      1.328      2.304      1.591          79
800:  48%|███      | 65/135 [12:45<12:52, 11.04s/it]
        2/3        0G      1.326      2.303      1.591         109
800:  48%|███      | 65/135 [12:56<12:52, 11.04s/it]
        2/3        0G      1.326      2.303      1.591         109
800:  49%|███      | 66/135 [12:56<12:40, 11.03s/it]
        2/3        0G      1.326      2.297      1.589         138
800:  49%|███      | 66/135 [13:07<12:40, 11.03s/it]
        2/3        0G      1.326      2.297      1.589         138
800:  50%|███      | 67/135 [13:07<12:32, 11.06s/it]
        2/3        0G      1.324        2.3       1.59          55
800:  50%|███      | 67/135 [13:18<12:32, 11.06s/it]
        2/3        0G      1.324        2.3       1.59          55
800:  50%|███      | 68/135 [13:18<12:18, 11.02s/it]
        2/3        0G      1.321      2.297       1.59          72
800:  50%|███      | 68/135 [13:29<12:18, 11.02s/it]
        2/3        0G      1.321      2.297       1.59          72
800:  51%|███      | 69/135 [13:29<12:04, 10.98s/it]
        2/3        0G       1.32      2.296       1.59          98
800:  51%|███      | 69/135 [13:40<12:04, 10.98s/it]
        2/3        0G       1.32      2.296       1.59          98
800:  52%|███      | 70/135 [13:40<11:55, 11.01s/it]
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          2/3           0G       1.318        2.294        1.589            92
800:  52%|██████       | 70/135 [13:51<11:55, 11.01s/it]
          2/3           0G       1.318        2.294        1.589            92
800:  53%|██████       | 71/135 [13:51<11:44, 11.00s/it]
          2/3           0G       1.316        2.297        1.588           101
800:  53%|██████       | 71/135 [14:02<11:44, 11.00s/it]
          2/3           0G       1.316        2.297        1.588           101
800:  53%|██████       | 72/135 [14:02<11:32, 10.98s/it]
          2/3           0G       1.314        2.297        1.588            84
800:  53%|██████       | 72/135 [14:13<11:32, 10.98s/it]
          2/3           0G       1.314        2.297        1.588            84
800:  54%|██████       | 73/135 [14:13<11:18, 10.95s/it]
          2/3           0G       1.317        2.3          1.591           104
800:  54%|██████       | 73/135 [14:24<11:18, 10.95s/it]
          2/3           0G       1.317        2.3          1.591           104
800:  55%|██████       | 74/135 [14:24<11:08, 10.96s/it]
          2/3           0G       1.317        2.301        1.592            87
800:  55%|██████       | 74/135 [14:35<11:08, 10.96s/it]
          2/3           0G       1.317        2.301        1.592            87
800:  56%|███████      | 75/135 [14:35<10:54, 10.91s/it]
          2/3           0G       1.318        2.302        1.594           119
800:  56%|███████      | 75/135 [14:46<10:54, 10.91s/it]
          2/3           0G       1.318        2.302        1.594           119
800:  56%|███████      | 76/135 [14:46<10:48, 10.98s/it]
          2/3           0G       1.319        2.301        1.595            88
800:  56%|███████      | 76/135 [14:57<10:48, 10.98s/it]
          2/3           0G       1.319        2.301        1.595            88
800:  57%|███████      | 77/135 [14:57<10:34, 10.93s/it]
          2/3           0G       1.319        2.3          1.596           118
800:  57%|███████      | 77/135 [15:08<10:34, 10.93s/it]
          2/3           0G       1.319        2.3          1.596           118
800:  58%|███████      | 78/135 [15:08<10:23, 10.94s/it]
          2/3           0G       1.319        2.304        1.595           111
800:  58%|███████      | 78/135 [15:19<10:23, 10.94s/it]
          2/3           0G       1.319        2.304        1.595           111
800:  59%|███████      | 79/135 [15:19<10:22, 11.11s/it]
          2/3           0G       1.32         2.307        1.597            71
800:  59%|███████      | 79/135 [15:30<10:22, 11.11s/it]
          2/3           0G       1.32         2.307        1.597            71
800:  59%|███████      | 80/135 [15:30<10:10, 11.09s/it]
          2/3           0G       1.32         2.307        1.598            93
800:  59%|███████      | 80/135 [15:41<10:10, 11.09s/it]
          2/3           0G       1.32         2.307        1.598            93
800:  60%|████████     | 81/135 [15:41<10:00, 11.13s/it]
          2/3           0G       1.32         2.307        1.599            75
800:  60%|████████     | 81/135 [15:53<10:00, 11.13s/it]
          2/3           0G       1.32         2.307        1.599            75
800:  61%|████████     | 82/135 [15:53<09:54, 11.21s/it]
          2/3           0G       1.321        2.305        1.598           176
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800:  61%|██████        | 82/135 [16:05<09:54, 11.21s/it]
        2/3          0G       1.321       2.305       1.598             176
800:  61%|██████        | 83/135 [16:05<09:51, 11.38s/it]
        2/3          0G       1.319       2.303       1.597             102
800:  61%|██████        | 83/135 [16:16<09:51, 11.38s/it]
        2/3          0G       1.319       2.303       1.597             102
800:  62%|██████        | 84/135 [16:16<09:42, 11.41s/it]
        2/3          0G       1.318       2.301       1.597              77
800:  62%|██████        | 84/135 [16:28<09:42, 11.41s/it]
        2/3          0G       1.318       2.301       1.597              77
800:  63%|██████        | 85/135 [16:28<09:42, 11.64s/it]
        2/3          0G       1.319       2.302       1.598             107
800:  63%|██████        | 85/135 [16:40<09:42, 11.64s/it]
        2/3          0G       1.319       2.302       1.598             107
800:  64%|██████        | 86/135 [16:40<09:32, 11.68s/it]
        2/3          0G       1.317       2.303       1.598              57
800:  64%|██████        | 86/135 [16:52<09:32, 11.68s/it]
        2/3          0G       1.317       2.303       1.598              57
800:  64%|██████        | 87/135 [16:52<09:21, 11.69s/it]
        2/3          0G       1.315       2.298       1.596             108
800:  64%|██████        | 87/135 [17:04<09:21, 11.69s/it]
        2/3          0G       1.315       2.298       1.596             108
800:  65%|██████        | 88/135 [17:04<09:10, 11.72s/it]
        2/3          0G       1.312       2.295       1.596              85
800:  65%|██████        | 88/135 [17:15<09:10, 11.72s/it]
        2/3          0G       1.312       2.295       1.596              85
800:  66%|██████        | 89/135 [17:15<08:59, 11.72s/it]
        2/3          0G       1.31        2.295       1.594              93
800:  66%|██████        | 89/135 [17:27<08:59, 11.72s/it]
        2/3          0G       1.31        2.295       1.594              93
800:  67%|██████        | 90/135 [17:27<08:45, 11.69s/it]
        2/3          0G       1.31        2.294       1.594             122
800:  67%|██████        | 90/135 [17:39<08:45, 11.69s/it]
        2/3          0G       1.31        2.294       1.594             122
800:  67%|██████        | 91/135 [17:39<08:37, 11.75s/it]
        2/3          0G       1.31        2.296       1.594              94
800:  67%|██████        | 91/135 [17:51<08:37, 11.75s/it]
        2/3          0G       1.31        2.296       1.594              94
800:  68%|██████        | 92/135 [17:51<08:25, 11.75s/it]
        2/3          0G       1.31        2.295       1.595             102
800:  68%|██████        | 92/135 [18:02<08:25, 11.75s/it]
        2/3          0G       1.31        2.295       1.595             102
800:  69%|██████        | 93/135 [18:02<08:14, 11.77s/it]
        2/3          0G       1.308       2.29        1.592             106
800:  69%|██████        | 93/135 [18:14<08:14, 11.77s/it]
        2/3          0G       1.308       2.29        1.592             106
800:  70%|██████        | 94/135 [18:14<08:05, 11.85s/it]
        2/3          0G       1.307       2.289       1.593              87
800:  70%|██████        | 94/135 [18:26<08:05, 11.85s/it]
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         2/3              0G        1.307        2.289        1.593              87
800:  70%|██████      | 95/135 [18:26<07:51, 11.80s/it]
         2/3              0G        1.309        2.289        1.595              93
800:  70%|██████      | 95/135 [18:38<07:51, 11.80s/it]
         2/3              0G        1.309        2.289        1.595              93
800:  71%|██████      | 96/135 [18:38<07:37, 11.74s/it]
         2/3              0G        1.308        2.288        1.596              78
800:  71%|██████      | 96/135 [18:49<07:37, 11.74s/it]
         2/3              0G        1.308        2.288        1.596              78
800:  72%|██████      | 97/135 [18:49<07:25, 11.73s/it]
         2/3              0G        1.311        2.293        1.599              85
800:  72%|██████      | 97/135 [19:01<07:25, 11.73s/it]
         2/3              0G        1.311        2.293        1.599              85
800:  73%|██████      | 98/135 [19:01<07:13, 11.71s/it]
         2/3              0G        1.314        2.295        1.601             108
800:  73%|██████      | 98/135 [19:13<07:13, 11.71s/it]
         2/3              0G        1.314        2.295        1.601             108
800:  73%|██████      | 99/135 [19:13<07:04, 11.80s/it]
         2/3              0G        1.315        2.296          1.6             146
800:  73%|██████      | 99/135 [19:25<07:04, 11.80s/it]
         2/3              0G        1.315        2.296          1.6             146
800:  74%|██████      | 100/135 [19:25<06:56, 11.91s/it]
         2/3              0G        1.317        2.293          1.6             179
800:  74%|██████      | 100/135 [19:37<06:56, 11.91s/it]
         2/3              0G        1.317        2.293          1.6             179
800:  75%|██████      | 101/135 [19:37<06:47, 12.00s/it]
         2/3              0G        1.314        2.293        1.599              59
800:  75%|██████      | 101/135 [19:57<06:47, 12.00s/it]
         2/3              0G        1.314        2.293        1.599              59
800:  76%|██████      | 102/135 [19:57<07:47, 14.17s/it]
         2/3              0G        1.316        2.294        1.602              87
800:  76%|██████      | 102/135 [20:12<07:47, 14.17s/it]
         2/3              0G        1.316        2.294        1.602              87
800:  76%|██████      | 103/135 [20:12<07:42, 14.46s/it]
         2/3              0G        1.316        2.293        1.601             131
800:  76%|██████      | 103/135 [20:24<07:42, 14.46s/it]
         2/3              0G        1.316        2.293        1.601             131
800:  77%|██████      | 104/135 [20:24<07:08, 13.84s/it]
         2/3              0G        1.317        2.292        1.602              72
800:  77%|██████      | 104/135 [20:36<07:08, 13.84s/it]
         2/3              0G        1.317        2.292        1.602              72
800:  78%|██████      | 105/135 [20:36<06:37, 13.24s/it]
         2/3              0G        1.317        2.288        1.602              86
800:  78%|██████      | 105/135 [20:48<06:37, 13.24s/it]
         2/3              0G        1.317        2.288        1.602              86
800:  79%|██████      | 106/135 [20:48<06:11, 12.80s/it]
         2/3              0G        1.319         2.29        1.604              72
800:  79%|██████      | 106/135 [20:59<06:11, 12.80s/it]
         2/3              0G        1.319         2.29        1.604              72
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800:  79%|███████    | 107/135 [20:59<05:49, 12.48s/it]
       2/3          0G        1.32       2.292       1.604          117
800:  79%|███████    | 107/135 [21:11<05:49, 12.48s/it]
       2/3          0G        1.32       2.292       1.604          117
800:  80%|███████    | 108/135 [21:11<05:31, 12.28s/it]
       2/3          0G        1.322      2.296       1.607           69
800:  80%|███████    | 108/135 [21:23<05:31, 12.28s/it]
       2/3          0G        1.322      2.296       1.607           69
800:  81%|███████    | 109/135 [21:23<05:14, 12.08s/it]
       2/3          0G        1.321      2.295       1.606           72
800:  81%|███████    | 109/135 [21:35<05:14, 12.08s/it]
       2/3          0G        1.321      2.295       1.606           72
800:  81%|███████    | 110/135 [21:35<05:03, 12.15s/it]
       2/3          0G        1.323      2.297       1.606          163
800:  81%|███████    | 110/135 [21:55<05:03, 12.15s/it]
       2/3          0G        1.323      2.297       1.606          163
800:  82%|███████    | 111/135 [21:55<05:43, 14.33s/it]
       2/3          0G        1.323      2.297       1.606           96
800:  82%|███████    | 111/135 [22:07<05:43, 14.33s/it]
       2/3          0G        1.323      2.297       1.606           96
800:  83%|███████    | 112/135 [22:07<05:16, 13.74s/it]
       2/3          0G        1.323       2.3        1.607           64
800:  83%|███████    | 112/135 [22:18<05:16, 13.74s/it]
       2/3          0G        1.323       2.3        1.607           64
800:  84%|███████    | 113/135 [22:18<04:45, 12.98s/it]
       2/3          0G        1.323      2.302       1.608           87
800:  84%|███████    | 113/135 [22:30<04:45, 12.98s/it]
       2/3          0G        1.323      2.302       1.608           87
800:  84%|███████    | 114/135 [22:30<04:22, 12.48s/it]
       2/3          0G        1.325      2.303       1.608          105
800:  84%|███████    | 114/135 [22:41<04:22, 12.48s/it]
       2/3          0G        1.325      2.303       1.608          105
800:  85%|███████    | 115/135 [22:41<04:05, 12.25s/it]
       2/3          0G        1.326      2.305       1.608          113
800:  85%|███████    | 115/135 [22:57<04:05, 12.25s/it]
       2/3          0G        1.326      2.305       1.608          113
800:  86%|███████    | 116/135 [22:57<04:13, 13.35s/it]
       2/3          0G        1.325      2.304       1.607          109
800:  86%|███████    | 116/135 [23:13<04:13, 13.35s/it]
       2/3          0G        1.325      2.304       1.607          109
800:  87%|███████    | 117/135 [23:13<04:16, 14.22s/it]
       2/3          0G        1.326      2.304       1.606          173
800:  87%|███████    | 117/135 [23:25<04:16, 14.22s/it]
       2/3          0G        1.326      2.304       1.606          173
800:  87%|███████    | 118/135 [23:25<03:49, 13.52s/it]
       2/3          0G        1.325      2.303       1.606           75
800:  87%|███████    | 118/135 [23:36<03:49, 13.52s/it]
       2/3          0G        1.325      2.303       1.606           75
800:  88%|███████    | 119/135 [23:36<03:24, 12.79s/it]
       2/3          0G        1.326      2.302       1.607          108
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800:  88%|███████  | 119/135 [23:54<03:24, 12.79s/it]
          2/3        0G       1.326      2.302      1.607        108
800:  89%|███████  | 120/135 [23:54<03:31, 14.11s/it]
          2/3        0G       1.328      2.301      1.607        146
800:  89%|███████  | 120/135 [24:05<03:31, 14.11s/it]
          2/3        0G       1.328      2.301      1.607        146
800:  90%|███████  | 121/135 [24:05<03:06, 13.32s/it]
          2/3        0G       1.331      2.299      1.606        168
800:  90%|███████  | 121/135 [24:17<03:06, 13.32s/it]
          2/3        0G       1.331      2.299      1.606        168
800:  90%|███████  | 122/135 [24:17<02:46, 12.79s/it]
          2/3        0G       1.332      2.298      1.606        152
800:  90%|███████  | 122/135 [24:28<02:46, 12.79s/it]
          2/3        0G       1.332      2.298      1.606        152
800:  91%|███████  | 123/135 [24:28<02:28, 12.37s/it]
          2/3        0G       1.332      2.298      1.606        107
800:  91%|███████  | 123/135 [24:39<02:28, 12.37s/it]
          2/3        0G       1.332      2.298      1.606        107
800:  92%|███████  | 124/135 [24:39<02:12, 12.08s/it]
          2/3        0G       1.331        2.3      1.608         58
800:  92%|███████  | 124/135 [24:51<02:12, 12.08s/it]
          2/3        0G       1.331        2.3      1.608         58
800:  93%|███████  | 125/135 [24:51<01:57, 11.80s/it]
          2/3        0G       1.331      2.303      1.609         56
800:  93%|███████  | 125/135 [25:10<01:57, 11.80s/it]
          2/3        0G       1.331      2.303      1.609         56
800:  93%|███████  | 126/135 [25:10<02:05, 13.95s/it]
          2/3        0G       1.332      2.303       1.61        119
800:  93%|███████  | 126/135 [25:23<02:05, 13.95s/it]
          2/3        0G       1.332      2.303       1.61        119
800:  94%|███████  | 127/135 [25:23<01:50, 13.81s/it]
          2/3        0G       1.332      2.303      1.611         88
800:  94%|███████  | 127/135 [25:34<01:50, 13.81s/it]
          2/3        0G       1.332      2.303      1.611         88
800:  95%|███████  | 128/135 [25:34<01:30, 12.98s/it]
          2/3        0G       1.332      2.303      1.611         89
800:  95%|███████  | 128/135 [25:45<01:30, 12.98s/it]
          2/3        0G       1.332      2.303      1.611         89
800:  96%|███████  | 129/135 [25:45<01:14, 12.47s/it]
          2/3        0G       1.331      2.302       1.61        149
800:  96%|███████  | 129/135 [25:57<01:14, 12.47s/it]
          2/3        0G       1.331      2.302       1.61        149
800:  96%|███████  | 130/135 [25:57<01:00, 12.12s/it]
          2/3        0G       1.333      2.304       1.61        103
800:  96%|███████  | 130/135 [26:08<01:00, 12.12s/it]
          2/3        0G       1.333      2.304       1.61        103
800:  97%|███████  | 131/135 [26:08<00:47, 11.80s/it]
          2/3        0G       1.334      2.306      1.612         69
800:  97%|███████  | 131/135 [26:19<00:47, 11.80s/it]
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          2/3          0G       1.334       2.306       1.612              69
800:   98%|████████| 132/135 [26:19<00:35, 11.67s/it]
          2/3          0G       1.333       2.304        1.61             108
800:   98%|████████| 132/135 [26:31<00:35, 11.67s/it]
          2/3          0G       1.333       2.304        1.61             108
800:   99%|████████| 133/135 [26:31<00:23, 11.65s/it]
          2/3          0G       1.337       2.307       1.611             200
800:   99%|████████| 133/135 [26:43<00:23, 11.65s/it]
          2/3          0G       1.337       2.307       1.611             200
800:   99%|████████| 134/135 [26:43<00:11, 11.74s/it]
          2/3          0G       1.338       2.308       1.612              24
800:   99%|████████| 134/135 [26:44<00:11, 11.74s/it]
          2/3          0G       1.338       2.308       1.612              24
800:  100%|████████| 135/135 [26:44<00:00,  8.63s/it]
          2/3          0G       1.338       2.308       1.612              24
800:  100%|████████| 135/135 [26:44<00:00, 11.89s/it]

                 Class      Images    Instances      Box(P          R
mAP50   mAP50-95):   0%|            | 0/4 [00:00<?, ?it/s]
                 Class      Images    Instances      Box(P          R
mAP50   mAP50-95):  25%|█          | 1/4 [00:06<00:19,  6.48s/it]
                 Class      Images    Instances      Box(P          R
mAP50   mAP50-95):  50%|███        | 2/4 [00:15<00:15,  7.94s/it]
                 Class      Images    Instances      Box(P          R
mAP50   mAP50-95):  75%|█████      | 3/4 [00:28<00:10, 10.40s/it]
                 Class      Images    Instances      Box(P          R
mAP50   mAP50-95): 100%|████████|   | 4/4 [00:30<00:00,  6.79s/it]
                 Class      Images    Instances      Box(P          R
mAP50   mAP50-95): 100%|████████|   | 4/4 [00:30<00:00,  7.50s/it]
Traceback (most recent call last):
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\spamy\AppData\Local\Programs\Python\Python312\
Scripts\yolo.exe\__main__.py", line 7, in <module>
  File "C:\Users\spamy\AppData\Local\Programs\Python\Python312\Lib\
site-packages\ultralytics\cfg\__init__.py", line 568, in entrypoint
    getattr(model, mode)(**overrides)  # default args from model
    ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
  File "C:\Users\spamy\AppData\Local\Programs\Python\Python312\Lib\
site-packages\ultralytics\engine\model.py", line 655, in train
    self.trainer.train()
  File "C:\Users\spamy\AppData\Local\Programs\Python\Python312\Lib\
site-packages\ultralytics\engine\trainer.py", line 213, in train
    self._do_train(world_size)
  File "C:\Users\spamy\AppData\Local\Programs\Python\Python312\Lib\
site-packages\ultralytics\engine\trainer.py", line 430, in _do_train
    self.save_metrics(metrics={**self.label_loss_items(self.tloss),
**self.metrics, **self.lr})
  File "C:\Users\spamy\AppData\Local\Programs\Python\Python312\Lib\
```

```
site-packages\ultralytics\engine\trainer.py", line 608, in
save_metrics
    with open(self.csv, "a") as f:
         ^^^^^^^^^^^^^^^^^^^^^
FileNotFoundError: [Errno 2] No such file or directory: 'runs\\
detect\\train10\\results.csv'
```

Training Results

Labels

```
%cd {HOME}
Image(filename=f'{HOME}/runs/detect/train/labels.jpg', width=600)

c:\Users\spamy\OneDrive\Desktop\project
```
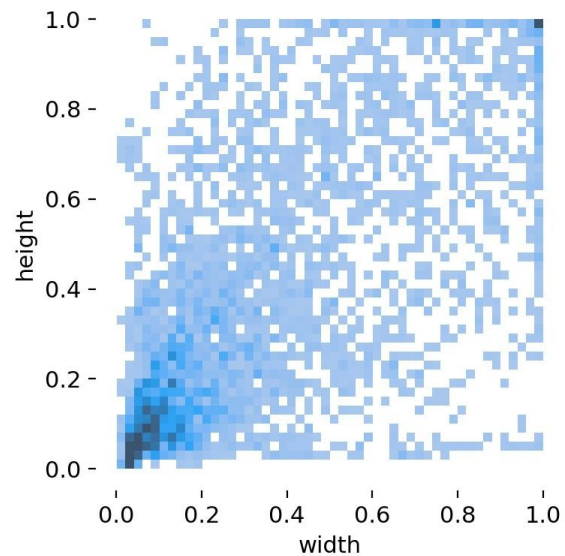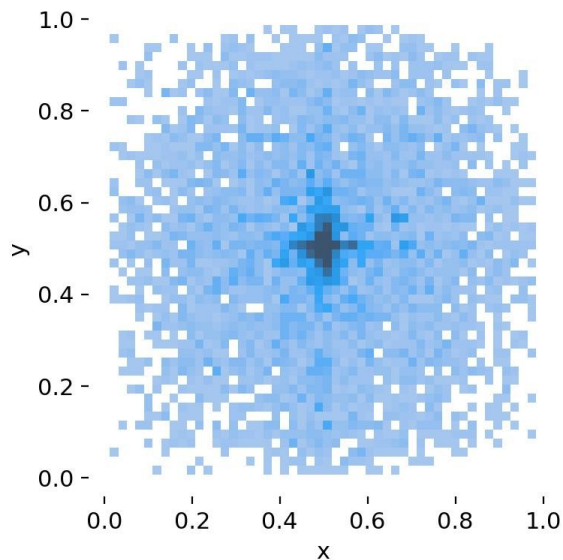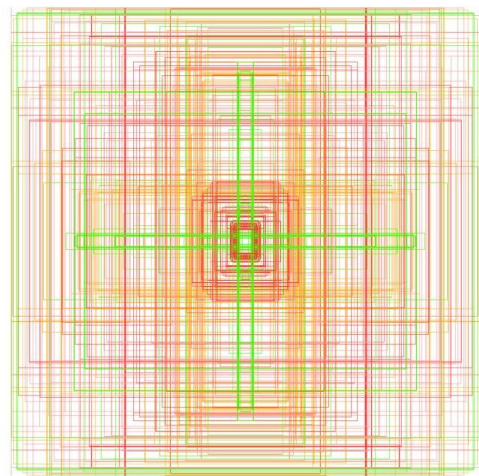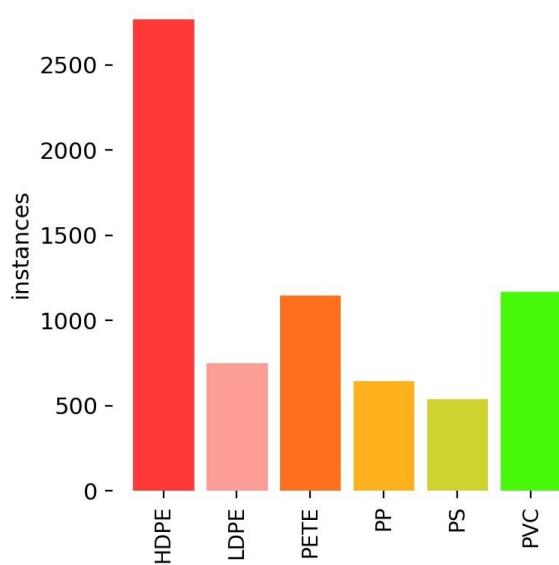
Labels Correlogram

```
%cd {HOME}
Image(filename=f'{HOME}/runs/detect/train/labels_correlogram.jpg',
width=600)

c:\Users\spamy\OneDrive\Desktop\project

This is now an optional IPython functionality, setting dhist requires
you to install the `pickleshare` library.
```
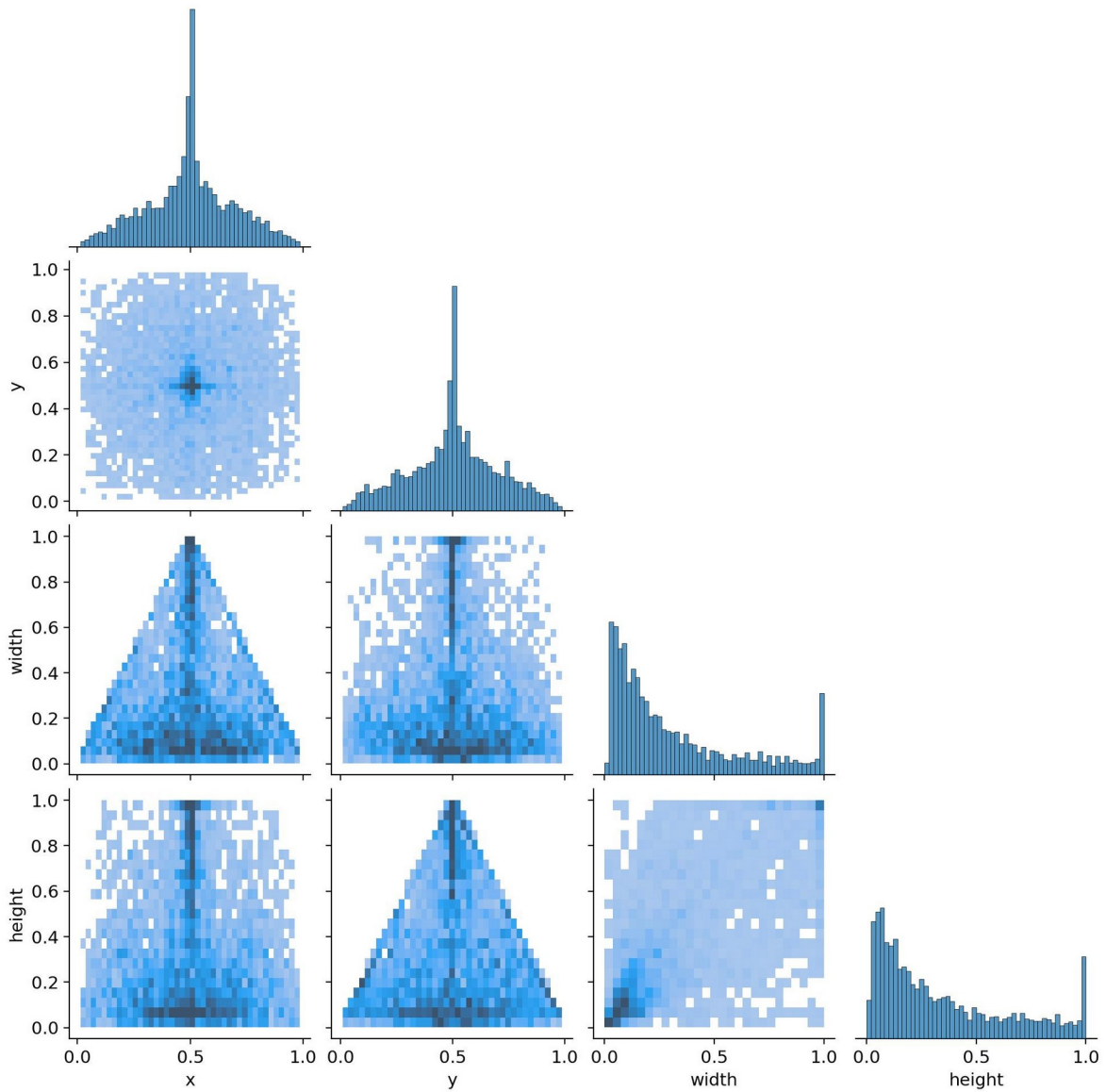
Normalised Confusion Matrix

```
%cd {HOME}
Image(filename=f'{HOME}/runs/detect/val/confusion_matrix_normalized.pn
g', width=600)

c:\Users\spamy\OneDrive\Desktop\project
```

Confusion Matrix Normalized

Predicted \ True	HDPE	LDPE	PETE	PP	PS	PVC	background
HDPE	0.25	0.04	0.04	0.23	0.12		0.53
LDPE		0.36	0.05	0.08	0.25	0.08	0.19
PETE	0.08		0.25	0.04			0.12
PP	0.01		0.02	0.04		0.04	0.06
PS				0.08			0.02
PVC	0.02		0.04		0.06	0.15	0.09
background	0.64	0.61	0.61	0.54	0.56	0.73	
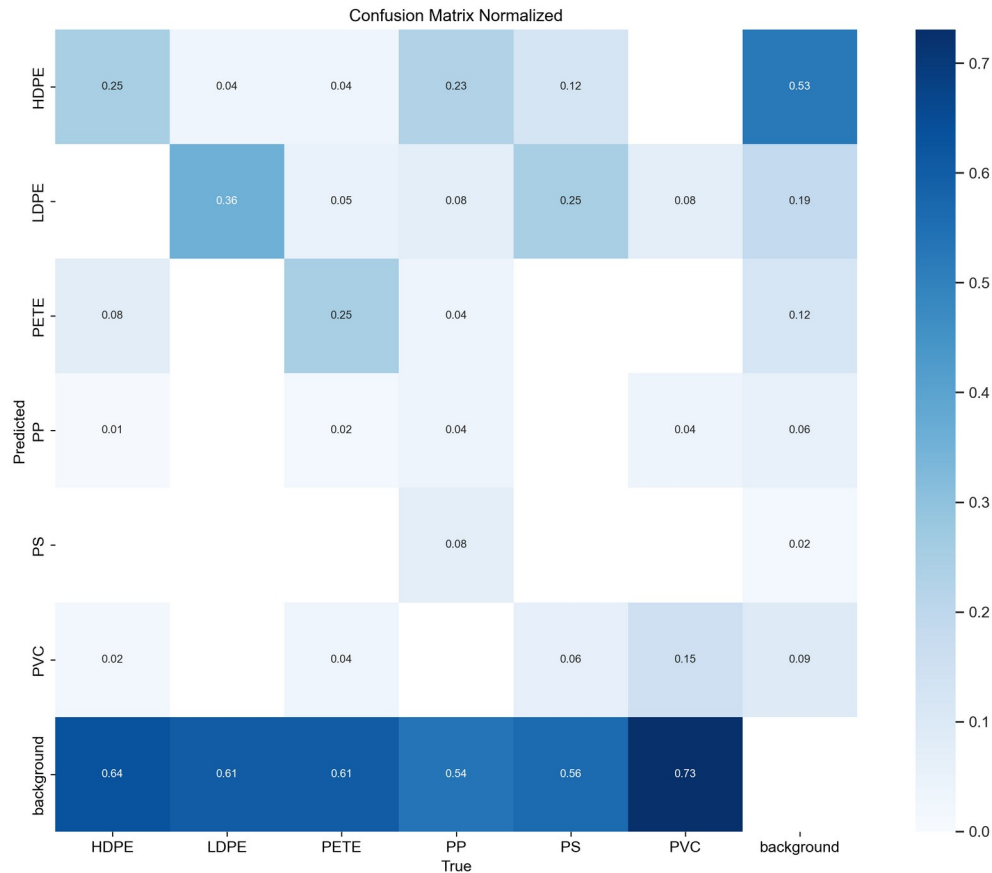
Precision Curves

```
%cd {HOME}
import ipyplot

images_array = [f'{HOME}/runs/detect/val/F1_Curve.png',
f'{HOME}/runs/detect/val/P_Curve.png',
f'{HOME}/runs/detect/val/PR_Curve.png',
f'{HOME}/runs/detect/val/R_Curve.png']
ipyplot.plot_images(images_array, max_images=5, img_width=500)

c:\Users\spamy\OneDrive\Desktop\project

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>
```

Detection Labels/Predictions

```
%cd {HOME}
import ipyplot

images_array = [f'{HOME}/runs/detect/val/val_batch0_labels.jpg',
```

```
f'{HOME}/runs/detect/val/val_batch0_pred.jpg']
ipyplot.plot_images(images_array, max_images=2, img_width=500)
```

c:\Users\spamy\OneDrive\Desktop\project

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>

```
%cd {HOME}
import ipyplot

images_array = [f'{HOME}/runs/detect/val/val_batch1_labels.jpg',
f'{HOME}/runs/detect/val/val_batch1_pred.jpg']
ipyplot.plot_images(images_array, max_images=2, img_width=500)
```

c:\Users\spamy\OneDrive\Desktop\project

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>

```
%cd {HOME}
import ipyplot

images_array = [f'{HOME}/runs/detect/val/val_batch2_labels.jpg',
f'{HOME}/runs/detect/val/val_batch2_pred.jpg']
ipyplot.plot_images(images_array, max_images=2, img_width=500)
```

c:\Users\spamy\OneDrive\Desktop\project

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>

Validate Custom Model

```
%cd {HOME}

!yolo task=detect mode=val
model={HOME}/runs/detect/train/weights/best.pt
data={dataset.location}/data.yaml
```

c:\Users\spamy\OneDrive\Desktop\project
Ultralytics YOLOv8.1.27 🚀 Python-3.12.0 torch-2.2.1+cpu CPU (AMD
Ryzen 7 7840HS w/ Radeon 780M Graphics)
Model summary (fused): 168 layers, 11127906 parameters, 0 gradients
                   all   100   240   0.116   0.279
0.101   0.0492
                  HDPE   100   88   0.153   0.375
0.111   0.0538
                  LDPE   100   28   0.108   0.425
```

```
              0.198          0.105
                        PETE          100          56        0.194        0.339
0.117          0.0512
                         PP           100          26        0.0278       0.0385
0.036          0.0175
                         PS           100          16        0.126        0.188
0.0881         0.0499
                        PVC           100          26        0.0854       0.308
0.0544         0.018
Speed: 2.7ms preprocess, 260.0ms inference, 0.0ms loss, 18.4ms
postprocess per image
Results saved to runs\detect\val
💡 Learn more at https://docs.ultralytics.com/modes/val


val: Scanning C:\Users\spamy\OneDrive\Desktop\project\datasets\
Plastic-Waste-20\valid\labels.cache... 100 images, 0 backgrounds, 0
corrupt: 100%|██████████| 100/100 [00:00<?, ?it/s]
val: Scanning C:\Users\spamy\OneDrive\Desktop\project\datasets\
Plastic-Waste-20\valid\labels.cache... 100 images, 0 backgrounds, 0
corrupt: 100%|██████████| 100/100 [00:00<?, ?it/s]

                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):   0%|            | 0/7 [00:00<?, ?it/s]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):  14%|█           | 1/7 [00:04<00:24,   4.03s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):  29%|██          | 2/7 [00:08<00:20,   4.01s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):  43%|███         | 3/7 [00:13<00:18,   4.75s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):  57%|████        | 4/7 [00:19<00:15,   5.03s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):  71%|█████       | 5/7 [00:24<00:10,   5.11s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95):  86%|██████      | 6/7 [00:28<00:04,   4.86s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95): 100%|████████████| 7/7 [00:30<00:00,   3.72s/it]
                  Class       Images   Instances       Box(P           R
mAP50   mAP50-95): 100%|████████████| 7/7 [00:30<00:00,   4.30s/it]
```

Inference with Custom Model

```
%cd {HOME}
!yolo task=detect mode=predict
model={HOME}/runs/detect/train/weights/best.pt conf=0.25
source={dataset.location}/test/images save=True

c:\Users\spamy\OneDrive\Desktop\project
Ultralytics YOLOv8.1.27 🚀 Python-3.12.0 torch-2.2.1+cpu CPU (AMD
```

```
Ryzen 7 7840HS w/ Radeon 780M Graphics)
Model summary (fused): 168 layers, 11127906 parameters, 0 gradients

image 1/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
00000062_jpg.rf.3d8575ba21d8f00b9652df01b964a961.jpg: 800x800 (no
detections), 232.4ms
image 2/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
00000367_jpg.rf.453a5ae9fe0936b522390125ec75e1a6.jpg: 544x800 1 LDPE,
141.4ms
image 3/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
01096b3ed7b69661053faf91e0f3a61e_jpg.rf.f0b8089381e7fc55e3dd8688227b7e
03.jpg: 800x544 1 HDPE, 1 PETE, 141.5ms
image 4/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
03e3420b2832ab83c044d1096c4d13c8_jpg.rf.29706b6347f4e890e6810a68ece889
95.jpg: 800x800 1 HDPE, 1 PP, 1 PVC, 169.7ms
image 5/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
0b1a5af81239844c1b6e7cfcbb65d606_jpg.rf.e1b01a5b58808cdb43b427920420e4
00.jpg: 800x544 5 HDPEs, 117.3ms
image 6/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
131a43de9b46fe4fb019a7094c635f52_jpg.rf.a67778330f863f496dd233811f26cf
36.jpg: 800x800 1 LDPE, 179.7ms
image 7/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
1d8970b4751f4528c31f72416b5f70bb_jpg.rf.036f293c24344b2a815846bacb8449
8e.jpg: 800x800 1 HDPE, 1 PS, 3 PVCs, 179.0ms
image 8/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
1f7d48a42482d76636e404eb4e56dee6_jpg.rf.dafb6d8b08269236e3a36790635cb1
50.jpg: 800x800 (no detections), 157.8ms
image 9/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
2df7deb6a8707d7a5bed1aa37ea4c743_jpg.rf.747dba764334cb988af38f33b4d344
98.jpg: 800x800 2 HDPEs, 2 LDPEs, 1 PVC, 167.8ms
image 10/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
2fa4efd2c05bf11d46c5a16a954c6da2_jpg.rf.1c6110f3baaf0bcdb756a6d81e0b0f
6e.jpg: 800x800 (no detections), 184.3ms
image 11/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
31d6fdf9a5b917e9d98ec9d19f1f4f30_jpg.rf.99f4f59b564c34c3b07f6682e03b57
15.jpg: 800x544 2 PETEs, 3 PVCs, 128.4ms
image 12/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
```

3f7c09ab85716a72335b0a92484d7a53_jpg.rf.3514113b915aeb89b984ef112f8797
15.jpg: 800x704 (no detections), 171.8ms
image 13/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
453d88c361e88841a9261514aa77bdb8_jpg.rf.f2336f20390819bc035630838f7aa8
a6.jpg: 608x800 3 HDPEs, 4 LDPEs, 1 PETE, 183.8ms
image 14/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
5804d8180f7c4ae1484c4f60c6437d28_jpg.rf.80a57438c1ee15d70cadeac4f156af
86.jpg: 800x800 1 PVC, 166.4ms
image 15/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
5b30da686f307f67ec1fdbf9e92a79bc_jpg.rf.9f2e40df16135312d174f204347749
44.jpg: 800x544 4 HDPEs, 1 PP, 126.0ms
image 16/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
68b1e93e88520167c96e85f479d2b69d_jpg.rf.50fefcf877960bb7e375dd3dda1a2d
f6.jpg: 800x800 (no detections), 173.0ms
image 17/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
7f689afcb70060aea32353028bfa9665_jpg.rf.26521bc073b059aa8b5cb63b913077
eb.jpg: 800x800 (no detections), 180.1ms
image 18/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
938f3005a0b3202bc289867d7dec433e_jpg.rf.1396c5e308bea1a3e59e652338ffa9
97.jpg: 800x800 (no detections), 180.4ms
image 19/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
9e3ec24bc55abf1625db0a62bfee39fd_jpg.rf.cb6779aa497f0e8692e0fa104b02ec
83.jpg: 800x800 1 PETE, 176.4ms
image 20/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_135603_jpg.rf.64006e05c899637b8a3aa44e754e5eb2.jpg:
800x608 1 HDPE, 1 PETE, 161.1ms
image 21/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_135707_jpg.rf.4c936608b7767904ea9429f04eccad2e.jpg:
800x608 1 PP, 133.4ms
image 22/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_140008_jpg.rf.89790be0c3cfd5cf29e68ee1c076b6ec.jpg:
800x608 1 HDPE, 1 LDPE, 1 PP, 141.1ms
image 23/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_140507_jpg.rf.2fd734074683698e9478f6798a0a1f35.jpg:
800x608 1 HDPE, 1 LDPE, 152.3ms
image 24/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_142017_jpg.rf.6ba7fbcf15e57ad79f794e7c60a93303.jpg:

```
800x608 1 HDPE, 131.4ms
image 25/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_142157_jpg.rf.1ce2ccfcb8303f656a58db065ceb795f.jpg:
800x608 2 HDPEs, 134.1ms
image 26/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_142256_jpg.rf.becb11e77d87a6ccec525fc064f87b64.jpg:
800x608 (no detections), 132.7ms
image 27/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_143115_jpg.rf.f80b33b62958fb3ab0e1573cbf2b8fb5.jpg:
608x800 1 HDPE, 2 PPs, 134.8ms
image 28/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
IMG_20191229_143242_jpg.rf.a6c53f3a3026db5c0f2c6cc4b7b1a03e.jpg:
800x608 1 HDPE, 133.6ms
image 29/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
c45df5920c45b9876df74c83c06b06e6_jpg.rf.4bf486039b36edeef9a6f8c4edd566
40.jpg: 800x800 2 HDPEs, 3 PVCs, 181.4ms
image 30/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
c832f54d9d1dcb0fbc6b28ef9dcead86_jpg.rf.950f545140214c43a862c94647328f
7e.jpg: 800x768 2 LDPEs, 176.5ms
image 31/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
cc87392b5327c5c0808a8fe7b0b12661_jpg.rf.a88f2269abbf49c056d453766dfeeb
6c.jpg: 800x608 1 HDPE, 137.9ms
image 32/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
d0357ba27f91ca30b492de4b40c1a433_jpg.rf.4fbe763f073a791040e7a2c7556a53
36.jpg: 800x800 2 PVCs, 167.3ms
image 33/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
d1a6a40469547284e10b61112b3489e3_jpg.rf.4cfe73aabee260be79e326fa47cba0
ea.jpg: 800x800 (no detections), 167.8ms
image 34/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
d2e78f0b920d3865afe7951a8fe1d8f4_jpg.rf.ec189e6ec914e11af2d79be79878e7
77.jpg: 800x800 1 HDPE, 174.0ms
image 35/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
df8d2a9d11e877c99acd7bfdb5cbbe6a_jpg.rf.52ac67e7a1cbf14ce8e721c30579b9
53.jpg: 800x800 1 PVC, 172.9ms
image 36/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
e80c1f84d680d50938ca1b315704e59b_jpg.rf.1192166ac195569127572c8515a800
f6.jpg: 800x800 (no detections), 164.4ms
```

```
image 37/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
e8882fbfe50f73ba1c347e583f2dac0c_jpg.rf.46152ac440153ecb25ec14fc4ddd97
f1.jpg: 800x800 1 HDPE, 2 LDPEs, 171.4ms
image 38/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
f4a0e58929864d57b3a0b6d163a9b3ae_jpg.rf.abdc13a1a1c5567a4b5362fb44f8f4
08.jpg: 800x800 1 HDPE, 172.5ms
image 39/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
f5148e3f0c14aa05ab948d3b2ab35136_jpg.rf.4a46ad394f3a12abaf59fde558092d
68.jpg: 800x608 1 HDPE, 3 PVCs, 126.1ms
image 40/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
f8b7e2844899c1afc96288604832cb89_jpg.rf.1e014fc66300d544605708f74a4d14
b7.jpg: 800x800 1 HDPE, 1 LDPE, 173.0ms
image 41/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
f9664e5a398a45385296d05b8c540af1_jpg.rf.c85fa661798362cf3a2fd9b2d3a8a3
5f.jpg: 800x768 9 HDPEs, 158.5ms
image 42/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
fotolia_6428456_XS_jpg.rf.795235508ddb802832afcb1be1a34747.jpg:
608x800 1 HDPE, 6 LDPEs, 6 PETEs, 128.3ms
image 43/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\images-4-
_jpeg.rf.abc8a03011e97a0a8e8e3de53f925921.jpg: 800x800 1 HDPE, 2
LDPEs, 171.0ms
image 44/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\lis-pvc-plafonesia-ls16-
putih_png.rf.3dc6c761e545ba8aa2f93cdc0cfd432a.jpg: 800x800 (no
detections), 172.8ms
image 45/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
plastic169_jpg.rf.9a513606416decb99505b9d3e36276fa.jpg: 608x800 2
HDPEs, 1 PP, 132.9ms
image 46/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
plastic395_jpg.rf.dd27a43e03db8b54ed009cfb8f7ad13b.jpg: 608x800 2
PETEs, 134.6ms
image 47/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
plastic447_jpg.rf.08a3a0d2024ced3742c068249750e6e0.jpg: 608x800 1 PP,
127.7ms
image 48/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
plastic6_jpg.rf.8d1b099a8d9dc205978ac438f262a37c.jpg: 608x800 2 PVCs,
129.9ms
image 49/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
```

```
Waste-20\test\images\sterofoam-styrofoam-
1280x720_jpg.rf.509b17bf5f5345f208f59fd8f12de38d.jpg: 480x800 2 LDPEs,
1 PVC, 122.9ms
image 50/50 c:\Users\spamy\OneDrive\Desktop\project\datasets\Plastic-
Waste-20\test\images\
trash69_jpg.rf.1f1fe9c59726b5dd836c7600a435dfee.jpg: 608x800 1 PS,
132.3ms
Speed: 3.9ms preprocess, 156.2ms inference, 0.9ms postprocess per
image at shape (1, 3, 608, 800)
Results saved to runs\detect\predict
💡 Learn more at https://docs.ultralytics.com/modes/predict
```

Individual Results Labels

```python
import glob
from IPython.display import Image, display

for image_path in glob.glob(f'{HOME}/runs/detect/predict/*.jpg')[:7]:
    display(Image(filename=image_path, width=300))
```