aws-img-yolov8

April 2, 2025

[ ]:
```
!pip3 install --upgrade torch torchvision torchaudio --extra-index-url https://
 ↪download.pytorch.org/whl/cu117
!pip3 install roboflow
!pip3 install --upgrade ultralytics
```

[2]:
```
import torch
torch.cuda.is_available()
```

[2]:
```
True
```

[3]:
```
from kaggle_secrets import UserSecretsClient
user_secrets = UserSecretsClient()
ROBOFLOW_API_KEY = user_secrets.get_secret("ROBOFLOW_API")

from roboflow import Roboflow
rf = Roboflow(api_key=ROBOFLOW_API_KEY)
project = rf.workspace("zhihang").project("fruits-and-vegetables-knetf-9dd0s")
dataset = project.version(1).download("yolov8")
```

```
loading Roboflow workspace…
loading Roboflow project…

Downloading Dataset Version Zip in Fruits-and-Vegetables-1 to yolov8::
100%|     | 345516/345516 [00:06<00:00, 55799.16it/s]



Extracting Dataset Version Zip to Fruits-and-Vegetables-1 in yolov8::
100%|     | 3670/3670 [00:00<00:00, 3734.96it/s]

Creating new Ultralytics Settings v0.0.6 file
View Ultralytics Settings with 'yolo settings' or at
'/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings
runs_dir=path/to/dir'. For help see
https://docs.ultralytics.com/quickstart/#ultralytics-settings.
```

[4]:
```
!cat /kaggle/working/Fruits-and-Vegetables-1/data.yaml
```

```
names:
- apple
- banana
- bell_pepper
- cabbage
- carrot
- chilli_pepper
- corn
- cucumber
- eggplant
- garlic
- grape
- kiwi
- lemon
- lettuce
- mango
- onion
- orange
- pineapple
- potato
- sweetpotato
- tomato
- watermelon
nc: 22
roboflow:
  license: Public Domain
  project: fruits-and-vegetables-knetf-9dd0s
  url: https://universe.roboflow.com/zhihang/fruits-and-vegetables-
knetf-9dd0s/dataset/1
  version: 1
  workspace: zhihang
test: ../test/images
train: ../train/images
val: ../valid/images
```

[5]:
```
!yolo task=detect mode=train epochs=50 data=/kaggle/working/
↪Fruits-and-Vegetables-1/data.yaml model=yolov8m.pt patience=30
```

```
Downloading
https://github.com/ultralytics/assets/releases/download/v8.3.0/yolov8m.pt to
'yolov8m.pt'…
100%|                    | 49.7M/49.7M [00:00<00:00, 128MB/s]
Ultralytics 8.3.99  Python-3.10.12 torch-2.6.0+cu124 CUDA:0 (Tesla
P100-PCIE-16GB, 16269MiB)
engine/trainer: task=detect, mode=train, model=yolov8m.pt,
data=/kaggle/working/Fruits-and-Vegetables-1/data.yaml, epochs=50, time=None,
patience=30, batch=16, imgsz=640, save=True, save_period=-1, cache=False,
device=None, workers=8, project=None, name=train, 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=True, opset=None,
workspace=None, nms=False, lr0=0.01, lrf=0.01, momentum=0.937,
weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warmup_bias_lr=0.1,
box=7.5, cls=0.5, dfl=1.5, pose=12.0, kobj=1.0, nbs=64, hsv_h=0.015, hsv_s=0.7,
hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0,
flipud=0.0, fliplr=0.5, bgr=0.0, mosaic=1.0, mixup=0.0, copy_paste=0.0,
copy_paste_mode=flip, auto_augment=randaugment, erasing=0.4, crop_fraction=1.0,
cfg=None, tracker=botsort.yaml, save_dir=runs/detect/train
Downloading https://ultralytics.com/assets/Arial.ttf to
'/root/.config/Ultralytics/Arial.ttf'…
100%|                      | 755k/755k [00:00<00:00, 20.5MB/s]
Overriding model.yaml nc=80 with nc=22

                   from  n    params  module
arguments
  0                  -1  1      1392  ultralytics.nn.modules.conv.Conv
[3, 48, 3, 2]
  1                  -1  1     41664  ultralytics.nn.modules.conv.Conv
[48, 96, 3, 2]
  2                  -1  2    111360  ultralytics.nn.modules.block.C2f
[96, 96, 2, True]
  3                  -1  1    166272  ultralytics.nn.modules.conv.Conv
[96, 192, 3, 2]
  4                  -1  4    813312  ultralytics.nn.modules.block.C2f
[192, 192, 4, True]
  5                  -1  1    664320  ultralytics.nn.modules.conv.Conv
[192, 384, 3, 2]
  6                  -1  4   3248640  ultralytics.nn.modules.block.C2f
[384, 384, 4, True]
  7                  -1  1   1991808  ultralytics.nn.modules.conv.Conv
[384, 576, 3, 2]
  8                  -1  2   3985920  ultralytics.nn.modules.block.C2f
[576, 576, 2, True]
  9                  -1  1    831168  ultralytics.nn.modules.block.SPPF
[576, 576, 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  2   1993728  ultralytics.nn.modules.block.C2f
[960, 384, 2]
 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  2    517632  ultralytics.nn.modules.block.C2f
[576, 192, 2]
 16                  -1  1    332160  ultralytics.nn.modules.conv.Conv
[192, 192, 3, 2]
 17            [-1, 12]  1         0  ultralytics.nn.modules.conv.Concat
[1]
 18                  -1  2   1846272  ultralytics.nn.modules.block.C2f
[576, 384, 2]
 19                  -1  1   1327872  ultralytics.nn.modules.conv.Conv
[384, 384, 3, 2]
 20             [-1, 9]  1         0  ultralytics.nn.modules.conv.Concat
[1]
 21                  -1  2   4207104  ultralytics.nn.modules.block.C2f
[960, 576, 2]
 22        [15, 18, 21]  1   3788434  ultralytics.nn.modules.head.Detect
[22, [192, 384, 576]]
Model summary: 169 layers, 25,869,058 parameters, 25,869,042 gradients, 79.1
GFLOPs

Transferred 469/475 items from pretrained weights
TensorBoard: Start with 'tensorboard --logdir runs/detect/train',
view at http://localhost:6006/
Freezing layer 'model.22.dfl.conv.weight'
AMP: running Automatic Mixed Precision (AMP) checks…
Downloading
https://github.com/ultralytics/assets/releases/download/v8.3.0/yolo11n.pt to
'yolo11n.pt'…
100%|                    | 5.35M/5.35M [00:00<00:00, 88.7MB/s]
AMP: checks passed
train: Scanning /kaggle/working/Fruits-and-
Vegetables-1/train/labels… 1277 ima
train: New cache created: /kaggle/working/Fruits-and-
Vegetables-1/train/labels.cache
/usr/local/lib/python3.10/dist-packages/albumentations/__init__.py:24:
UserWarning: A new version of Albumentations is available: 2.0.5 (you have
1.4.20). Upgrade using: pip install -U albumentations. To disable automatic
update checks, set the environment variable NO_ALBUMENTATIONS_UPDATE to 1.
  check_for_updates()
albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01,
blur_limit=(3, 7)), ToGray(p=0.01, num_output_channels=3,
method='weighted_average'), CLAHE(p=0.01, clip_limit=(1.0, 4.0),
```

```
tile_grid_size=(8, 8))
val: Scanning /kaggle/working/Fruits-and-
Vegetables-1/valid/labels… 363 images
val: New cache created: /kaggle/working/Fruits-and-
Vegetables-1/valid/labels.cache
Plotting labels to runs/detect/train/labels.jpg…
optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and
'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum'
automatically…
optimizer: AdamW(lr=0.000385, momentum=0.9) with parameter groups
77 weight(decay=0.0), 84 weight(decay=0.0005), 83 bias(decay=0.0)
TensorBoard: model graph visualization added
Image sizes 640 train, 640 val
Using 4 dataloader workers
Logging results to runs/detect/train
Starting training for 50 epochs…

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       1/50      8.23G       1.11      2.874      1.474         61        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.36      0.489      0.445
0.313

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       2/50       8.3G      1.086      1.972      1.394         47        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.525      0.489      0.485
0.318

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       3/50      8.37G      1.108      1.896      1.417         61        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.488      0.439      0.427
0.263

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       4/50      8.43G       1.13      1.802      1.432         57        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.549      0.451      0.499
0.308

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       5/50       8.5G      1.111       1.64      1.404         61        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.499      0.532      0.523
0.344

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
```

```
       6/50      8.57G      1.092      1.594      1.417         67        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.521      0.505      0.524
0.335

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       7/50      8.63G      1.056        1.5      1.381         55        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.561       0.62        0.6
0.392

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       8/50       8.7G      1.036        1.4      1.368         97        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.544      0.614       0.61
0.416

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       9/50      8.77G      1.037       1.37      1.361         68        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.607      0.648      0.655
0.46

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      10/50      8.83G      1.014      1.305      1.362         76        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.64      0.648      0.694
0.487

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      11/50       8.9G     0.9975      1.254      1.327         34        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.63      0.677        0.7
0.476

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      12/50      8.97G     0.9766      1.193      1.328         50        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.665      0.645      0.684
0.48

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      13/50      9.04G     0.9721      1.114      1.313         60        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.595      0.717       0.71
0.494

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
```

```
      14/50       9.1G     0.9369      1.099      1.292         64        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.662      0.703      0.737
0.508

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      15/50      9.17G     0.9268      1.059      1.296         39        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.65      0.666       0.69
0.485

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      16/50      9.23G     0.9063      1.004      1.273         79        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.719      0.626      0.709
0.498

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      17/50      10.5G     0.9187      1.023      1.277         68        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.698      0.672      0.724
0.515

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      18/50      10.6G     0.9047     0.9624      1.274         76        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.657      0.693      0.726
0.52

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      19/50      10.6G     0.9045     0.9543      1.273         55        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.689      0.705      0.726
0.513

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      20/50      10.7G     0.8841     0.8862      1.244         64        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.666      0.692      0.711
0.515

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      21/50      10.8G     0.8666     0.8923      1.248         64        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.65      0.671      0.698
0.505

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
```

```
      22/50      10.8G     0.8609     0.8431      1.252         60        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.734      0.718      0.759
0.539

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      23/50      10.9G     0.8204     0.8133      1.219         63        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.692       0.69      0.735
0.525

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      24/50        11G     0.8493     0.8119      1.239        107        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.68      0.726       0.75
0.538

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      25/50        11G      0.833      0.794      1.215         69        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.731      0.691      0.751
0.543

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      26/50      11.1G     0.8027     0.7628      1.196         51        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.714      0.722      0.767
0.561

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      27/50      11.2G     0.7966     0.7606      1.191         55        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.786      0.691       0.78
0.568

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      28/50      11.2G     0.7827      0.714      1.193         54        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.729      0.704      0.737
0.54

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      29/50      11.3G     0.7806     0.6906      1.185         77        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.763      0.706      0.763
0.558

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
```

```
      30/50      11.4G     0.7736     0.6762      1.177         66        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.723      0.759      0.785
0.567

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      31/50      11.4G     0.7397     0.6478      1.153         61        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.73      0.727      0.765
0.554

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      32/50      11.5G     0.7418      0.646       1.15         60        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.741      0.736      0.778
0.569

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      33/50      11.6G     0.7235     0.6191      1.141         66        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.699      0.724      0.756
0.549

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      34/50      11.6G     0.7223      0.613      1.151         65        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.74      0.715      0.774
0.569

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      35/50      11.7G     0.7095     0.5882      1.131         71        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.736      0.708      0.757
0.552

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      36/50      12.5G     0.6947     0.5687       1.13         60        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.762      0.708      0.765
0.558

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      37/50      12.5G     0.6848      0.574      1.131         60        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.752       0.75       0.78
0.568

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
```

```
      38/50      12.6G     0.6802     0.5494      1.116         67        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.781      0.698      0.781
0.565

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      39/50      12.7G     0.6597     0.5336      1.109         73        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.764      0.742       0.78
0.57

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      40/50      12.7G     0.6437     0.5138      1.102         48        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.759      0.715      0.779
0.565
Closing dataloader mosaic
albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01,
blur_limit=(3, 7)), ToGray(p=0.01, num_output_channels=3,
method='weighted_average'), CLAHE(p=0.01, clip_limit=(1.0, 4.0),
tile_grid_size=(8, 8))

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      41/50      12.8G     0.5535     0.4095      1.047         25        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.721      0.733      0.762
0.56

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      42/50      12.9G      0.529     0.3792      1.027         28        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.755      0.733      0.782
0.564

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      43/50      14.1G     0.5081     0.3326      1.011         71        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.77      0.744      0.788
0.575

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      44/50      14.2G     0.4916     0.3189      1.002         25        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.775      0.739       0.79
0.58

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      45/50      14.3G     0.4779     0.3108     0.9842         45        640: 1
```

```
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.793      0.726      0.794
0.577

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      46/50        10G     0.4654     0.2924     0.9721         34        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.759      0.769      0.793
0.576

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      47/50        10G     0.4555     0.2879      0.971         21        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.761      0.734      0.794
0.583

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      48/50        10G     0.4504     0.2938     0.9653         33        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.777      0.728      0.794
0.578

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      49/50        10G     0.4442     0.2844     0.9684         27        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.762      0.746      0.792
0.581

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
      50/50        10G     0.4357     0.2759     0.9662         34        640: 1
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804       0.75      0.756      0.791
0.58

50 epochs completed in 0.767 hours.
Optimizer stripped from runs/detect/train/weights/last.pt, 52.0MB
Optimizer stripped from runs/detect/train/weights/best.pt, 52.0MB

Validating runs/detect/train/weights/best.pt…
Ultralytics 8.3.99  Python-3.10.12 torch-2.6.0+cu124 CUDA:0 (Tesla
P100-PCIE-16GB, 16269MiB)
Model summary (fused): 92 layers, 25,852,498 parameters, 0 gradients, 78.8
GFLOPs
                 Class     Images  Instances      Box(P          R      mAP50  m
                   all        363        804      0.766      0.733      0.794
0.583
                 apple         17         22      0.876      0.909      0.947
0.8
```

```
              banana         11         14      0.691      0.929      0.929
0.791
         bell_pepper         37        114      0.898      0.698      0.846
0.687
             cabbage         10         16      0.712      0.688      0.768
0.546
              carrot         20         52      0.665      0.923      0.836
0.469
        chilli_pepper         31         86      0.558      0.581      0.604
0.393
                corn         26         53      0.762      0.887      0.894
0.632
            cucumber         20         51      0.779      0.762      0.802
0.558
            eggplant         16         33      0.818      0.953      0.958
0.677
              garlic          6         19      0.807      0.579      0.798
0.491
               grape         16         24       0.83      0.817      0.905
0.614
                kiwi          9         35      0.789      0.534      0.778
0.499
               lemon         15         32      0.699      0.781      0.774
0.516
             lettuce         17         20      0.907       0.85      0.874
0.756
               mango         20         49      0.951      0.794      0.952
0.696
               onion         11         24      0.412      0.458      0.367
0.222
              orange          9         21      0.921      0.554      0.768
0.66
           pineapple         12         21      0.933       0.66      0.879
0.663
              potato         12         34      0.729      0.647      0.722
0.632
         sweetpotato         13         42      0.798      0.786       0.77
0.546
              tomato         16         25       0.52       0.52      0.402
0.268
          watermelon         16         17      0.797      0.824      0.895
0.719
/usr/local/lib/python3.10/dist-packages/matplotlib/colors.py:721:
RuntimeWarning: invalid value encountered in less
  xa[xa < 0] = -1
/usr/local/lib/python3.10/dist-packages/matplotlib/colors.py:721:
RuntimeWarning: invalid value encountered in less
  xa[xa < 0] = -1
```

```
Speed: 0.1ms preprocess, 9.0ms inference, 0.0ms loss, 1.6ms postprocess per
image
Results saved to runs/detect/train
 Learn more at https://docs.ultralytics.com/modes/train
```

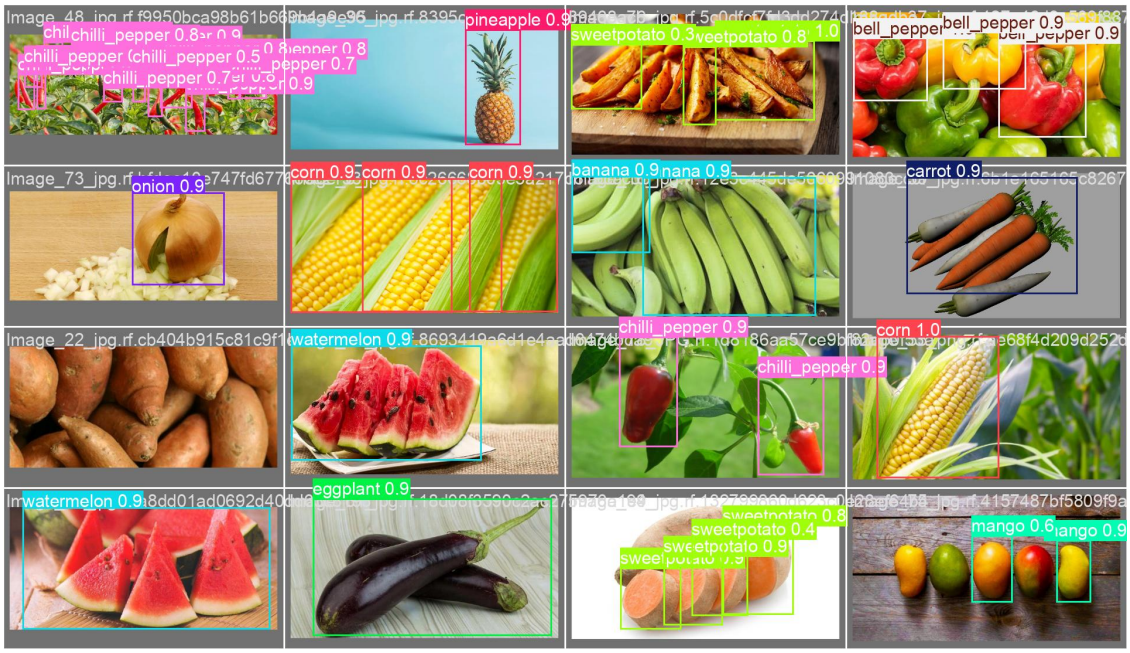
[ ]:
```
#!yolo task=detect mode=train resume model=/kaggle/working/runs/detect/train/
 ↪weights/best.pt data=/kaggle/working/Fruits-and-Vegetables-1/data.yaml␣
 ↪epochs=100
```

[6]:
```
!ls /kaggle/working/runs/detect/train
```

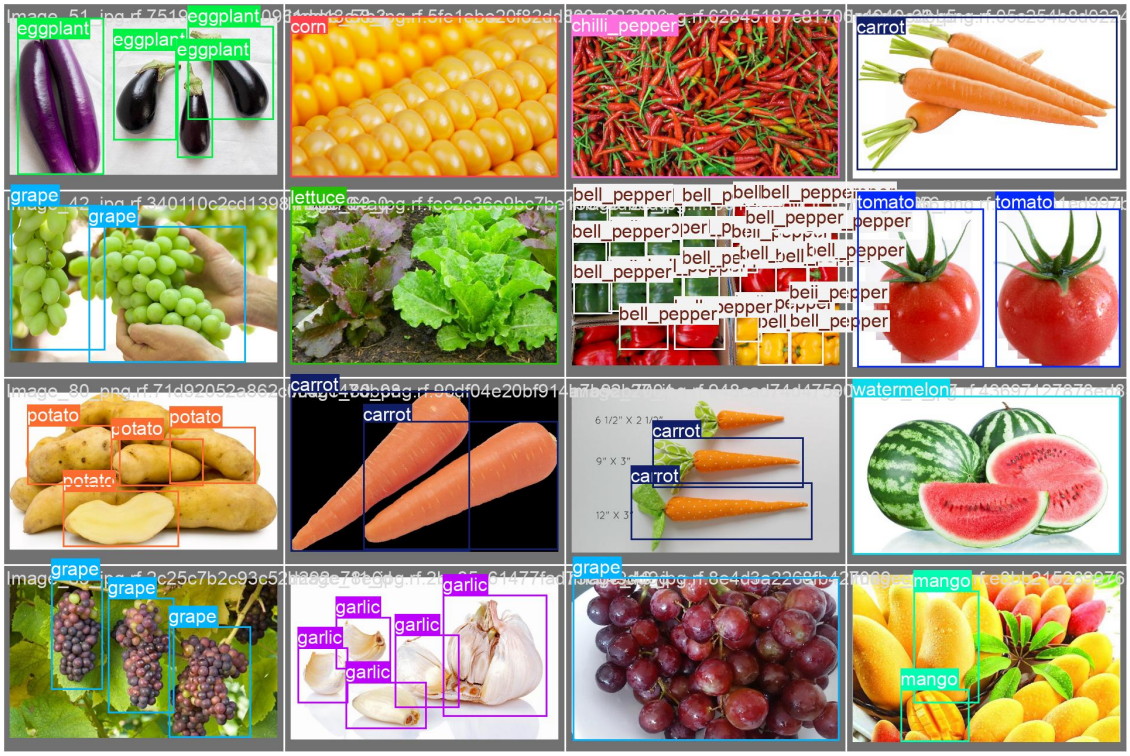
```
args.yaml                                       train_batch1.jpg
confusion_matrix_normalized.png                 train_batch2.jpg
confusion_matrix.png                            train_batch3200.jpg
events.out.tfevents.1743520839.d39e803d790e.85.0 train_batch3201.jpg
F1_curve.png                                    train_batch3202.jpg
labels_correlogram.jpg                          val_batch0_labels.jpg
labels.jpg                                      val_batch0_pred.jpg
P_curve.png                                     val_batch1_labels.jpg
PR_curve.png                                    val_batch1_pred.jpg
R_curve.png                                     val_batch2_labels.jpg
results.csv                                     val_batch2_pred.jpg
results.png                                     weights
train_batch0.jpg
```

[7]:
```
from IPython.display import display, Image

print("---------------------- batch0 ----------------------")
display(Image(filename='/kaggle/working/runs/detect/train/val_batch0_pred.jpg'))
display(Image(filename='/kaggle/working/runs/detect/train/val_batch0_labels.
 ↪jpg'))
print("---------------------- batch1 ----------------------")
display(Image(filename='/kaggle/working/runs/detect/train/val_batch1_pred.jpg'))
display(Image(filename='/kaggle/working/runs/detect/train/val_batch1_labels.
 ↪jpg'))
print("---------------------- batch2 ----------------------")
display(Image(filename='/kaggle/working/runs/detect/train/val_batch2_pred.jpg'))
display(Image(filename='/kaggle/working/runs/detect/train/val_batch2_labels.
 ↪jpg'))
```

```
---------------------- batch0 ----------------------
```

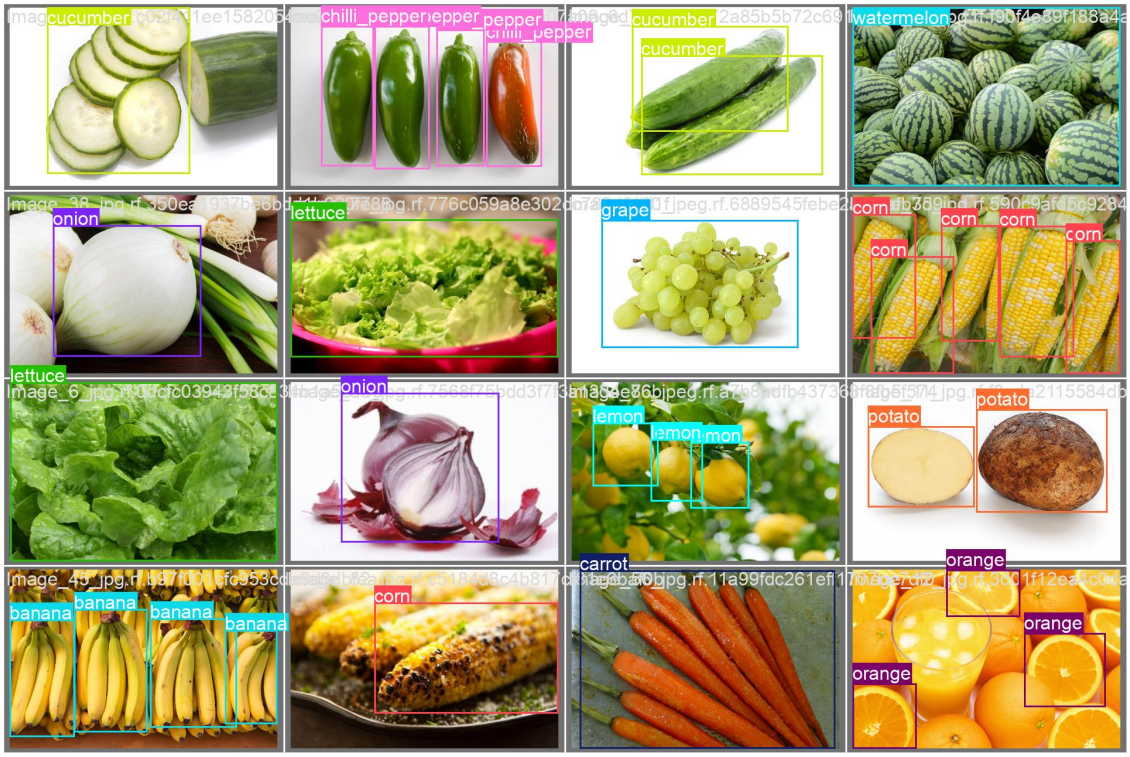

pineapple 0.9
sweetpotato 0.3
bell_pepper 0.9
onion 0.9
corn 0.9
corn 0.9
corn 0.9
banana 0.9
carrot 0.9
watermelon 0.9
chilli_pepper 0.9
corn 1.0
watermelon 0.9
eggplant 0.9
sweetpotato 0.4
sweetpotato 0.9
mango 0.6


eggplant 0.9
eggplant 0.8
corn 0.9
chilli_pepper 1.0
carrot 0.9
grape 0.8
grape 0.9
lettuce 0.9
bell_pepper 0.7
bell_pepper 0.9
bell_pepper 0.4
bell_pepper 0.6
bell_pepper 0.8
tomato 0.9
tomato 1.0
bell_pepper 0.6
potato 0.8
potato 0.9
potato 0.6
potato 0.5
carrot 0.8
carrot 0.9
chilli_pepper 0.7
watermelon 0.9
grape 0.9
grape 1.0
grape 0.9
garlic 1.0
garlic 0.9
garlic 0.9
garlic 1.0
grape 0.9
mango 0.7


eggplant
eggplant
eggplant
corn
chilli_pepper
carrot
grape
grape
lettuce
bell_pepper
tomato
tomato
potato
potato
potato
carrot
carrot
carrot
watermelon
grape
grape
grape
garlic
garlic
garlic
garlic
grape
mango
mango

---------- batch2 ----------

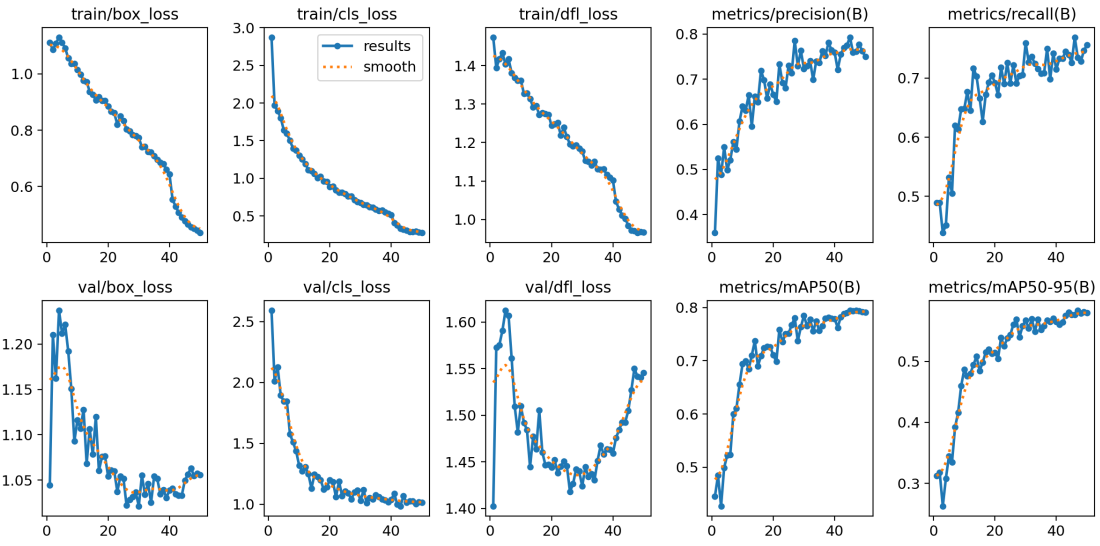

cucumber 0.9
cucumber 0.9
chilli_pepper 0.9
cucumber 0.9
cucumber 0.9
watermelon 0.3
onion 0.8
lettuce 1.0
grape 1.0
corn 0.9
corn 1.0
corn 1.0
corn 0.9
corn 1.0
lettuce 1.0
onion 0.9
onion 0.7
lemon 0.7
orange 0.3
lemon 0.7
potato 0.4
kiwi 0.6
corn 0.7
banana 0.4
carrot 0.9
lemon 0.3
orange 0.3
lemon 0.3

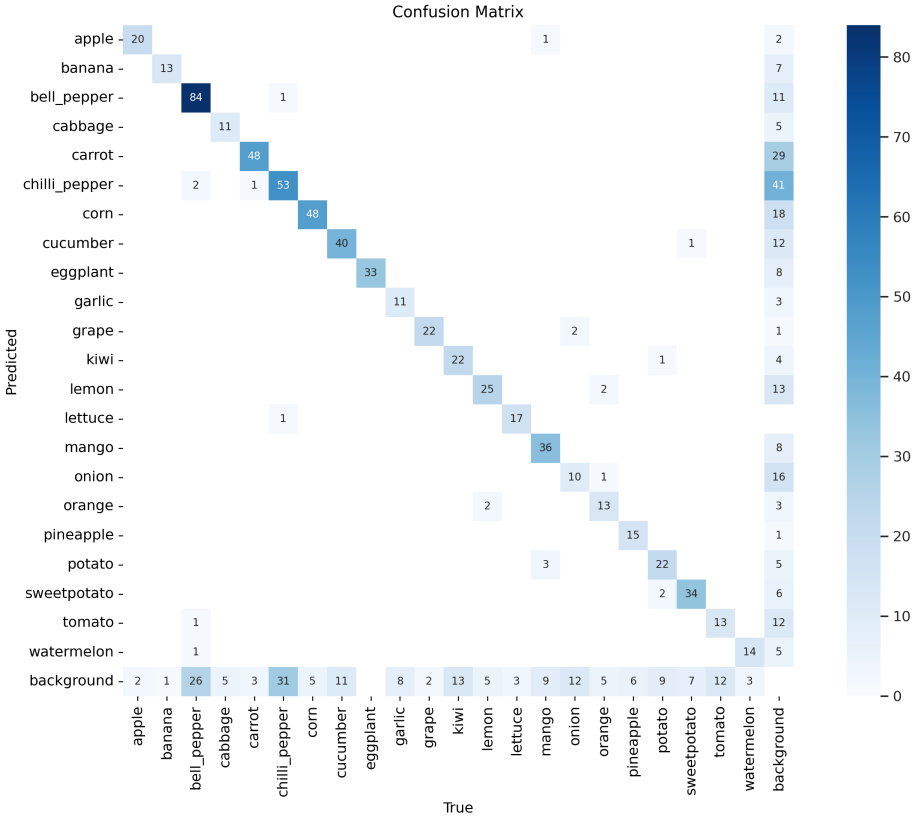


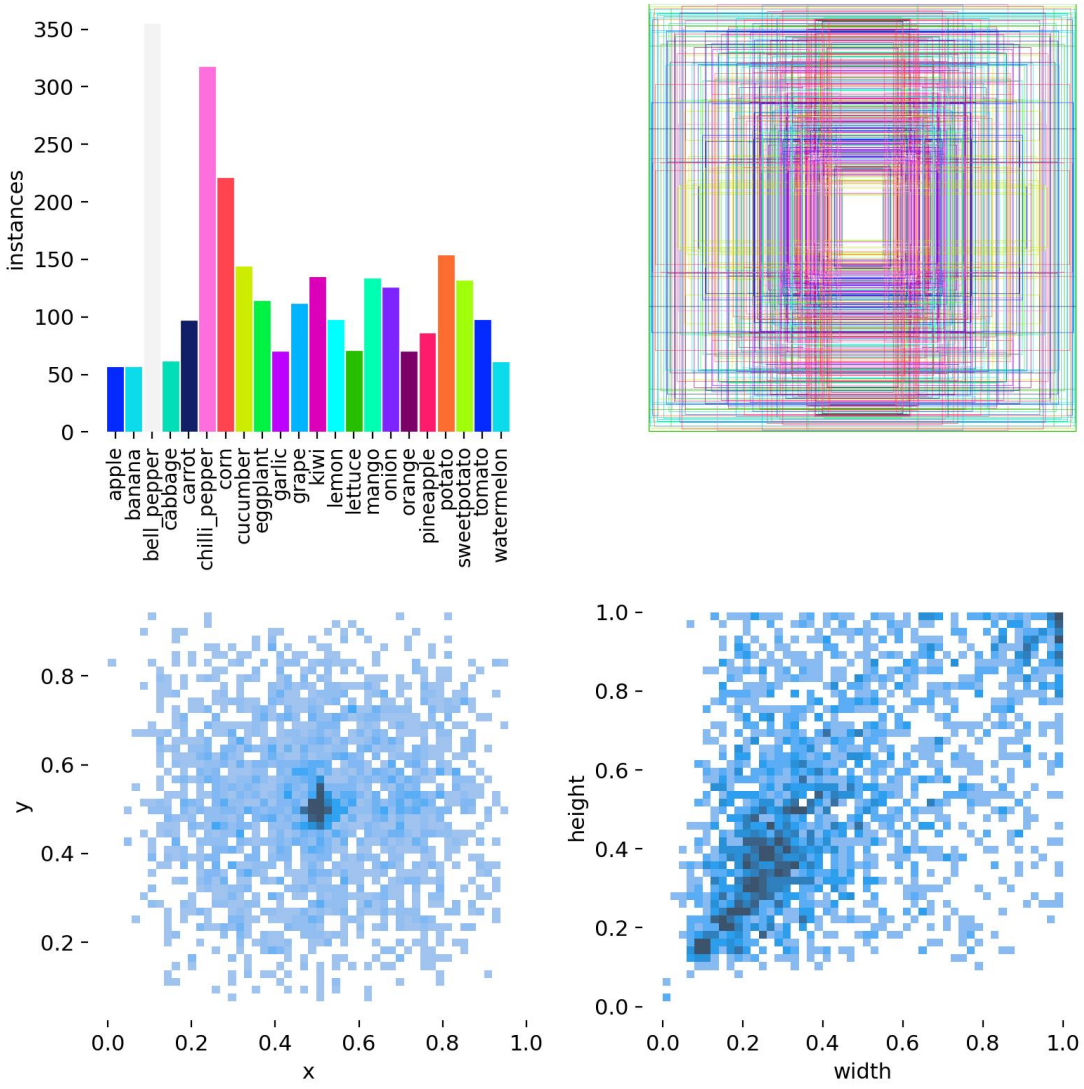
[8]:
```
from ultralytics import YOLO
from PIL import Image
from IPython.display import display
from IPython.display import Image as DisplayImage
import requests

url = 'https://akynazh.site/images/pub/
  ↪watermelon_d79dab34-ddf3-41fd-b6b6-8149bedc4670.png'
image = Image.open(requests.get(url, stream=True).raw)

model = YOLO("/kaggle/working/runs/detect/train/weights/best.pt")
results = model.predict(source=image, conf=0.2, save=True)  # save plotted␣
  ↪images
# print(results)
display(DisplayImage(filename=results[0].save_dir + "/" + results[0].path))
```

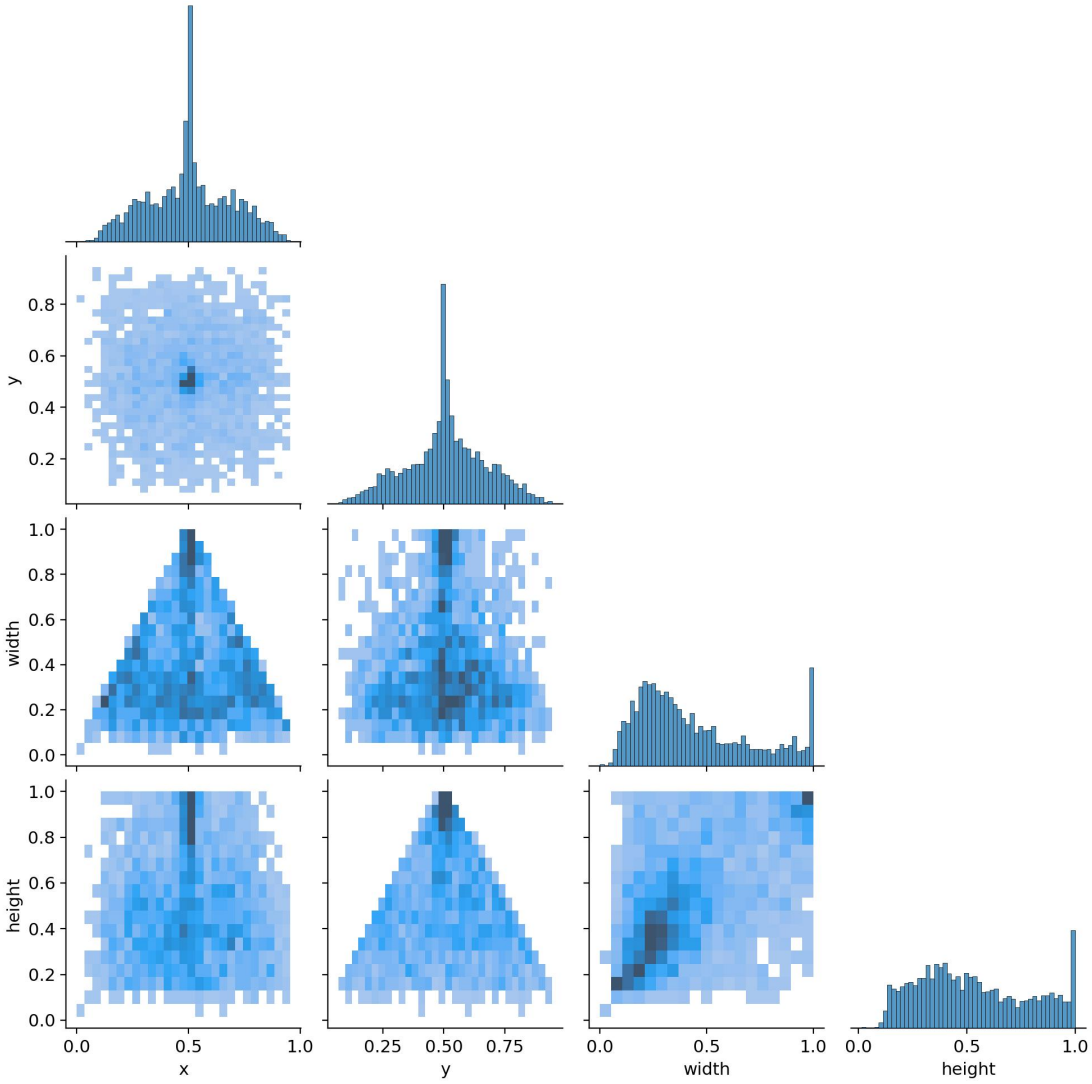
```
0: 640x640 2 watermelons, 16.3ms
Speed: 9.1ms preprocess, 16.3ms inference, 169.2ms postprocess per image at
shape (1, 3, 640, 640)
Results saved to runs/detect/predict
```

[9]:
```
from IPython.display import display, Image

display(Image(filename='/kaggle/working/runs/detect/train/results.png'))
display(Image(filename='/kaggle/working/runs/detect/train/confusion_matrix.
 ↪png'))
display(Image(filename='/kaggle/working/runs/detect/train/labels.jpg'))
display(Image(filename='/kaggle/working/runs/detect/train/labels_correlogram.
 ↪jpg'))
```


train/box_loss
train/cls_loss
results
smooth
train/dfl_loss
metrics/precision(B)
metrics/recall(B)
val/box_loss
val/cls_loss
val/dfl_loss
metrics/mAP50(B)
metrics/mAP50-95(B)


Confusion Matrix
Predicted
True
apple
banana
bell_pepper
cabbage
carrot
chilli_pepper
corn
cucumber
eggplant
garlic
grape
kiwi
lemon
lettuce
mango
onion
orange
pineapple
potato
sweetpotato
tomato
watermelon
background


instances
0
50
100
150
200
250
300
350
apple
banana
bell_pepper
cabbage
carrot
chilli_pepper
corn
cucumber
eggplant
garlic
grape
kiwi
lemon
lettuce
mango
onion
orange
pineapple
potato
sweetpotato
tomato
watermelon
y
0.2
0.4
0.6
0.8
x
0.0
0.2
0.4
0.6
0.8
1.0
height
0.0
0.2
0.4
0.6
0.8
1.0
width
0.0
0.2
0.4
0.6
0.8
1.0


y
width
height
x
y
width
height