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

```
Mounted at /content/drive
```

```
!git clone https://github.com/ultralytics/yolov5
%cd yolov5
%pip install -qr requirements.txt
```

```
Cloning into 'yolov5'...
remote: Enumerating objects: 16836, done.
remote: Counting objects: 100% (11/11), done.
remote: Compressing objects: 100% (11/11), done.
remote: Total 16836 (delta 1), reused 6 (delta 0), pack-reused 16825
Receiving objects: 100% (16836/16836), 15.57 MiB | 12.92 MiB/s, done.
Resolving deltas: 100% (11541/11541), done.
/content/yolov5
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 41.3/41.3 kB 1.6 MB/s eta 0:00:00
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 207.3/207.3 kB 9.3 MB/s eta 0:00:00
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 4.5/4.5 MB 75.6 MB/s eta 0:00:00
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 64.9/64.9 kB 6.3 MB/s eta 0:00:00
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 865.5/865.5 kB 50.0 MB/s eta 0:00:00
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 62.7/62.7 kB 6.1 MB/s eta 0:00:00
ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the sou
google-colab 1.0.0 requires requests==2.31.0, but you have requests 2.32.3 which is incompatible.
```

```
import torch
import utils
display = utils.notebook_init()
```

```
YOLOv5 🚀 v7.0-350-g6096750f Python-3.10.12 torch-2.3.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
Setup complete ✅ (2 CPUs, 12.7 GB RAM, 33.6/78.2 GB disk)
```

```
!unzip -q /content/drive/MyDrive/weeds.zip -d /content/yolov5/
```

```
import os
import shutil
from sklearn.model_selection import train_test_split

# Paths
data_dir = '/content/yolov5/agri_data/data'
train_images_dir = '/content/yolov5/agri_data/train/images'
val_images_dir = '/content/yolov5/agri_data/val/images'
train_labels_dir = '/content/yolov5/agri_data/train/labels'
val_labels_dir = '/content/yolov5/agri_data/val/labels'

# Create directories
os.makedirs(train_images_dir, exist_ok=True)
os.makedirs(val_images_dir, exist_ok=True)
os.makedirs(train_labels_dir, exist_ok=True)
os.makedirs(val_labels_dir, exist_ok=True)

# Get list of images and corresponding labels
images = [f for f in os.listdir(data_dir) if f.endswith('.jpeg')]
labels = [f for f in os.listdir(data_dir) if f.endswith('.txt')]

# Split data into train and validation sets
train_images, val_images, train_labels, val_labels = train_test_split(images, labels, test_size=0.2, random_state=42)

# Copy files to respective directories
for img, lbl in zip(train_images, train_labels):
    shutil.copy(os.path.join(data_dir, img), train_images_dir)
    shutil.copy(os.path.join(data_dir, lbl), train_labels_dir)

for img, lbl in zip(val_images, val_labels):
    shutil.copy(os.path.join(data_dir, img), val_images_dir)
    shutil.copy(os.path.join(data_dir, lbl), val_labels_dir)
```

```
data_yaml_content = """
train: /content/yolov5/agri_data/train/images
val: /content/yolov5/agri_data/val/images

nc: 2
names: ['crop', 'weed']
"""
with open('/content/yolov5/data.yaml', 'w') as f:
    f.write(data_yaml_content)
```

```
# For Conversion
# !python export.py --weights best.pt --img 512 --include tflite
```

```
!python train.py --img 320 --batch 32 --epochs 20 --data /content/yolov5/data.yaml --weights yolov5s.pt --cache --name weed_detection
```

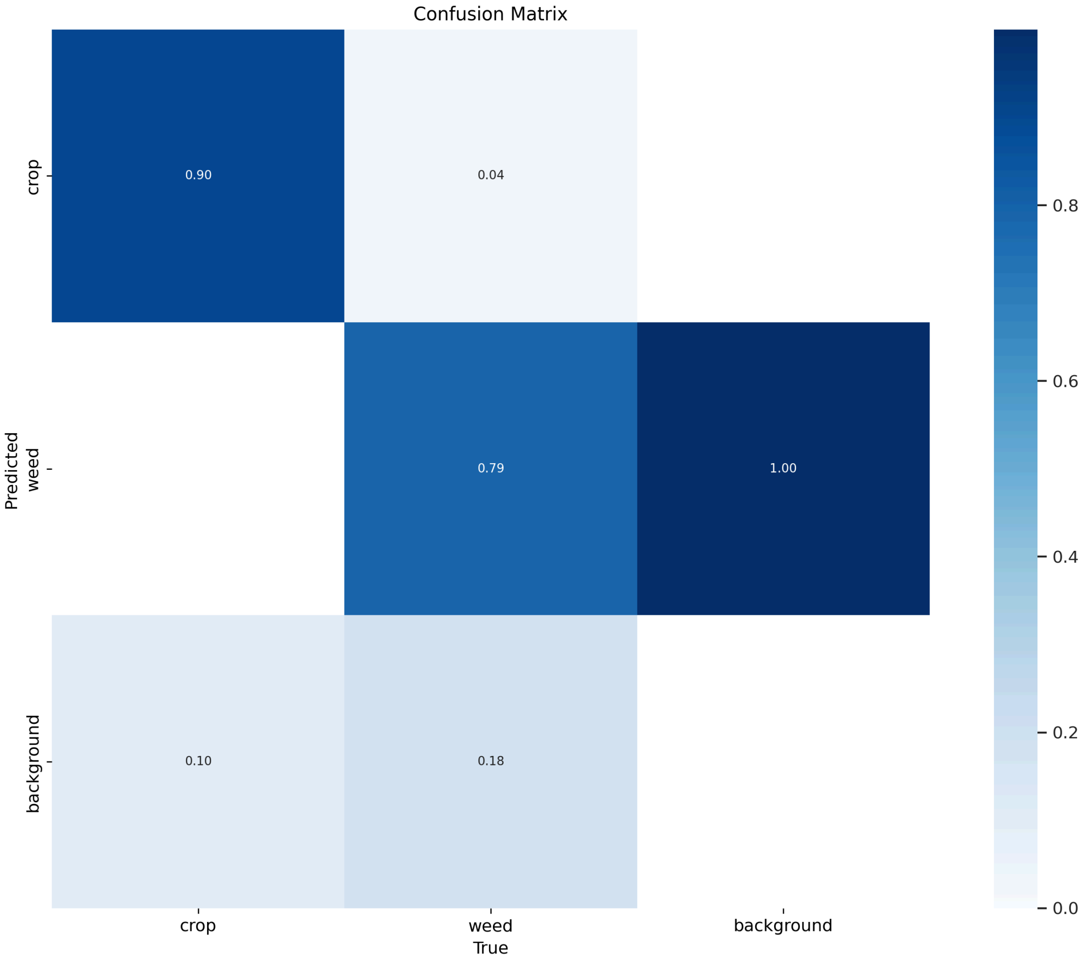
```
      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      11/19      2.11G     0.0377    0.01709   0.004619         43        320: 100% 33/33 [00:06<00:00,  4.77it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  4.68it/s]
                   all        260         48      0.139      0.561      0.156      0.107

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      12/19      2.11G     0.0363    0.01726   0.004269         32        320: 100% 33/33 [00:06<00:00,  5.31it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  3.15it/s]
                   all        260         48      0.139      0.664      0.188      0.132

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      13/19      2.11G    0.03576    0.01724   0.003995         38        320: 100% 33/33 [00:08<00:00,  3.97it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  4.62it/s]
                   all        260         48      0.133      0.575      0.131     0.0811

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      14/19      2.11G    0.03544    0.01718   0.004783         39        320: 100% 33/33 [00:05<00:00,  5.73it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  3.52it/s]
                   all        260         48      0.124      0.733      0.169      0.124

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      15/19      2.11G    0.03516    0.01771    0.00392         35        320: 100% 33/33 [00:09<00:00,  3.62it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  4.73it/s]
                   all        260         48      0.144      0.738       0.16      0.116

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      16/19      2.11G    0.03457    0.01743   0.003884         54        320: 100% 33/33 [00:05<00:00,  5.77it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  4.67it/s]
                   all        260         48      0.148        0.7      0.167      0.114

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      17/19      2.11G    0.03233    0.01645   0.003944         38        320: 100% 33/33 [00:09<00:00,  3.54it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  3.66it/s]
                   all        260         48       0.13       0.65      0.161      0.113

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      18/19      2.11G    0.03189    0.01661   0.003611         35        320: 100% 33/33 [00:05<00:00,  5.73it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  4.63it/s]
                   all        260         48      0.147      0.621      0.176      0.124

      Epoch    GPU_mem   box_loss   obj_loss   cls_loss  Instances       Size
      19/19      2.11G    0.03266    0.01673   0.003681         44        320: 100% 33/33 [00:08<00:00,  4.07it/s]
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:01<00:00,  3.22it/s]
                   all        260         48      0.149      0.611      0.193      0.132

20 epochs completed in 0.053 hours.
Optimizer stripped from runs/train/weed_detection/weights/last.pt, 14.3MB
Optimizer stripped from runs/train/weed_detection/weights/best.pt, 14.3MB

Validating runs/train/weed_detection/weights/best.pt...
Fusing layers...
Model summary: 157 layers, 7015519 parameters, 0 gradients, 15.8 GFLOPs
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 5/5 [00:02<00:00,  2.48it/s]
                   all        260         48       0.15      0.611      0.192      0.131
                  crop        260         20      0.174        0.9       0.22      0.174
                  weed        260         28      0.125      0.321      0.165     0.0886
Results saved to runs/train/weed_detection
```

```
!python val.py --weights runs/train/weed_detection/weights/best.pt --data /content/yolov5/data.yaml --img 320
```

```
val: data=/content/yolov5/data.yaml, weights=['runs/train/weed_detection/weights/best.pt'], batch_size=32, imgsz=320, conf_thres=0.0
YOLOv5 🚀 v7.0-350-g6096750f Python-3.10.12 torch-2.3.1+cu121 CUDA:0 (Tesla T4, 15102MiB)

Fusing layers...
Model summary: 157 layers, 7015519 parameters, 0 gradients, 15.8 GFLOPs
val: Scanning /content/yolov5/agri_data/val/labels.cache... 39 images, 221 backgrounds, 0 corrupt: 100% 260/260 [00:00<?, ?it/s]
```

```
                     Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 9/9 [00:05<00:00,  1.71it/s]
                       all        260         48       0.15      0.611      0.192      0.132
                      crop        260         20      0.174        0.9       0.22      0.174
                      weed        260         28      0.125      0.321      0.165     0.0892
Speed: 0.1ms pre-process, 3.3ms inference, 8.4ms NMS per image at shape (32, 3, 320, 320)
Results saved to runs/val/exp
```

```
from IPython.display import Image, display

# Define the path to the confusion matrix image
confusion_matrix_path = 'runs/val/exp/confusion_matrix.png'

# Display the confusion matrix image
display(Image(filename=confusion_matrix_path))
```



D

[ ] ↳ *3 cells hidden*