

✓ Setup

```
!nvidia-smi
```

```
Thu Feb 15 12:55:44 2024
+
| NVIDIA-SMI 535.104.05      Driver Version: 535.104.05    CUDA Version: 12.2
+-----+
| GPU  Name                  Persistence-M | Bus-Id     Disp.A  | Volatile Uncorr. ECC
| Fan  Temp     Perf          Pwr:Usage/Cap |          Memory-Usage | GPU-Util  Compute M.
|          |              |              |               |           | MIG M.
+-----+
| 0   Tesla T4                Off  | 00000000:00:04.0 Off |          0
| N/A   45C     P8            10W /  70W |      0MiB / 15360MiB |      0%   Default
|          |              |              |               |           |
+-----+
+
| Processes:
| GPU  GI  CI          PID  Type  Process name        GPU Memory
| ID   ID          ID   ID             Usage
+-----+
| No running processes found
+

```

```
import os
SC = os.getcwd()
print(SC)
```

```
/content
```

✓ Installing YOLOv8

```
!pip install ultralytics==8.0.196
```

```
from IPython import display
display.clear_output()
```

```
import ultralytics
ultralytics.checks()
```

```
Ultralytics YOLOv8.0.196 🚀 Python-3.10.12 torch-2.1.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
Setup complete ✅ (2 CPUs, 12.7 GB RAM, 26.3/78.2 GB disk)
```

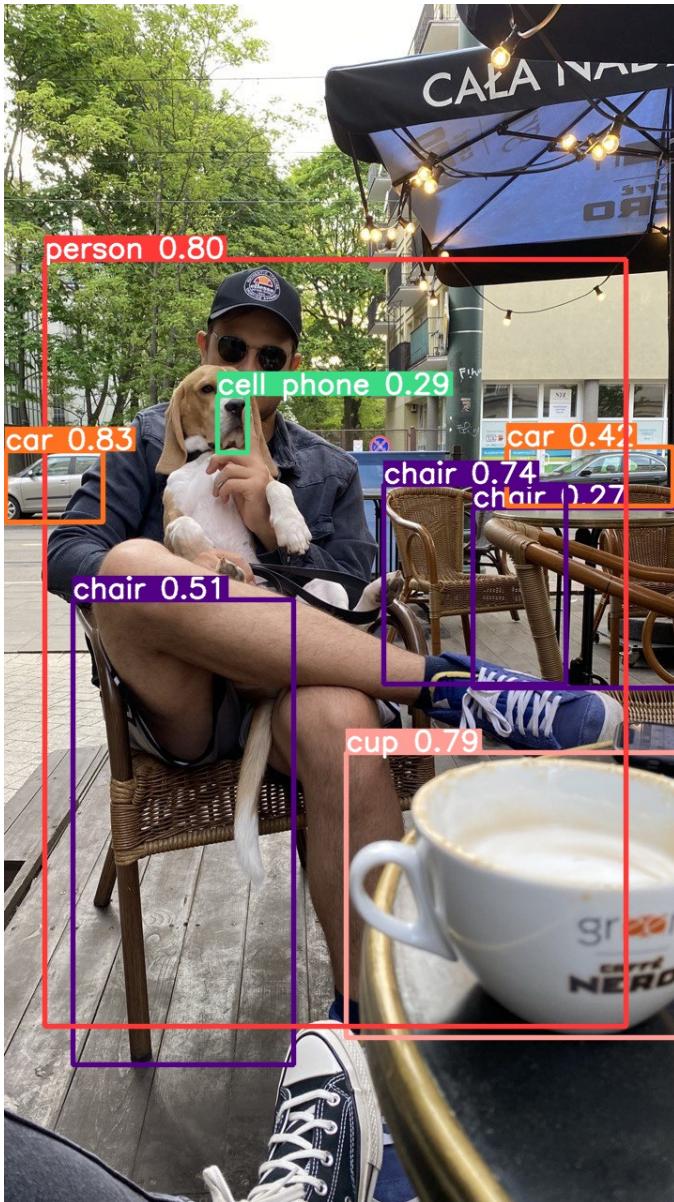
```
from ultralytics import YOLO  
  
from IPython.display import display, Image
```

✓ Checking the setup

```
%cd {SC}  
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='https://media.roboflow.co  
  
/content  
Downloading https://github.com/ultralytics/assets/releases/download/v0.0.0/yolov8n.pt t  
100% 6.23M/6.23M [00:00<00:00, 147MB/s]  
Ultralytics YOLOv8.0.196 🚀 Python-3.10.12 torch-2.1.0+cu121 CUDA:0 (Tesla T4, 15102MiB)  
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs  
  
Downloading https://media.roboflow.com/notebooks/examples/dog-3.jpeg to 'dog-3.jpeg'...  
100% 269k/269k [00:00<00:00, 125MB/s]  
WARNING ⚠️ NMS time limit 0.550s exceeded  
image 1/1 /content/dog-3.jpeg: 640x384 1 person, 2 cars, 1 cup, 3 chairs, 1 cell phone,  
Speed: 13.1ms preprocess, 106.6ms inference, 762.6ms postprocess per image at shape (1,  
Results saved to runs/detect/predict  
💡 Learn more at https://docs.ultralytics.com/modes/predict
```

```
%cd {SC}  
Image(filename='/content/runs/detect/predict/dog-3.jpeg', height=600)
```

```
/content
```



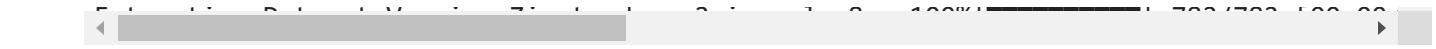
▼ Importing Dataset from Roboflow

```
!mkdir {SC}/datasets  
%cd {SC}/datasets  
  
!pip install roboflow  
  
from roboflow import Roboflow  
rf = Roboflow(api_key="r6085u5oVC5CYpNFcK77")  
project = rf.workspace("aishwary-phhjg").project("dams-doyhu")  
dataset = project.version(2).download("yolov8")
```

```
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (f
Requirement already satisfied: six in /usr/local/lib/python3.10/dist-packages (from r
Collecting supervision (from roboflow)
  Downloading supervision-0.18.0-py3-none-any.whl (86 kB)
  ━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 86.7/86.7 kB 12.9 MB/s eta 0:00:00
Requirement already satisfied: urllib3>=1.26.6 in /usr/local/lib/python3.10/dist-pack
Requirement already satisfied: tqdm>=4.41.0 in /usr/local/lib/python3.10/dist-package
Requirement already satisfied: PyYAML>=5.3.1 in /usr/local/lib/python3.10/dist-packag
Collecting requests-toolbelt (from roboflow)
  Downloading requests_toolbelt-1.0.0-py2.py3-none-any.whl (54 kB)
  ━━━━━━━━━━━━━━━━━━━━━━━━ 54.5/54.5 kB 8.6 MB/s eta 0:00:00
Collecting python-magic (from roboflow)
  Downloading python_magic-0.4.27-py2.py3-none-any.whl (13 kB)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-pac
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-pa
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-pac
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-pac
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/
Requirement already satisfied: defusedxml<0.8.0,>=0.7.1 in /usr/local/lib/python3.10/
Requirement already satisfied: scipy<2.0.0,>=1.10.0 in /usr/local/lib/python3.10/dist
Installing collected packages: python-magic, python-dotenv, opencv-python-headless, i
Attempting uninstall: opencv-python-headless
  Found existing installation: opencv-python-headless 4.9.0.80
  Uninstalling opencv-python-headless-4.9.0.80:
    Successfully uninstalled opencv-python-headless-4.9.0.80
Attempting uninstall: idna
  Found existing installation: idna 3.6
  Uninstalling idna-3.6:
    Successfully uninstalled idna-3.6
Attempting uninstall: cycler
  Found existing installation: cycler 0.12.1
  Uninstalling cycler-0.12.1:
    Successfully uninstalled cycler-0.12.1
Attempting uninstall: chardet
  Found existing installation: chardet 5.2.0
  Uninstalling chardet-5.2.0:
    Successfully uninstalled chardet-5.2.0
Attempting uninstall: certifi
  Found existing installation: certifi 2024.2.2
  Uninstalling certifi-2024.2.2:
    Successfully uninstalled certifi-2024.2.2
ERROR: pip's dependency resolver does not currently take into account all the package
lida 0.0.10 requires fastapi, which is not installed.
lida 0.0.10 requires kaleido, which is not installed.
lida 0.0.10 requires python-multipart, which is not installed.
lida 0.0.10 requires uvicorn, which is not installed.
Successfully installed certifi-2023.7.22 chardet-4.0.0 cycler-0.10.0 idna-2.10 opencv
WARNING: The following packages were previously imported in this runtime:
  [certifi,chardet,cv2,cycler,idna]
You must restart the runtime in order to use newly installed versions.
```

RESTART SESSION

```
loading Roboflow workspace...
loading Roboflow project...
Downloading Dataset Version Zip in dams-2 to yolov8:: 100%|██████████| 24549/24549 [0
```



▼ Model Training

```
%cd {SC}
```

```
!yolo task=detect mode=train model=yolov8l.pt data={dataset.location}/data.yaml epochs=100
```

85/100	15.1G	1.671 Class all	1.541 Images 86	1.768 Box(P 0.608	4 R 0.721	800: 100% 1 mAP50 0.698	mAP50- 0.
86/100	5.49G	Epoch GPU_mem Class all	box_loss 1.721 Images 86	cls_loss 1.568 Instances 86	dfl_loss 1.772 Box(P 0.648	Instances 3 R 0.512	Size 800: 100% 1 mAP50 0.626
87/100	4.52G	Epoch GPU_mem Class all	box_loss 1.754 Images 86	cls_loss 1.628 Instances 86	dfl_loss 1.849 Box(P 0.61	Instances 3 R 0.581	Size 800: 100% 1 mAP50 0.648
88/100	15.3G	Epoch GPU_mem Class all	box_loss 1.73 Images 86	cls_loss 1.487 Instances 86	dfl_loss 1.804 Box(P 0.676	Instances 4 R 0.512	Size 800: 100% 1 mAP50 0.606
89/100	4.74G	Epoch GPU_mem Class all	box_loss 1.64 Images 86	cls_loss 1.446 Instances 86	dfl_loss 1.748 Box(P 0.615	Instances 3 R 0.633	Size 800: 100% 1 mAP50 0.636
90/100	4.68G	Epoch GPU_mem Class all	box_loss 1.741 Images 86	cls_loss 1.553 Instances 86	dfl_loss 1.823 Box(P 0.683	Instances 2 R 0.616	Size 800: 100% 1 mAP50 0.663

Closing dataloader mosaic

albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7))

91/100	4.74G	Epoch GPU_mem Class all	box_loss 1.721 Images 86	cls_loss 1.504 Instances 86	dfl_loss 1.901 Box(P 0.678	Instances 2 R 0.616	Size 800: 100% 1 mAP50 0.678
92/100	15.3G	Epoch GPU_mem Class all	box_loss 1.628 Images 86	cls_loss 1.359 Instances 86	dfl_loss 1.843 Box(P 0.571	Instances 2 R 0.64	Size 800: 100% 1 mAP50 0.635
93/100	4.57G	Epoch GPU_mem	box_loss 1.601	cls_loss 1.316	dfl_loss 1.819	Instances 2	Size 800: 100% 1

Checking the results

```
!ls {SC}/runs/detect/train2/
```

args.yaml	R_curve.png	val_batch0_lab
confusion_matrix_normalized.png	results.csv	val_batch0_pre
confusion_matrix.png	results.png	val_batch1_lab
events.out.tfevents.1708002068.209f1bb61380.1797.0	train_batch0.jpg	val_batch1_pre
F1_curve.png	train_batch1260.jpg	val_batch2_lab

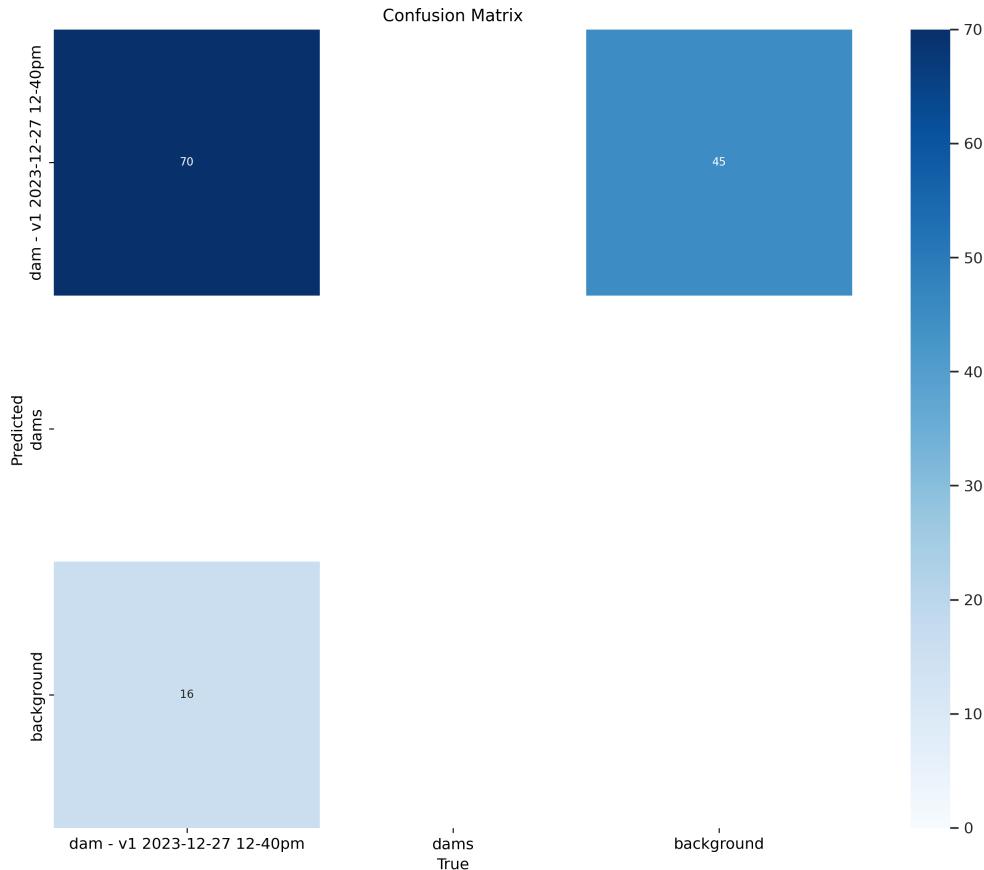
```
labels_correlogram.jpg  
labels.jpg  
P_curve.png  
PR_curve.png
```

```
train_batch1261.jpg val_batch2_pre  
train_batch1262.jpg weights  
train_batch1.jpg  
train_batch2.jpg
```

```
%cd {SC}
```

```
Image(filename=f'{SC}/runs/detect/train2/confusion_matrix.png', width=600)
```

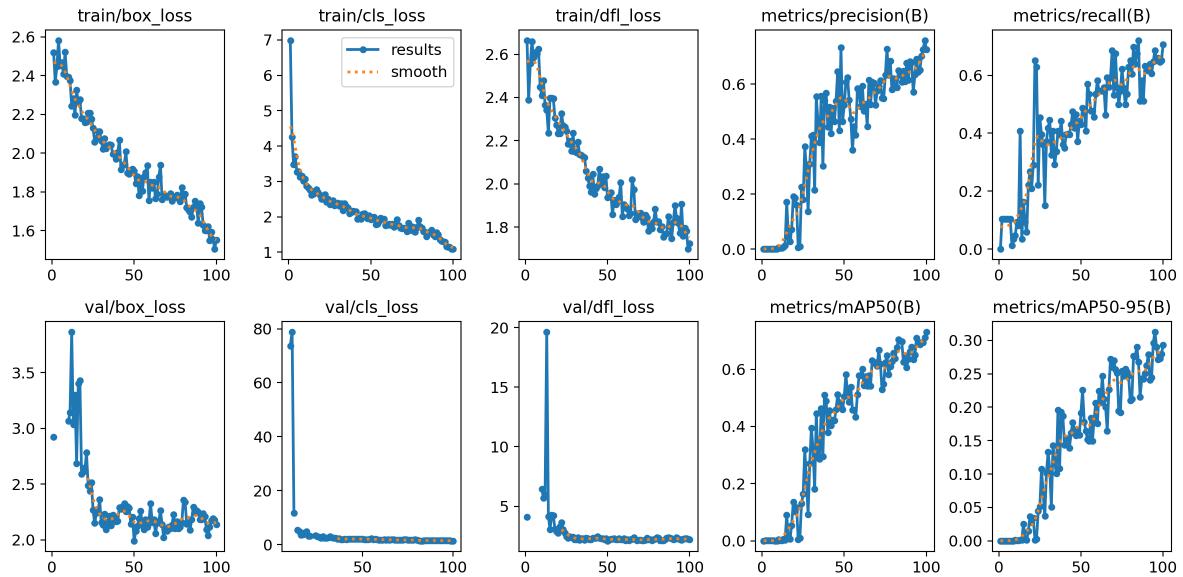
```
/content
```



```
%cd {SC}
```

```
Image(filename=f'{SC}/runs/detect/train2/results.png', width=600)
```

/content



```
%cd {SC}
```

```
Image(filename=f'{SC}/runs/detect/train2/val_batch0_pred.jpg', width=600)
```

/content



%cd {SC}

!yolo task=detect mode=val model={SC}/runs/detect/train2/weights/best.pt data={dataset.loca

/content

Ultralytics YOLOv8.0.196 🚀 Python-3.10.12 torch-2.1.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
Model summary (fused): 268 layers, 43608150 parameters, 0 gradients, 164.8 GFLOPs

val: Scanning /content/datasets/dams-2/valid/labels.cache... 86 images, 0 backgrounds,

Class	Images	Instances	Box(P)	R	mAP50	mAP50-95
all	86	86	0.646	0.679	0.695	0.31

dam - v1 2023-12-27 12-40pm 86 86 0.646 0.679 0.695

Speed: 4.7ms preprocess, 54.6ms inference, 0.0ms loss, 11.5ms postprocess per image
Results saved to runs/detect/val

💡 Learn more at <https://docs.ultralytics.com/modes/val>

```
%cd {SC}
!yolo task=detect mode=predict model={SC}/runs/detect/train2/weights/best.pt conf=0.25 sour
image 31/89 /content/datasets/dams-2/test/images/Lower-Sagileru-Project_png_jpg.rf.9c
image 32/89 /content/datasets/dams-2/test/images/Ludava.jpg.rf.6b71366d1a8c375494d232
image 33/89 /content/datasets/dams-2/test/images/MAHAN_png_jpg.rf.3250248af43d9afe00
image 34/89 /content/datasets/dams-2/test/images/MAHESWAR-HYDRO-ELECTRIC-PROJECT_png_
image 35/89 /content/datasets/dams-2/test/images/MAHESWAR-HYDROELECTRIC-PROJECT_png_j
image 36/89 /content/datasets/dams-2/test/images/MAHISANALLA-dam_png_jpg.rf.32c032bf7
image 37/89 /content/datasets/dams-2/test/images/MANDIRA_png_jpg.rf.2bec62f49b3fbef91
image 38/89 /content/datasets/dams-2/test/images/MANIKHEDA_png_jpg.rf.c9e703d7d010017
image 39/89 /content/datasets/dams-2/test/images/MANJORE-IRR-PROJECT-dam_png_jpg.rf.7
image 40/89 /content/datasets/dams-2/test/images/MINIMATA-BANGO_png_jpg.rf.af1d5f951f
image 41/89 /content/datasets/dams-2/test/images/MOGA_png_jpg.rf.67265e876e3f7f6ff90b
image 42/89 /content/datasets/dams-2/test/images/MOOzhiyar_png_jpg.rf.d5f480853d33f2e
image 43/89 /content/datasets/dams-2/test/images/MUDIAKHERI_png_jpg.rf.2a009d74751169
image 44/89 /content/datasets/dams-2/test/images/MURRUM-SILLI_png_jpg.rf.9c87e7af0ff0
image 45/89 /content/datasets/dams-2/test/images/MYNTDU-LESHKA-CONCRETE-DAM-STAGE-I-S
image 46/89 /content/datasets/dams-2/test/images/Machhu-1-Dam_png_jpg.rf.41c39045f8c7
image 47/89 /content/datasets/dams-2/test/images/Maddigedda-Reservoir_png_jpg.rf.92b3
image 48/89 /content/datasets/dams-2/test/images/Madduvalasa-Reservoir_png_jpg.rf.99e
image 49/89 /content/datasets/dams-2/test/images/Mahabaleshwarwadi_PNG_jpg.rf.7996ecb
```