

```

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

/content

!pip install ultralytics

Collecting ultralytics
  Downloading ultralytics-8.1.18-py3-none-any.whl (716 kB)
    716.0/716.0 kB 9.0 MB/s eta 0:00:00
Requirement already satisfied: matplotlib>=3.3.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (3.7.1)
Requirement already satisfied: opencv-python>=4.6.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.8.0.76)
Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (9.4.0)
Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (6.0.1)
Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.31.0)
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.11.4)
Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.1.0+cu121)
Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.16.0+cu121)
Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.66.2)
Requirement already satisfied: psutil in /usr/local/lib/python3.10/dist-packages (from ultralytics) (5.9.5)
Requirement already satisfied: py-cpuinfo in /usr/local/lib/python3.10/dist-packages (from ultralytics) (9.0.0)
Collecting thop>=0.1.1 (from ultralytics)
  Downloading thop-0.1.1.post2209072238-py3-none-any.whl (15 kB)
Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.5.3)
Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.13.1)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.2.0)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (4.49.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.4.5)
Requirement already satisfied: numpy>=1.20 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.25.2)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (23.2)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (3.1.1)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2023.4)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.6)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2024.2.2)
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.13.1)
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (4.9.0)
Requirement already satisfied: sympy in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (1.12)
Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.2.1)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.1.3)
Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2023.6.0)
Requirement already satisfied: triton==2.1.0 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2.1.0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib>=3.3.0->ultralytics) (1.1)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from jinja2->torch>=1.8.0->ultralytics) (2.1.5)
Requirement already satisfied: mpmath>=0.19 in /usr/local/lib/python3.10/dist-packages (from sympy->torch>=1.8.0->ultralytics) (1.3.0)
Installing collected packages: thop, ultralytics
Successfully installed thop-0.1.1.post2209072238 ultralytics-8.1.18

```

```

from IPython import display
display.clear_output()

```

```

import ultralytics
ultralytics.checks()

Ultralytics YOLOv8.1.18 🚀 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)

```

```

!mkdir {HOME}/datasets
%cd {HOME}/datasets

/content/datasets

```

```

!pip install roboflow --quiet

```

```

  70.2/70.2 kB 2.6 MB/s eta 0:00:00
  158.3/158.3 kB 7.6 MB/s eta 0:00:00
  178.7/178.7 kB 9.6 MB/s eta 0:00:00
  58.8/58.8 kB 7.3 MB/s eta 0:00:00
  49.1/49.1 kB 9.6 MB/s eta 0:00:00
  86.7/86.7 kB 9.5 MB/s eta 0:00:00
  54.5/54.5 kB 6.8 MB/s eta 0:00:00

```

```

from roboflow import Roboflow
rf = Roboflow(api_key="7mzMEU1itMQLPMRQAxNW")
project = rf.workspace("personfalldetection").project("person-fall")
dataset = project.version(3).download("yolov8")

```

```

loading Roboflow workspace...
loading Roboflow project...
Dependency ultralytics==8.0.196 is required but found version=8.1.18, to fix: `pip install ultralytics==8.0.196`
Downloading Dataset Version Zip in Person-Fall-3 to yolov8:: 100%|██████████| 800524/800524 [00:17<00:00, 44760.51it/s]

```

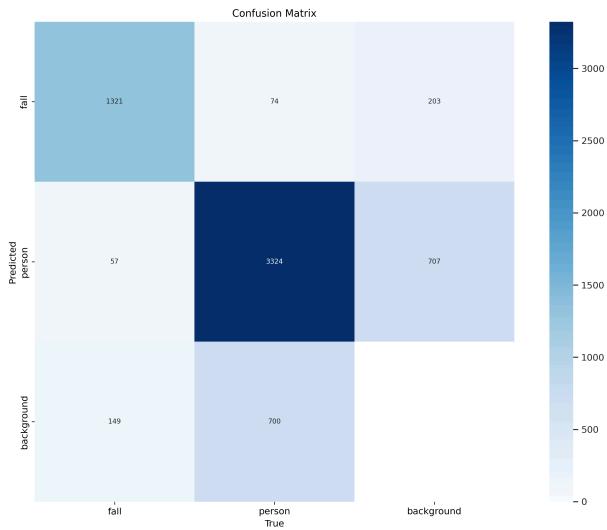
```
Extracting Dataset Version Zip to Person-Fall-3 in yolov8:: 100%|██████████| 17131/17131 [00:04<00:00, 4055.58it/s]
```

```
%cd {HOME}
```

```
!yolo task=detect mode=train model=yolov8s.pt data=/content/datasets/Person-Fall-3/data.yaml epochs=25 imgsz=800 plots=True
```

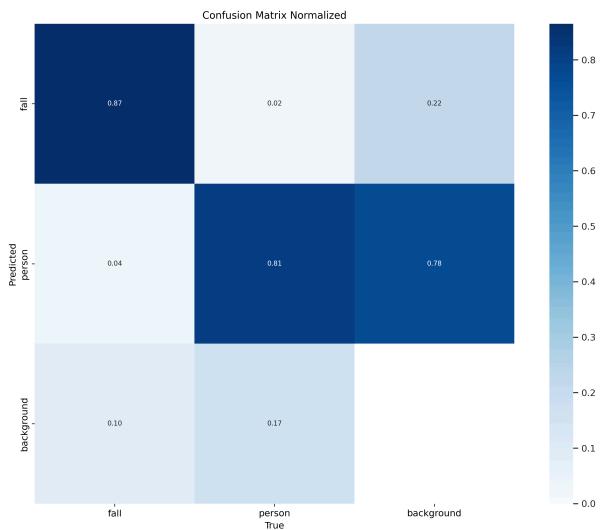
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
1/25	6.49G	1.524	1.513	1.498	37	800: 100% 439/439 [04:38<00:00, 1.58it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.79it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.587	0.562	0.54 0.25
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
2/25	6.85G	1.578	1.49	1.574	54	800: 100% 439/439 [04:28<00:00, 1.63it/s] mAP50 mAP50-95): 100% 48/48 [00:25<00:00, 1.87it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.58	0.471	0.503 0.23
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
3/25	6.87G	1.566	1.465	1.567	64	800: 100% 439/439 [04:32<00:00, 1.61it/s] mAP50 mAP50-95): 100% 48/48 [00:25<00:00, 1.86it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.658	0.592	0.629 0.315
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
4/25	6.85G	1.517	1.38	1.531	70	800: 100% 439/439 [04:32<00:00, 1.61it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.82it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.7	0.611	0.685 0.361
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
5/25	6.74G	1.472	1.309	1.5	83	800: 100% 439/439 [04:31<00:00, 1.62it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.83it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.741	0.656	0.731 0.389
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
6/25	6.63G	1.437	1.25	1.475	55	800: 100% 439/439 [04:28<00:00, 1.63it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.82it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.775	0.657	0.748 0.415
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
7/25	6.86G	1.403	1.191	1.447	73	800: 100% 439/439 [04:29<00:00, 1.63it/s] mAP50 mAP50-95): 100% 48/48 [00:25<00:00, 1.87it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.79	0.69	0.775 0.435
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
8/25	6.85G	1.376	1.131	1.423	49	800: 100% 439/439 [04:30<00:00, 1.62it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.84it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.751	0.671	0.758 0.422
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
9/25	6.79G	1.35	1.098	1.404	72	800: 100% 439/439 [04:30<00:00, 1.62it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.84it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.776	0.665	0.756 0.419
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
10/25	6.81G	1.345	1.075	1.399	59	800: 100% 439/439 [04:32<00:00, 1.61it/s] mAP50 mAP50-95): 100% 48/48 [00:26<00:00, 1.82it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.813	0.717	0.809 0.469
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
11/25	6.84G	1.305	1.044	1.381	55	800: 100% 439/439 [04:32<00:00, 1.61it/s] mAP50 mAP50-95): 100% 48/48 [00:25<00:00, 1.85it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.808	0.724	0.81 0.461
Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
12/25	6.85G	1.295	1.008	1.367	37	800: 100% 439/439 [04:31<00:00, 1.62it/s] mAP50 mAP50-95): 100% 48/48 [00:25<00:00, 1.84it/s]
	Class	Images	Instances	Box(P R		
	all	1511	5625	0.809	0.717	0.809 0.469

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

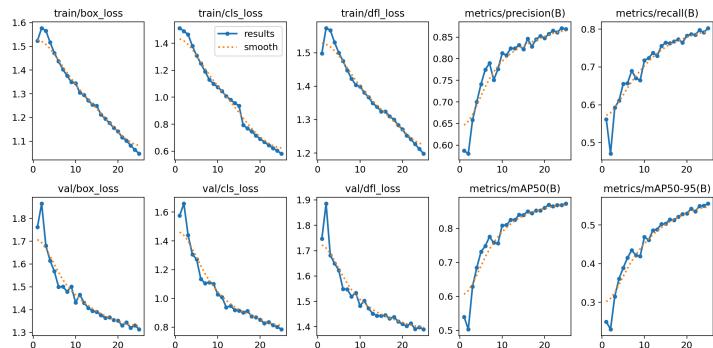


```
from IPython.display import display, Image
```

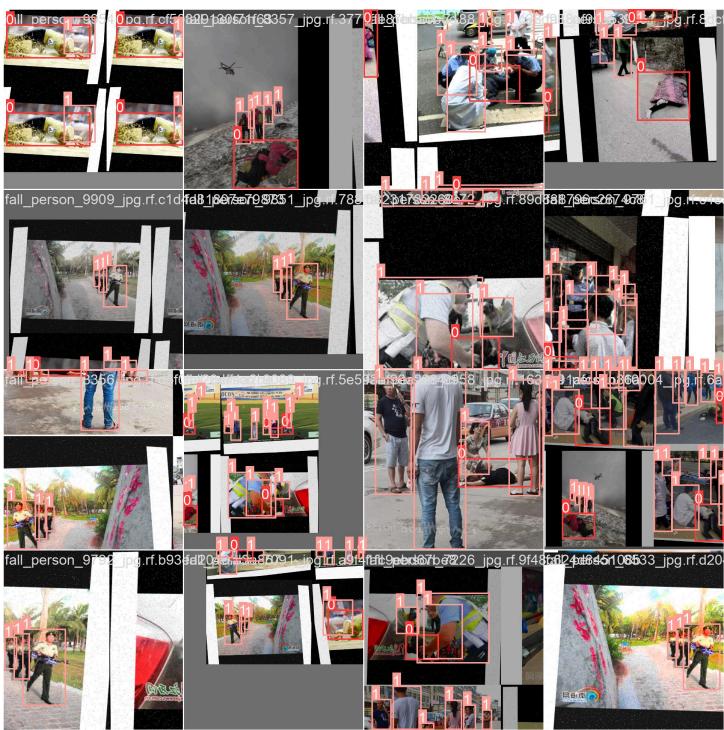
```
Image(filename=f'/content/runs/detect/train2/confusion_matrix_normalized.png', width=600)
```



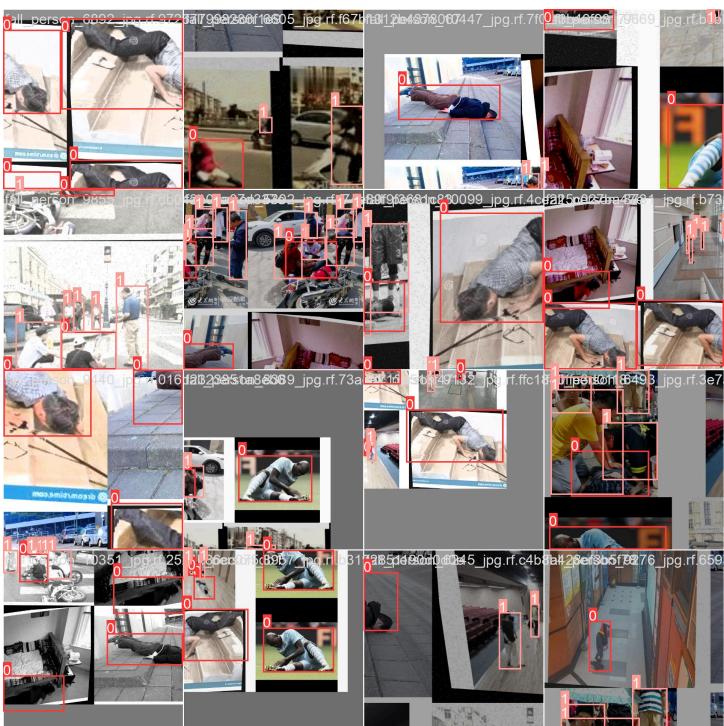
```
Image(filename=f'/content/runs/detect/train2/results.png', width=600)
```



```
Image(filename=f'/content/runs/detect/train2/train_batch0.jpg', width=600)
```



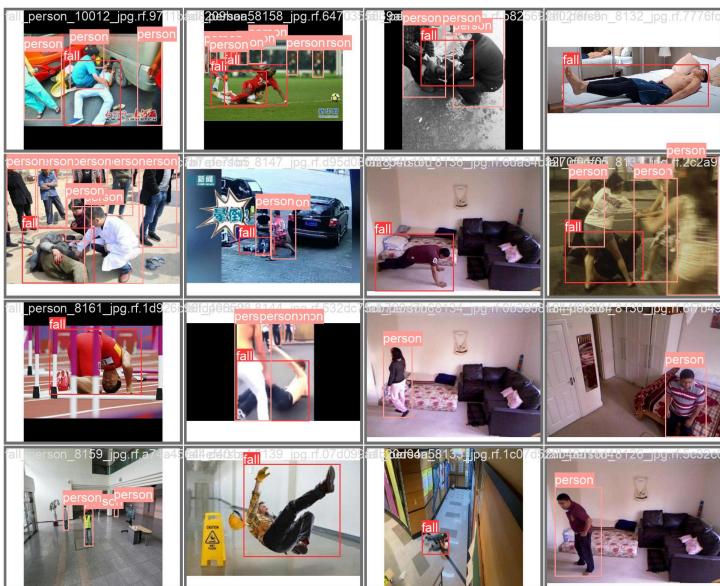
Image(filename=f'/content/runs/detect/train2/train_batch1.jpg', width=600)



Image(filename=f'/content/runs/detect/train2/val_batch0_pred.jpg', width=600)



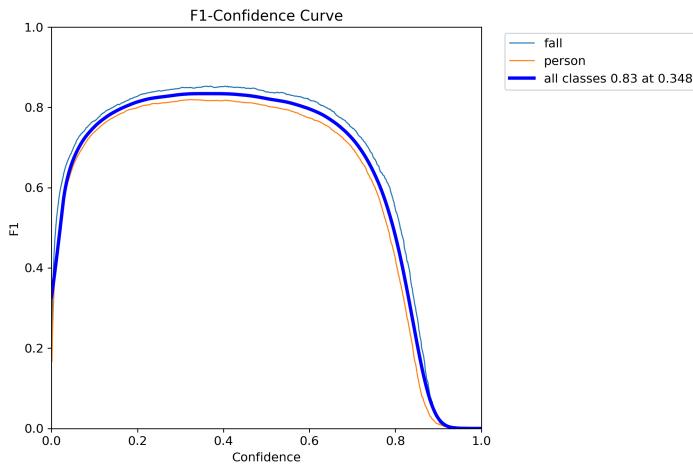
```
!Image(filename=f'/content/runs/detect/train2/val_batch0_labels.jpg', width=600)
```



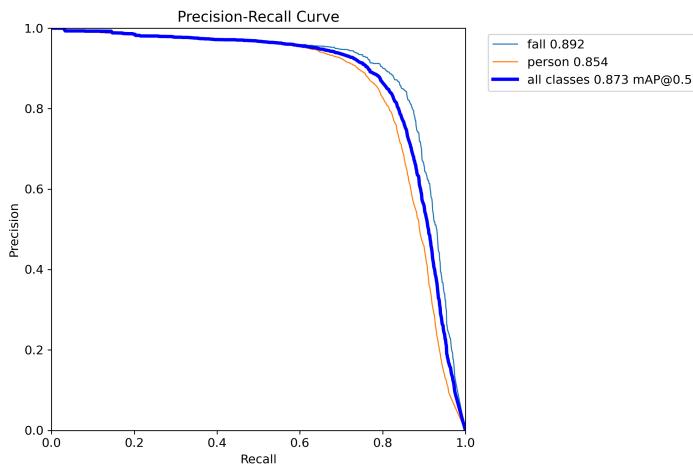
```
!yolo task = detect mode=val model=/content/runs/detect/train2/weights/best.pt data=/content/datasets/Person-Fall-3/data.yaml
```

```
Ultralytics YOLOv8.1.18 🚀 Python-3.10.12 torch-2.1.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
Model summary (fused): 168 layers, 11126358 parameters, 0 gradients, 28.4 GFLOPs
val: Scanning /content/datasets/Person-Fall-3/valid/labels.cache...
      Class   Images  Instances    Box(P      R      mAP50      mAP50-95): 100% 95/95 [00:34<00:00, 2.78it/s]
          all     1511      5625    0.869    0.804    0.873    0.556
          fall     1511      1527    0.869    0.836    0.892    0.593
          person    1511      4098    0.869    0.771    0.854    0.518
Speed: 1.1ms preprocess, 10.5ms inference, 0.0ms loss, 2.5ms postprocess per image
Results saved to runs/detect/val
💡 Learn more at https://docs.ultralytics.com/modes/val
```

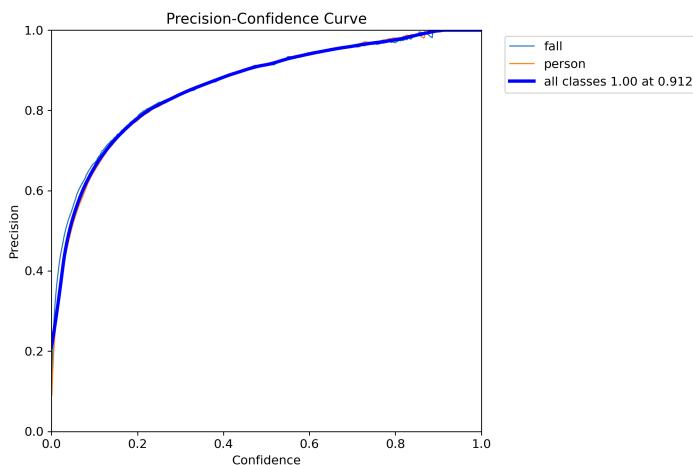
```
!Image(filename=f'/content/runs/detect/train2/F1_curve.png', width=600)
```



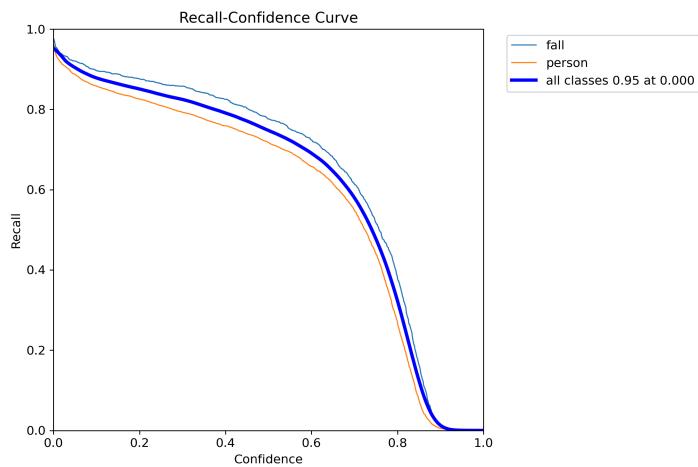
```
Image(filename=f'/content/runs/detect/train2/PR_curve.png', width=600)
```



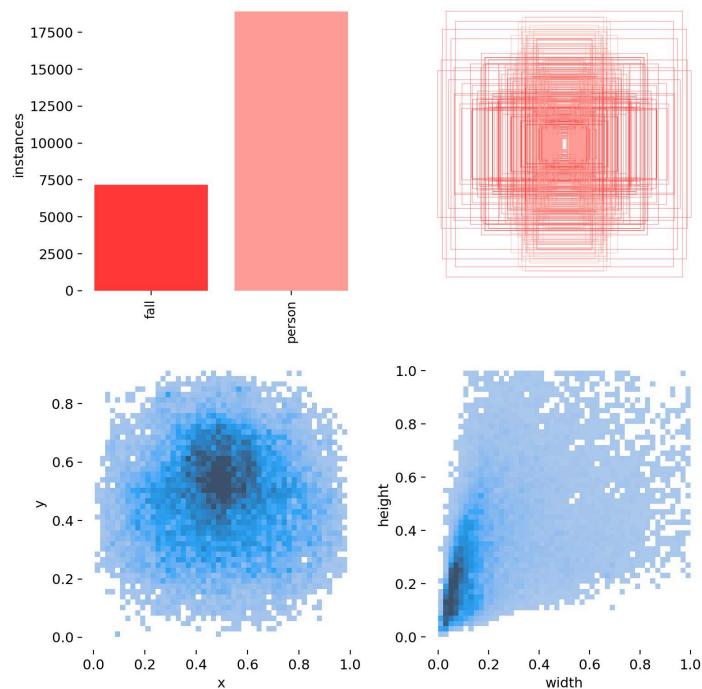
```
Image(filename=f'/content/runs/detect/train2/P_curve.png', width=600)
```



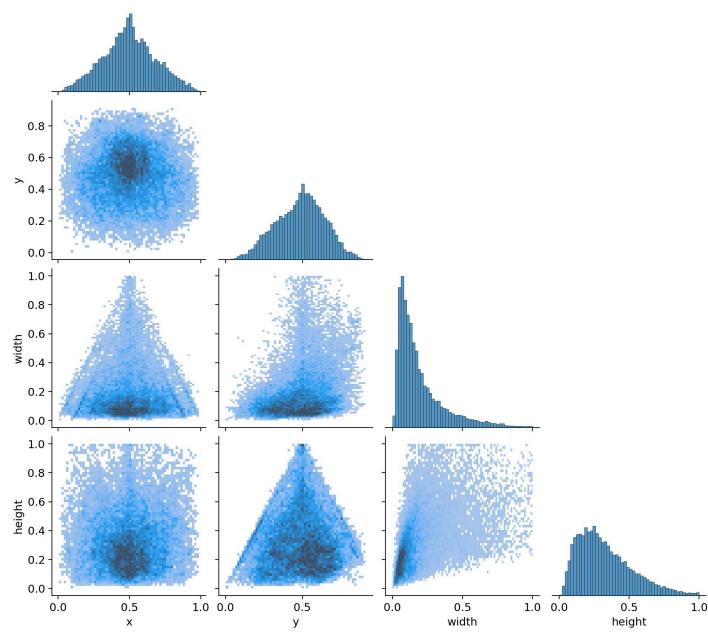
```
Image(filename=f'/content/runs/detect/train2/R_curve.png', width=600)
```



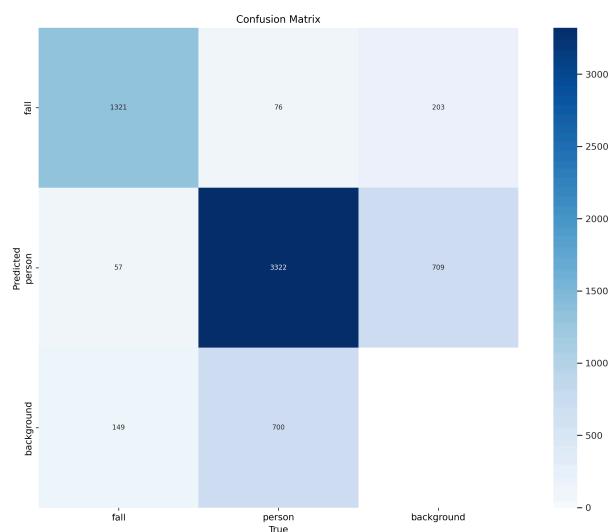
```
Image(filename=f'/content/runs/detect/train2/labels.jpg', width=600)
```



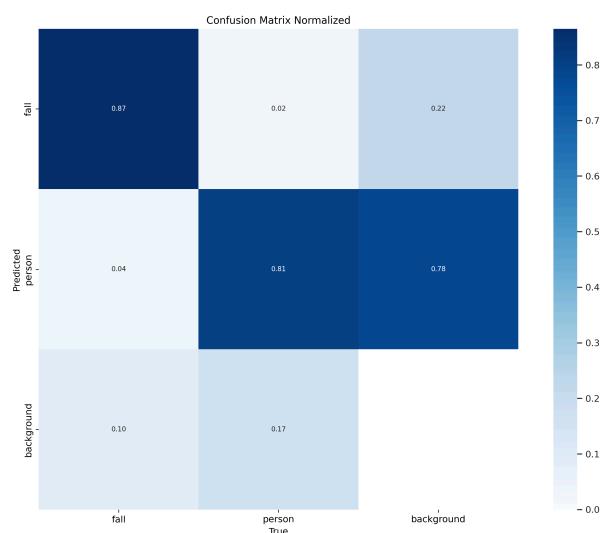
```
Image(filename=f'/content/runs/detect/train2/labels_correlogram.jpg', width=600)
```



```
Image(filename=f'/content/runs/detect/val/confusion_matrix.png', width=600)
```



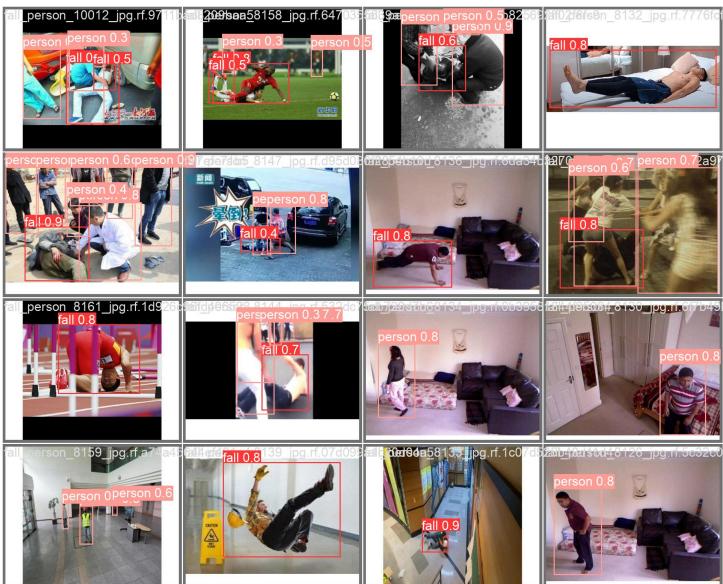
```
Image(filename=f'/content/runs/detect/val/confusion_matrix_normalized.png', width=600)
```



Image(filename=f'/content/runs/detect/val/val_batch0_labels.jpg', width=600)



Image(filename=f'/content/runs/detect/val/val_batch0_pred.jpg', width=600)



Image(filename=f'/content/runs/detect/val/F1_curve.png', width=600)

