

object-detection-experiment-yolov9

November 21, 2024

```
[ ]: import os
HOME = os.getcwd()
print(HOME)
```

/content

```
[ ]: !git clone https://github.com/SkalskiP/yolov9.git
%cd yolov9
!pip install -r requirements.txt
```

Cloning into 'yolov9'...

remote: Enumerating objects: 325, done.

remote: Total 325 (delta 0), reused 0 (delta 0), pack-reused 325 (from 1)

Receiving objects: 100% (325/325), 2.25 MiB | 5.17 MiB/s, done.

Resolving deltas: 100% (162/162), done.

/content/yolov9

Collecting gitpython (from -r requirements.txt (line 5))

Downloading GitPython-3.1.43-py3-none-any.whl.metadata (13 kB)

Requirement already satisfied: ipython in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 6)) (7.34.0)

Requirement already satisfied: matplotlib>=3.2.2 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 7)) (3.7.1)

Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 8)) (1.26.4)

Requirement already satisfied: opencv-python>=4.1.1 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 9)) (4.10.0.84)

Requirement already satisfied: Pillow>=7.1.2 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 10)) (10.4.0)

Requirement already satisfied: psutil in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 11)) (5.9.5)

Requirement already satisfied: PyYAML>=5.3.1 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 12)) (6.0.2)

Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 13)) (2.32.3)

Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.10/dist-

packages (from -r requirements.txt (line 14)) (1.13.1)
 Collecting thop>=0.1.1 (from -r requirements.txt (line 15))
 Downloading thop-0.1.1.post2209072238-py3-none-any.whl.metadata (2.7 kB)
 Requirement already satisfied: torch>=1.7.0 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 16)) (2.4.1+cu121)
 Requirement already satisfied: torchvision>=0.8.1 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 17)) (0.19.1+cu121)
 Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 18)) (4.66.5)
 Requirement already satisfied: tensorboard>=2.4.1 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 22)) (2.17.0)
 Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 27)) (2.2.2)
 Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 28)) (0.13.1)
 Requirement already satisfied: albumentations>=1.0.3 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 46)) (1.4.15)
 Requirement already satisfied: pycocotools>=2.0 in /usr/local/lib/python3.10/dist-packages (from -r requirements.txt (line 47)) (2.0.8)
 Collecting gitdb<5,>=4.0.1 (from gitpython->-r requirements.txt (line 5))
 Downloading gitdb-4.0.11-py3-none-any.whl.metadata (1.2 kB)
 Requirement already satisfied: setuptools>=18.5 in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (71.0.4)
 Collecting jedi>=0.16 (from ipython->-r requirements.txt (line 6))
 Using cached jedi-0.19.1-py2.py3-none-any.whl.metadata (22 kB)
 Requirement already satisfied: decorator in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (4.4.2)
 Requirement already satisfied: pickleshare in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (0.7.5)
 Requirement already satisfied: traitlets>=4.2 in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (5.7.1)
 Requirement already satisfied: prompt-toolkit!=3.0.0,!<3.0.1,<3.1.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (3.0.48)
 Requirement already satisfied: pygments in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (2.18.0)
 Requirement already satisfied: backcall in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (0.2.0)
 Requirement already satisfied: matplotlib-inline in /usr/local/lib/python3.10/dist-packages (from ipython->-r requirements.txt (line 6)) (0.1.7)
 Requirement already satisfied: pexpect>4.3 in /usr/local/lib/python3.10/dist-

packages (from ipython->-r requirements.txt (line 6)) (4.9.0)
 Requirement already satisfied: contourpy>=1.0.1 in
 /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.2.2->-r
 requirements.txt (line 7)) (1.3.0)
 Requirement already satisfied: cyclor>=0.10 in /usr/local/lib/python3.10/dist-
 packages (from matplotlib>=3.2.2->-r requirements.txt (line 7)) (0.12.1)
 Requirement already satisfied: fonttools>=4.22.0 in
 /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.2.2->-r
 requirements.txt (line 7)) (4.54.1)
 Requirement already satisfied: kiwisolver>=1.0.1 in
 /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.2.2->-r
 requirements.txt (line 7)) (1.4.7)
 Requirement already satisfied: packaging>=20.0 in
 /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.2.2->-r
 requirements.txt (line 7)) (24.1)
 Requirement already satisfied: pyparsing>=2.3.1 in
 /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.2.2->-r
 requirements.txt (line 7)) (3.1.4)
 Requirement already satisfied: python-dateutil>=2.7 in
 /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.2.2->-r
 requirements.txt (line 7)) (2.8.2)
 Requirement already satisfied: charset-normalizer<4,>=2 in
 /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->-r
 requirements.txt (line 13)) (3.3.2)
 Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-
 packages (from requests>=2.23.0->-r requirements.txt (line 13)) (3.10)
 Requirement already satisfied: urllib3<3,>=1.21.1 in
 /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->-r
 requirements.txt (line 13)) (2.2.3)
 Requirement already satisfied: certifi>=2017.4.17 in
 /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->-r
 requirements.txt (line 13)) (2024.8.30)
 Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-
 packages (from torch>=1.7.0->-r requirements.txt (line 16)) (3.16.1)
 Requirement already satisfied: typing-extensions>=4.8.0 in
 /usr/local/lib/python3.10/dist-packages (from torch>=1.7.0->-r requirements.txt
 (line 16)) (4.12.2)
 Requirement already satisfied: sympy in /usr/local/lib/python3.10/dist-packages
 (from torch>=1.7.0->-r requirements.txt (line 16)) (1.13.3)
 Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-
 packages (from torch>=1.7.0->-r requirements.txt (line 16)) (3.3)
 Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages
 (from torch>=1.7.0->-r requirements.txt (line 16)) (3.1.4)
 Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages
 (from torch>=1.7.0->-r requirements.txt (line 16)) (2024.6.1)
 Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.10/dist-
 packages (from tensorboard>=2.4.1->-r requirements.txt (line 22)) (1.4.0)
 Requirement already satisfied: grpcio>=1.48.2 in /usr/local/lib/python3.10/dist-

packages (from tensorboard>=2.4.1->-r requirements.txt (line 22)) (1.64.1)
 Requirement already satisfied: markdown>=2.6.8 in
 /usr/local/lib/python3.10/dist-packages (from tensorboard>=2.4.1->-r
 requirements.txt (line 22)) (3.7)
 Requirement already satisfied: protobuf!=4.24.0,<5.0.0,>=3.19.6 in
 /usr/local/lib/python3.10/dist-packages (from tensorboard>=2.4.1->-r
 requirements.txt (line 22)) (3.20.3)
 Requirement already satisfied: six>1.9 in /usr/local/lib/python3.10/dist-
 packages (from tensorboard>=2.4.1->-r requirements.txt (line 22)) (1.16.0)
 Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in
 /usr/local/lib/python3.10/dist-packages (from tensorboard>=2.4.1->-r
 requirements.txt (line 22)) (0.7.2)
 Requirement already satisfied: werkzeug>=1.0.1 in
 /usr/local/lib/python3.10/dist-packages (from tensorboard>=2.4.1->-r
 requirements.txt (line 22)) (3.0.4)
 Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-
 packages (from pandas>=1.1.4->-r requirements.txt (line 27)) (2024.2)
 Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-
 packages (from pandas>=1.1.4->-r requirements.txt (line 27)) (2024.2)
 Requirement already satisfied: scikit-image>=0.21.0 in
 /usr/local/lib/python3.10/dist-packages (from alumentations>=1.0.3->-r
 requirements.txt (line 46)) (0.24.0)
 Requirement already satisfied: pydantic>=2.7.0 in
 /usr/local/lib/python3.10/dist-packages (from alumentations>=1.0.3->-r
 requirements.txt (line 46)) (2.9.2)
 Requirement already satisfied: albucore>=0.0.15 in
 /usr/local/lib/python3.10/dist-packages (from alumentations>=1.0.3->-r
 requirements.txt (line 46)) (0.0.16)
 Requirement already satisfied: eval-type-backport in
 /usr/local/lib/python3.10/dist-packages (from alumentations>=1.0.3->-r
 requirements.txt (line 46)) (0.2.0)
 Requirement already satisfied: opencv-python-headless>=4.9.0.80 in
 /usr/local/lib/python3.10/dist-packages (from alumentations>=1.0.3->-r
 requirements.txt (line 46)) (4.10.0.84)
 Collecting smmap<6,>=3.0.1 (from gitdb<5,>=4.0.1->gitpython->-r requirements.txt
 (line 5))
 Downloading smmap-5.0.1-py3-none-any.whl.metadata (4.3 kB)
 Requirement already satisfied: parso<0.9.0,>=0.8.3 in
 /usr/local/lib/python3.10/dist-packages (from jedi>=0.16->ipython->-r
 requirements.txt (line 6)) (0.8.4)
 Requirement already satisfied: ptyprocess>=0.5 in
 /usr/local/lib/python3.10/dist-packages (from pexpect>4.3->ipython->-r
 requirements.txt (line 6)) (0.7.0)
 Requirement already satisfied: wcwidth in /usr/local/lib/python3.10/dist-
 packages (from prompt-toolkit!=3.0.0,!3.0.1,<3.1.0,>=2.0.0->ipython->-r
 requirements.txt (line 6)) (0.2.13)
 Requirement already satisfied: annotated-types>=0.6.0 in
 /usr/local/lib/python3.10/dist-packages (from

```

pydantic>=2.7.0->albumentations>=1.0.3->-r requirements.txt (line 46)) (0.7.0)
Requirement already satisfied: pydantic-core==2.23.4 in
/usr/local/lib/python3.10/dist-packages (from
pydantic>=2.7.0->albumentations>=1.0.3->-r requirements.txt (line 46)) (2.23.4)
Requirement already satisfied: imageio>=2.33 in /usr/local/lib/python3.10/dist-
packages (from scikit-image>=0.21.0->albumentations>=1.0.3->-r requirements.txt
(line 46)) (2.35.1)
Requirement already satisfied: tifffile>=2022.8.12 in
/usr/local/lib/python3.10/dist-packages (from scikit-
image>=0.21.0->albumentations>=1.0.3->-r requirements.txt (line 46)) (2024.9.20)
Requirement already satisfied: lazy-loader>=0.4 in
/usr/local/lib/python3.10/dist-packages (from scikit-
image>=0.21.0->albumentations>=1.0.3->-r requirements.txt (line 46)) (0.4)
Requirement already satisfied: MarkupSafe>=2.1.1 in
/usr/local/lib/python3.10/dist-packages (from
werkzeug>=1.0.1->tensorboard>=2.4.1->-r requirements.txt (line 22)) (2.1.5)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in
/usr/local/lib/python3.10/dist-packages (from sympy->torch>=1.7.0->-r
requirements.txt (line 16)) (1.3.0)
Downloading GitPython-3.1.43-py3-none-any.whl (207 kB)
207.3/207.3 kB
7.5 MB/s eta 0:00:00
Downloading thop-0.1.1.post2209072238-py3-none-any.whl (15 kB)
Downloading gitdb-4.0.11-py3-none-any.whl (62 kB)
62.7/62.7 kB
4.9 MB/s eta 0:00:00
Using cached jedi-0.19.1-py2.py3-none-any.whl (1.6 MB)
Downloading smmap-5.0.1-py3-none-any.whl (24 kB)
Installing collected packages: smmap, jedi, gitdb, thop, gitpython
Successfully installed gitdb-4.0.11 gitpython-3.1.43 jedi-0.19.1 smmap-5.0.1
thop-0.1.1.post2209072238

```

```
[ ]: !pip install roboflow
```

```

Collecting roboflow
  Downloading roboflow-1.1.47-py3-none-any.whl.metadata (9.7 kB)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-
packages (from roboflow) (2024.8.30)
Collecting idna==3.7 (from roboflow)
  Downloading idna-3.7-py3-none-any.whl.metadata (9.9 kB)
Requirement already satisfied: cycler in /usr/local/lib/python3.10/dist-packages
(from roboflow) (0.12.1)
Requirement already satisfied: kiwisolver>=1.3.1 in
/usr/local/lib/python3.10/dist-packages (from roboflow) (1.4.7)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-
packages (from roboflow) (3.7.1)
Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.10/dist-
packages (from roboflow) (1.26.4)

```

```

Requirement already satisfied: opencv-python-headless==4.10.0.84 in
/usr/local/lib/python3.10/dist-packages (from roboflow) (4.10.0.84)
Requirement already satisfied: Pillow>=7.1.2 in /usr/local/lib/python3.10/dist-
packages (from roboflow) (10.4.0)
Requirement already satisfied: python-dateutil in
/usr/local/lib/python3.10/dist-packages (from roboflow) (2.8.2)
Collecting python-dotenv (from roboflow)
  Downloading python_dotenv-1.0.1-py3-none-any.whl.metadata (23 kB)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-
packages (from roboflow) (2.32.3)
Requirement already satisfied: six in /usr/local/lib/python3.10/dist-packages
(from roboflow) (1.16.0)
Requirement already satisfied: urllib3>=1.26.6 in
/usr/local/lib/python3.10/dist-packages (from roboflow) (2.2.3)
Requirement already satisfied: tqdm>=4.41.0 in /usr/local/lib/python3.10/dist-
packages (from roboflow) (4.66.5)
Requirement already satisfied: PyYAML>=5.3.1 in /usr/local/lib/python3.10/dist-
packages (from roboflow) (6.0.2)
Collecting requests-toolbelt (from roboflow)
  Downloading requests_toolbelt-1.0.0-py2.py3-none-any.whl.metadata (14 kB)
Collecting filetype (from roboflow)
  Downloading filetype-1.2.0-py2.py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: contourpy>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->roboflow) (1.3.0)
Requirement already satisfied: fonttools>=4.22.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->roboflow) (4.54.1)
Requirement already satisfied: packaging>=20.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->roboflow) (24.1)
Requirement already satisfied: pyparsing>=2.3.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->roboflow) (3.1.4)
Requirement already satisfied: charset-normalizer<4,>=2 in
/usr/local/lib/python3.10/dist-packages (from requests->roboflow) (3.3.2)
Downloading roboflow-1.1.47-py3-none-any.whl (80 kB)
      80.4/80.4 kB
7.5 MB/s eta 0:00:00
Downloading idna-3.7-py3-none-any.whl (66 kB)
      66.8/66.8 kB
6.6 MB/s eta 0:00:00
Downloading filetype-1.2.0-py2.py3-none-any.whl (19 kB)
Downloading python_dotenv-1.0.1-py3-none-any.whl (19 kB)
Downloading requests_toolbelt-1.0.0-py2.py3-none-any.whl (54 kB)
      54.5/54.5 kB
5.7 MB/s eta 0:00:00
Installing collected packages: filetype, python-dotenv, idna, requests-
toolbelt, roboflow
  Attempting uninstall: idna
    Found existing installation: idna 3.10
    Uninstalling idna-3.10:

```

Successfully uninstalled idna-3.10
Successfully installed filetype-1.2.0 idna-3.7 python-dotenv-1.0.1 requests-toolbelt-1.0.0 roboflow-1.1.47

```
[ ]: !wget -P {HOME}/weights -q https://github.com/WongKinYiu/yolov9/releases/
      ↪download/v0.1/yolov9-c.pt
!wget -P {HOME}/weights -q https://github.com/WongKinYiu/yolov9/releases/
      ↪download/v0.1/yolov9-e.pt
!wget -P {HOME}/weights -q https://github.com/WongKinYiu/yolov9/releases/
      ↪download/v0.1/gelan-c.pt
!wget -P {HOME}/weights -q https://github.com/WongKinYiu/yolov9/releases/
      ↪download/v0.1/gelan-e.pt
```

```
[ ]: !ls -la {HOME}/weights
```

```
total 402444
drwxr-xr-x 2 root root      4096 Oct 10 07:26 .
drwxr-xr-x 1 root root      4096 Oct 10 07:26 ..
-rw-r--r-- 1 root root 51508261 Feb 18  2024 gelan-c.pt
-rw-r--r-- 1 root root 117203713 Feb 18  2024 gelan-e.pt
-rw-r--r-- 1 root root 103153312 Feb 18  2024 yolov9-c.pt
-rw-r--r-- 1 root root 140217688 Feb 18  2024 yolov9-e.pt
```

```
[ ]: !wget -P {HOME}/data -q https://media.roboflow.com/notebooks/examples/dog.jpeg
```

```
[ ]: SOURCE_IMAGE_PATH = f'{HOME}/data/dog.jpeg'
```

```
[ ]: !python detect.py --weights {HOME}/weights/yolov9-c.pt --conf 0.1 --source_
      ↪{HOME}/data/dog.jpeg
```

```
detect: weights=['/content/weights/yolov9-c.pt'],
source=/content/data/dog.jpeg, data=data/coco128.yaml, imgsz=[640, 640],
conf_thres=0.1, iou_thres=0.45, max_det=1000, device=, view_img=False,
save_txt=False, save_conf=False, save_crop=False, nosave=False, classes=None,
agnostic_nms=False, augment=False, visualize=False, update=False,
project=runs/detect, name=exp, exist_ok=False, line_thickness=3,
hide_labels=False, hide_conf=False, half=False, dnn=False, vid_stride=1
YOL0v5 1e33dbb Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
```

/content/yolov9/models/experimental.py:75: FutureWarning: You are using
`torch.load` with `weights_only=False` (the current default value), which uses
the default pickle module implicitly. It is possible to construct malicious
pickle data which will execute arbitrary code during unpickling (See
<https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models> for
more details). In a future release, the default value for `weights_only` will be
flipped to `True`. This limits the functions that could be executed during
unpickling. Arbitrary objects will no longer be allowed to be loaded via this
mode unless they are explicitly allowlisted by the user via

`torch.serialization.add_safe_globals`. We recommend you start setting
`weights_only=True` for any use case where you don't have full control of the
loaded file. Please open an issue on GitHub for any issues related to this
experimental feature.

```
ckpt = torch.load(attempt_download(w), map_location='cpu') # load
```

Fusing layers...

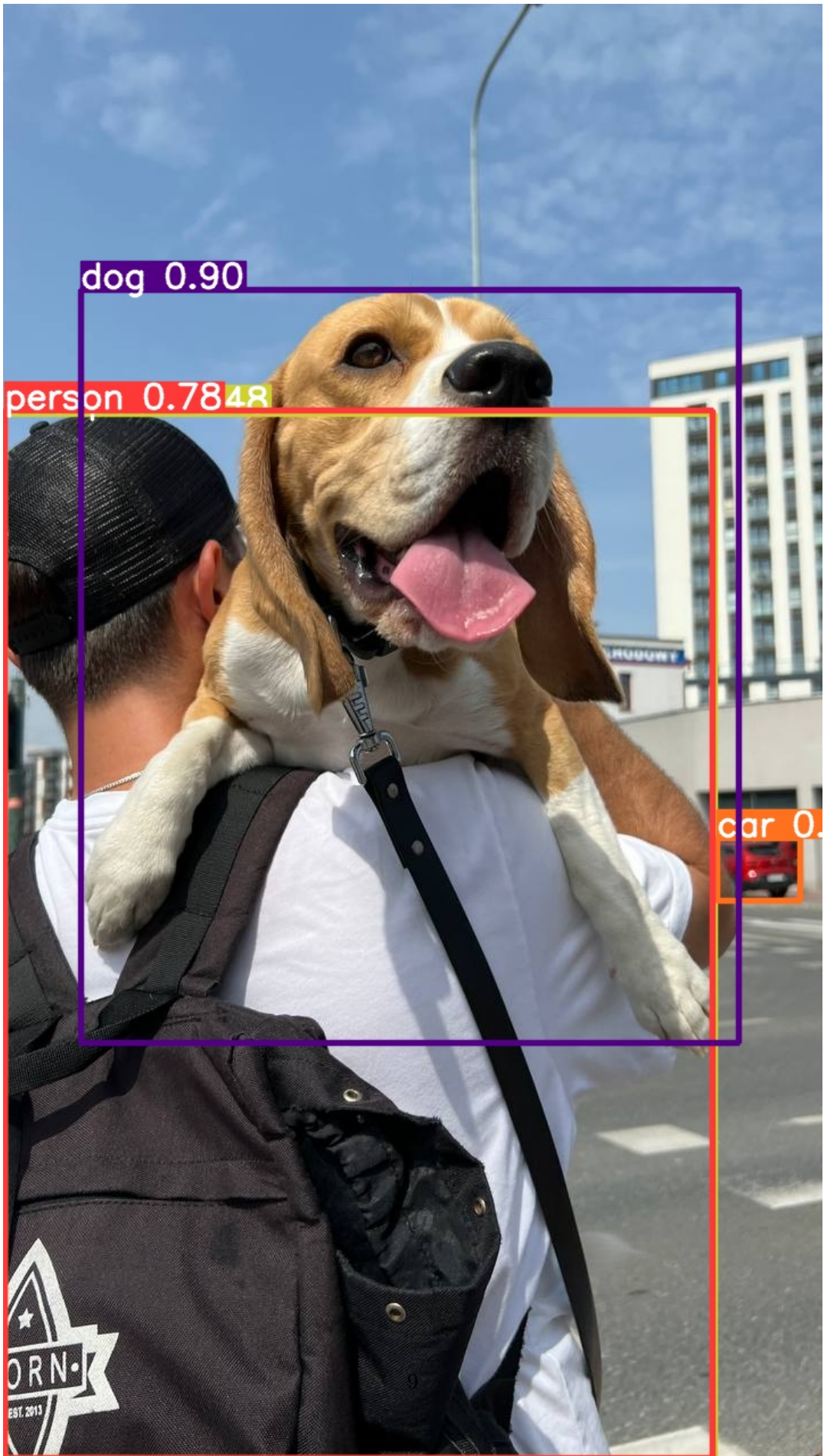
Model summary: 724 layers, 51141120 parameters, 0 gradients, 238.7 GFLOPs

image 1/1 /content/data/dog.jpeg: 640x384 1 person, 1 car, 1 dog, 1 backpack,
129.0ms

Speed: 0.6ms pre-process, 129.0ms inference, 1094.2ms NMS per image at shape (1,
3, 640, 640)

Results saved to runs/detect/exp

```
[ ]: from IPython.display import Image, display  
display(Image(filename=f'runs/detect/exp/dog.jpeg',width=600))
```

dog 0.90

person 0.7848

car 0.1



Fine Tunning on Football player dataset from roboflow

```
[ ]: %cd {HOME}/yolov9
```

/content/yolov9

```
[ ]: import roboflow
rf = roboflow.Roboflow(api_key="01lGvsAht987tLanCUbP")
project = rf.workspace("roboflow-jvuqo").
    ↳project("football-players-detection-3zvbc")
version = project.version(8)
dataset = version.download("yolov9")
```

loading Roboflow workspace...

loading Roboflow project...

Downloading Dataset Version Zip in football-players-detection-8 to yolov9::
100%| | 57648/57648 [00:02<00:00, 20826.26it/s]

Extracting Dataset Version Zip to football-players-detection-8 in yolov9::
100%| | 522/522 [00:00<00:00, 2266.04it/s]

```
[ ]: %cd {HOME}/yolov9
```

```
!python train.py \
--batch 16 --epoch 5 --img 600 --device 0 --min-items 0 --close-mosaic 15 \
--data {dataset.location}/data.yaml \
--weights {HOME}/weights/gelan-c.pt \
--cfg models/detect/gelan-c.yaml \
--hyp hyp.scratch-high.yaml \
--name football-detection
```

/content/yolov9

2024-10-10 07:32:53.561492: E

external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:485] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

2024-10-10 07:32:53.595405: E

external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:8454] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

2024-10-10 07:32:53.605515: E

external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1452] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when

one has already been registered

2024-10-10 07:32:53.632381: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

2024-10-10 07:32:55.496686: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT

train: weights=/content/weights/gelan-c.pt,
 cfg=models/detect/gelan-c.yaml, data=/content/yolov9/football-players-detection-8/data.yaml, hyp=hyp.scratch-high.yaml, epochs=5, batch_size=16, imgsz=600, rect=False, resume=False, nosave=False, noval=False, noautoanchor=False, noplots=False, evolve=None, bucket=, cache=None, image_weights=False, device=0, multi_scale=False, single_cls=False, optimizer=SGD, sync_bn=False, workers=8, project=runs/train, name=football-detection, exist_ok=False, quad=False, cos_lr=False, flat_cos_lr=False, fixed_lr=False, label_smoothing=0.0, patience=100, freeze=[0], save_period=-1, seed=0, local_rank=-1, min_items=0, close_mosaic=15, entity=None, upload_dataset=False, bbox_interval=-1, artifact_alias=latest

YOLOv5 1e33dbb Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4, 15102MiB)

hyperparameters: 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, cls_pw=1.0, dfl=1.5, obj_pw=1.0, iou_t=0.2, anchor_t=5.0, fl_gamma=0.0, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.9, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, mosaic=1.0, mixup=0.15, copy_paste=0.3

ClearML: run 'pip install clearml' to automatically track, visualize and remotely train YOLO in ClearML

Comet: run 'pip install comet_ml' to automatically track and visualize YOLO runs in Comet

TensorBoard: Start with 'tensorboard --logdir runs/train', view at <http://localhost:6006/>

/content/yolov9/train.py:108: FutureWarning: You are using `torch.load` with `weights_only=False` (the current default value), which uses the default pickle module implicitly. It is possible to construct malicious pickle data which will execute arbitrary code during unpickling (See <https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models> for more details). In a future release, the default value for `weights_only` will be flipped to `True`. This limits the functions that could be executed during unpickling. Arbitrary objects will no longer be allowed to be loaded via this mode unless they are explicitly allowlisted by the user via `torch.serialization.add_safe_globals`. We recommend you start setting `weights_only=True` for any use case where you don't have full control of the loaded file. Please open an issue on GitHub for any issues related to this experimental feature.

ckpt = torch.load(weights, map_location='cpu') # load checkpoint to CPU to

avoid CUDA memory leak

Overriding model.yaml nc=80 with nc=4

	from	n	params	module	
arguments					
0	-1	1	1856	models.common.Conv	[3,
64, 3, 2]					
1	-1	1	73984	models.common.Conv	[64,
128, 3, 2]					
2	-1	1	212864	models.common.RepNCSPELAN4	
[128, 256, 128, 64, 1]					
3	-1	1	164352	models.common.ADown	
[256, 256]					
4	-1	1	847616	models.common.RepNCSPELAN4	
[256, 512, 256, 128, 1]					
5	-1	1	656384	models.common.ADown	
[512, 512]					
6	-1	1	2857472	models.common.RepNCSPELAN4	
[512, 512, 512, 256, 1]					
7	-1	1	656384	models.common.ADown	
[512, 512]					
8	-1	1	2857472	models.common.RepNCSPELAN4	
[512, 512, 512, 256, 1]					
9	-1	1	656896	models.common.SPELAN	
[512, 512, 256]					
10	-1	1	0	torch.nn.modules.upsampling.Upsample	
[None, 2, 'nearest']					
11	[-1, 6]	1	0	models.common.Concat	[1]
12	-1	1	3119616	models.common.RepNCSPELAN4	
[1024, 512, 512, 256, 1]					
13	-1	1	0	torch.nn.modules.upsampling.Upsample	
[None, 2, 'nearest']					
14	[-1, 4]	1	0	models.common.Concat	[1]
15	-1	1	912640	models.common.RepNCSPELAN4	
[1024, 256, 256, 128, 1]					
16	-1	1	164352	models.common.ADown	
[256, 256]					
17	[-1, 12]	1	0	models.common.Concat	[1]
18	-1	1	2988544	models.common.RepNCSPELAN4	
[768, 512, 512, 256, 1]					
19	-1	1	656384	models.common.ADown	
[512, 512]					
20	[-1, 9]	1	0	models.common.Concat	[1]
21	-1	1	3119616	models.common.RepNCSPELAN4	
[1024, 512, 512, 256, 1]					
22	[15, 18, 21]	1	5493724	models.yolo.DDetect	[4,
[256, 512, 512]]					

gelan-c summary: 621 layers, 25440156 parameters, 25440140 gradients, 103.2

GFLOPs

```
Transferred 931/937 items from /content/weights/gelan-c.pt
AMP: checks passed
WARNING --img-size 600 must be multiple of max stride 32, updating to 608
optimizer: SGD(lr=0.01) with parameter groups 154
weight(decay=0.0), 161 weight(decay=0.0005), 160 bias
augmentations: 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, 4.0),
tile_grid_size=(8, 8))
train: Scanning /content/yolov9/football-players-
detection-8/train/labels.cache... 204 images, 0 backgrounds, 0 corrupt: 100%
204/204 [00:00<?, ?it/s]
val: Scanning /content/yolov9/football-players-
detection-8/valid/labels.cache... 38 images, 0 backgrounds, 0 corrupt: 100%
38/38 [00:00<?, ?it/s]
Plotting labels to runs/train/football-detection2/labels.jpg...
/content/yolov9/train.py:244: FutureWarning:
`torch.cuda.amp.GradScaler(args...)` is deprecated. Please use
`torch.amp.GradScaler('cuda', args...)` instead.
    scaler = torch.cuda.amp.GradScaler(enabled=amp)
Image sizes 608 train, 608 val
Using 2 dataloader workers
Logging results to runs/train/football-detection2
Starting training for 5 epochs...

    Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances      Size
  0% 0/13 [00:00<?, ?it/s]/content/yolov9/train.py:302: FutureWarning:
`torch.cuda.amp.autocast(args...)` is deprecated. Please use
`torch.amp.autocast('cuda', args...)` instead.
    with torch.cuda.amp.autocast(amp):
        0/4      10.7G      1.486          5      0.9089      667      608:
  0% 0/13 [00:07<?, ?it/s]Exception in thread Thread-5 (plot_images):
Traceback (most recent call last):
  File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
    self.run()
  File "/usr/lib/python3.10/threading.py", line 953, in run
    self._target(*self._args, **self._kwargs)
  File "/content/yolov9/utils/plots.py", line 300, in plot_images
    annotator.box_label(box, label, color=color)
  File "/content/yolov9/utils/plots.py", line 86, in box_label
    w, h = self.font.getsize(label) # text width, height
AttributeError: 'FreeTypeFont' object has no attribute 'getsize'
WARNING TensorBoard graph visualization failure Sizes of tensors must match
except in dimension 1. Expected size 36 but got size 37 for tensor number 1 in
the list.

    0/4      10.7G      1.486          5      0.9089      667      608:
```

```

8% 1/13 [00:10<02:00, 10.06s/it]/content/yolov9/train.py:302: FutureWarning:
`torch.cuda.amp.autocast(args...)` is deprecated. Please use
`torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/4      12.1G      1.556      5.026      0.9297      813      608:
15% 2/13 [00:10<00:51, 4.66s/it]Exception in thread Thread-6 (plot_images):
Traceback (most recent call last):
  File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
    self.run()
  File "/usr/lib/python3.10/threading.py", line 953, in run
    self._target(*self._args, **self._kwargs)
  File "/content/yolov9/utils/plots.py", line 300, in plot_images
    annotator.box_label(box, label, color=color)
  File "/content/yolov9/utils/plots.py", line 86, in box_label
    w, h = self.font.getsize(label) # text width, height
AttributeError: 'FreeTypeFont' object has no attribute 'getsize'
    0/4      12.1G      1.571      5.018      0.9375      641      608:
23% 3/13 [00:11<00:29, 2.91s/it]Exception in thread Thread-7 (plot_images):
Traceback (most recent call last):
  File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
    self.run()
  File "/usr/lib/python3.10/threading.py", line 953, in run
    self._target(*self._args, **self._kwargs)
  File "/content/yolov9/utils/plots.py", line 300, in plot_images
    annotator.box_label(box, label, color=color)
  File "/content/yolov9/utils/plots.py", line 86, in box_label
    w, h = self.font.getsize(label) # text width, height
AttributeError: 'FreeTypeFont' object has no attribute 'getsize'
    0/4      12.1G      1.44      4.069      0.9018      282      608:
100% 13/13 [00:20<00:00, 1.56s/it]
      Class      Images  Instances      P      R      mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.16it/s]
      all      38      905      0.942      0.221      0.209
0.141

      Epoch      GPU_mem      box_loss      cls_loss      dfl_loss  Instances      Size
      1/4      12.1G      1.263      1.26      0.8448      404      608:
100% 13/13 [00:16<00:00, 1.25s/it]
      Class      Images  Instances      P      R      mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.14it/s]
      all      38      905      0.954      0.219      0.238
0.123

      Epoch      GPU_mem      box_loss      cls_loss      dfl_loss  Instances      Size
      2/4      12.2G      1.309      1.066      0.8362      654      608:
100% 13/13 [00:18<00:00, 1.43s/it]
      Class      Images  Instances      P      R      mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.96it/s]

```

	all	38	905	0.535	0.281	0.271
--	-----	----	-----	-------	-------	-------

0.179

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
3/4	15G	1.235	0.9198	0.8288	410	608:

100% 13/13 [00:17<00:00, 1.35s/it]

Class	Images	Instances	P	R	mAP50
all	38	905	0.607	0.318	0.319

0.203

Epoch	GPU_mem	box_loss	cls_loss	df1_loss	Instances	Size
4/4	11.9G	1.187	0.8883	0.8235	518	608:

100% 13/13 [00:18<00:00, 1.40s/it]

Class	Images	Instances	P	R	mAP50
all	38	905	0.759	0.352	0.362

0.258

5 epochs completed in 0.031 hours.

/content/yolov9/utils/general.py:999: FutureWarning: You are using `torch.load` with `weights_only=False` (the current default value), which uses the default pickle module implicitly. It is possible to construct malicious pickle data which will execute arbitrary code during unpickling (See <https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models> for more details). In a future release, the default value for `weights_only` will be flipped to `True`. This limits the functions that could be executed during unpickling. Arbitrary objects will no longer be allowed to be loaded via this mode unless they are explicitly allowlisted by the user via `torch.serialization.add_safe_globals`. We recommend you start setting `weights_only=True` for any use case where you don't have full control of the loaded file. Please open an issue on GitHub for any issues related to this experimental feature.

```
x = torch.load(f, map_location=torch.device('cpu'))
```

Optimizer stripped from runs/train/football-detection2/weights/last.pt, saved as runs/train/football-detection2/weights/last_stripped.pt, 51.4MB

Optimizer stripped from runs/train/football-detection2/weights/best.pt, saved as runs/train/football-detection2/weights/best_stripped.pt, 51.4MB

Validating runs/train/football-detection2/weights/best.pt...

/content/yolov9/models/experimental.py:75: FutureWarning: You are using `torch.load` with `weights_only=False` (the current default value), which uses the default pickle module implicitly. It is possible to construct malicious pickle data which will execute arbitrary code during unpickling (See <https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models> for more details). In a future release, the default value for `weights_only` will be flipped to `True`. This limits the functions that could be executed during unpickling. Arbitrary objects will no longer be allowed to be loaded via this

mode unless they are explicitly allowlisted by the user via
`torch.serialization.add_safe_globals`. We recommend you start setting
`weights_only=True` for any use case where you don't have full control of the
loaded file. Please open an issue on GitHub for any issues related to this
experimental feature.

```
ckpt = torch.load(attempt_download(w), map_location='cpu') # load
```

Fusing layers...

gelan-c summary: 467 layers, 25414044 parameters, 0 gradients, 102.5 GFLOPs

	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:01<00:00,	1.46it/s]		

	all	38	905	0.76	0.352	0.362
--	-----	----	-----	------	-------	-------

0.257

	ball	38	35	1	0	0
--	------	----	----	---	---	---

0

	goalkeeper	38	27	0.913	0.0741	0.255
--	------------	----	----	-------	--------	-------

0.175

	player	38	754	0.793	0.939	0.926
--	--------	----	-----	-------	-------	-------

0.663

	referee	38	89	0.334	0.393	0.269
--	---------	----	----	-------	-------	-------

0.191

Exception in thread Thread-15 (plot_images):

Traceback (most recent call last):

```
File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
    self.run()
```

```
File "/usr/lib/python3.10/threading.py", line 953, in run
    self._target(*self._args, **self._kwargs)
```

```
File "/content/yolov9/utils/plots.py", line 300, in plot_images
    annotator.box_label(box, label, color=color)
```

```
File "/content/yolov9/utils/plots.py", line 86, in box_label
    w, h = self.font.getsize(label) # text width, height
```

AttributeError: 'FreeTypeFont' object has no attribute 'getsize'

Exception in thread Thread-14 (plot_images):

Traceback (most recent call last):

```
File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
```

Exception in thread Thread-12 (plot_images):

```
self.run()
```

Traceback (most recent call last):

```
File "/usr/lib/python3.10/threading.py", line 953, in run
```

```
File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
    self._target(*self._args, **self._kwargs)
```

```
File "/content/yolov9/utils/plots.py", line 300, in plot_images
    self.run()
```

```
File "/usr/lib/python3.10/threading.py", line 953, in run
    annotator.box_label(box, label, color=color)
```

```
File "/content/yolov9/utils/plots.py", line 86, in box_label
```

Exception in thread Thread-13 (plot_images):

Traceback (most recent call last):

```
File "/usr/lib/python3.10/threading.py", line 1016, in _bootstrap_inner
```



```

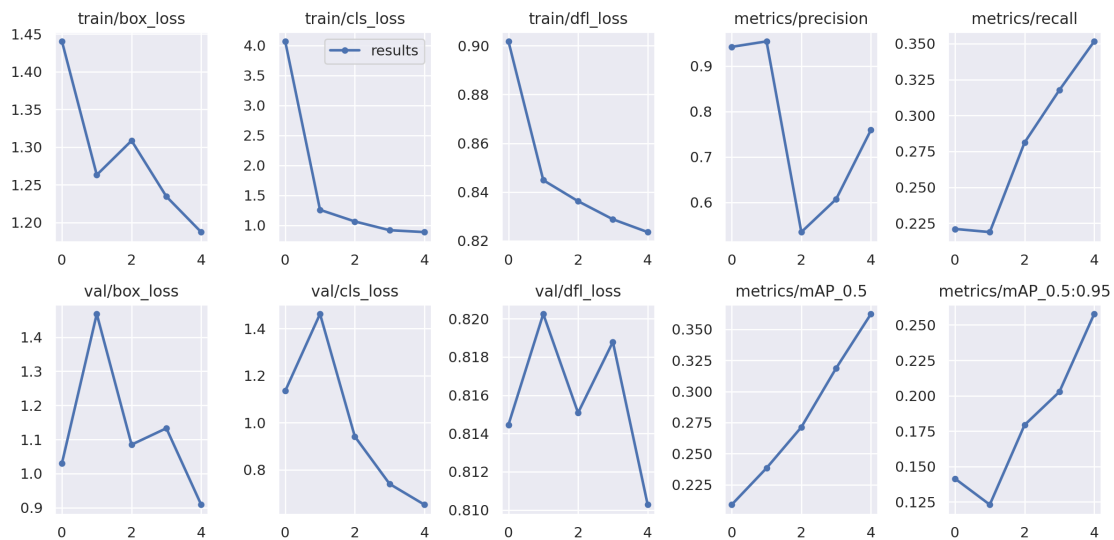
self._target(*self._args, **self._kwargs)
File "/content/yolov9/utils/plots.py", line 300, in plot_images
    self.run()
File "/usr/lib/python3.10/threading.py", line 953, in run
    annotator.box_label(box, label, color=color)
File "/content/yolov9/utils/plots.py", line 86, in box_label
    w, h = self.font.getsize(label) # text width, height
AttributeError: 'FreeTypeFont' object has no attribute 'getsize'
self._target(*self._args, **self._kwargs)
File "/content/yolov9/utils/plots.py", line 300, in plot_images
    w, h = self.font.getsize(label) # text width, height
AttributeError: 'FreeTypeFont' object has no attribute 'getsize'
annotator.box_label(box, label, color=color)
File "/content/yolov9/utils/plots.py", line 86, in box_label
    w, h = self.font.getsize(label) # text width, height
AttributeError: 'FreeTypeFont' object has no attribute 'getsize'
Results saved to runs/train/football-detection2

```

```

[ ]: from IPython.display import Image, display
display(Image(filename=f'{HOME}/yolov9/runs/train/football-detection2/results.
↪png'))

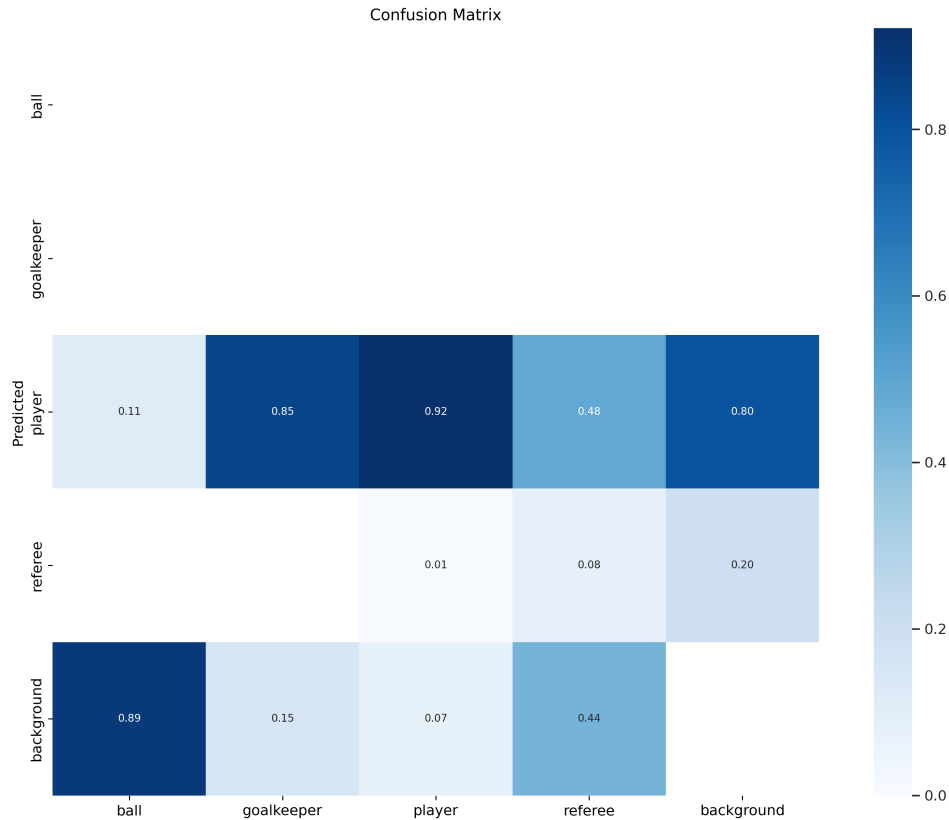
```



```

[ ]: from IPython.display import Image, display
display(Image(filename='/content/yolov9/runs/train/football-detection2/
↪confusion_matrix.png'))

```



```
[ ]: !python detect.py --weights /content/yolov9/runs/train/football-detection2/weights/best.pt --conf 0.1 --device 0 --source {dataset.location}/test/images
```

```
detect: weights=['/content/yolov9/runs/train/football-detection2/weights/best.pt'], source=/content/yolov9/football-players-detection-8/test/images, data=data/coco128.yaml, imgsz=[640, 640], conf_thres=0.1, iou_thres=0.45, max_det=1000, device=0, view_img=False, save_txt=False, save_conf=False, save_crop=False, nosave=False, classes=None, agnostic_nms=False, augment=False, visualize=False, update=False, project=runs/detect, name=exp, exist_ok=False, line_thickness=3, hide_labels=False, hide_conf=False, half=False, dnn=False, vid_stride=1
YOLOv5 1e33dbb Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
```

/content/yolov9/models/experimental.py:75: FutureWarning: You are using `torch.load` with `weights_only=False` (the current default value), which uses the default pickle module implicitly. It is possible to construct malicious pickle data which will execute arbitrary code during unpickling (See <https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models> for more details). In a future release, the default value for `weights_only` will be flipped to `True`. This limits the functions that could be executed during unpickling. Arbitrary objects will no longer be allowed to be loaded via this

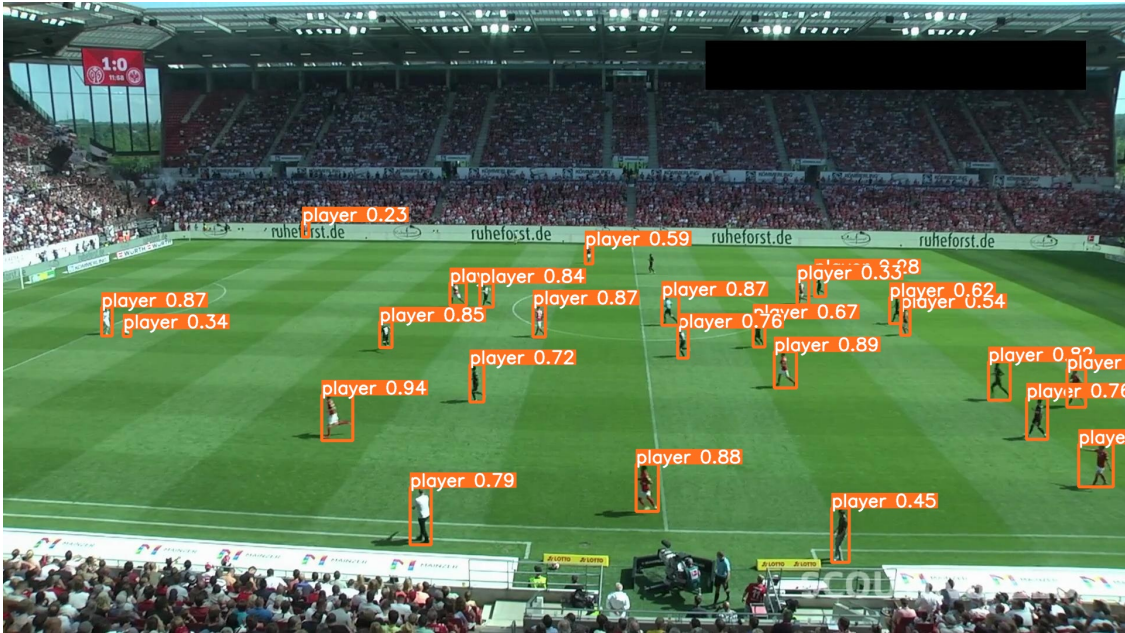
mode unless they are explicitly allowlisted by the user via
`torch.serialization.add_safe_globals`. We recommend you start setting
`weights_only=True` for any use case where you don't have full control of the
loaded file. Please open an issue on GitHub for any issues related to this
experimental feature.

```
ckpt = torch.load(attempt_download(w), map_location='cpu') # load
Fusing layers...
gelan-c summary: 467 layers, 25414044 parameters, 0 gradients, 102.5 GFLOPs
image 1/13 /content/yolov9/football-players-
detection-8/test/images/40cd38_7_6_png.rf.68ef7fcd663cdf0f5b96bacdbcd94e07.jpg:
384x640 25 players, 60.8ms
image 2/13 /content/yolov9/football-players-
detection-8/test/images/42ba34_1_5_png.rf.4337fde8f8be3640cf4351fb41ac9c3ca.jpg:
384x640 24 players, 2 referees, 32.9ms
image 3/13 /content/yolov9/football-players-
detection-8/test/images/42ba34_5_5_png.rf.ceb556bd4c92d41496ae1d8c56600c4a.jpg:
384x640 23 players, 32.8ms
image 4/13 /content/yolov9/football-players-
detection-8/test/images/4b770a_1_4_png.rf.5a45b3b841a06de414ceb802e34c136f.jpg:
384x640 25 players, 1 referee, 32.8ms
image 5/13 /content/yolov9/football-players-
detection-8/test/images/4b770a_3_6_png.rf.d0d9403f2f73ca0da7a6a1373c02b749.jpg:
384x640 25 players, 27.2ms
image 6/13 /content/yolov9/football-players-
detection-8/test/images/573e61_1_9_png.rf.e82af77d907cdc12ccbd6857f53b9b1.jpg:
384x640 23 players, 26.9ms
image 7/13 /content/yolov9/football-players-
detection-8/test/images/573e61_9_6_png.rf.fc52856b5974cb67862c25bae96f25ad.jpg:
384x640 28 players, 3 referees, 27.2ms
image 8/13 /content/yolov9/football-players-
detection-8/test/images/744b27_1_10_png.rf.e6f27d3b66a0c6720b9e9e50265251a6.jpg:
384x640 23 players, 1 referee, 26.8ms
image 9/13 /content/yolov9/football-players-
detection-8/test/images/744b27_7_4_png.rf.3431eaf3ff56847b5076376771bdf954.jpg:
384x640 22 players, 26.8ms
image 10/13 /content/yolov9/football-players-
detection-8/test/images/744b27_9_9_png.rf.b229c5eff4425a17d2f7e4b34cf7edd1.jpg:
384x640 20 players, 26.8ms
image 11/13 /content/yolov9/football-players-
detection-8/test/images/798b45_3_3_png.rf.f3a1db99742364b75a965df8ed33ba8f.jpg:
384x640 27 players, 26.0ms
image 12/13 /content/yolov9/football-players-
detection-8/test/images/a9f16c_2_10_png.rf.cf607320fc980b28b6e14b14fed46e91.jpg:
384x640 24 players, 1 referee, 25.9ms
image 13/13 /content/yolov9/football-players-
detection-8/test/images/a9f16c_2_9_png.rf.ee1080f3ec9bad6ba2b8ae4799f90b59.jpg:
384x640 24 players, 1 referee, 25.8ms
Speed: 0.4ms pre-process, 30.7ms inference, 52.6ms NMS per image at shape (1, 3,
```

640, 640)

Results saved to runs/detect/exp2

```
[ ]: from IPython.display import Image, display
display(Image(filename='/content/yolov9/runs/detect/exp2/40cd38_7_6_png.rf.
↪68ef7fcd663cdf0f5b96bacdbcd94e07.jpg'))
```



```
[ ]: !python detect.py --weights /content/yolov9/runs/train/football-detection2/
↪weights/last.pt --conf 0.1 --device 0 --source {dataset.location}/test/images
```

```
detect: weights=['/content/yolov9/runs/train/football-
detection2/weights/last.pt'], source=/content/yolov9/football-players-
detection-8/test/images, data=data/coco128.yaml, imgsz=[640, 640],
conf_thres=0.1, iou_thres=0.45, max_det=1000, device=0, view_img=False,
save_txt=False, save_conf=False, save_crop=False, nosave=False, classes=None,
agnostic_nms=False, augment=False, visualize=False, update=False,
project=runs/detect, name=exp, exist_ok=False, line_thickness=3,
hide_labels=False, hide_conf=False, half=False, dnn=False, vid_stride=1
YOLOv5 1e33dbb Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
```

/content/yolov9/models/experimental.py:75: FutureWarning: You are using `torch.load` with `weights_only=False` (the current default value), which uses the default pickle module implicitly. It is possible to construct malicious pickle data which will execute arbitrary code during unpickling (See <https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models> for more details). In a future release, the default value for `weights_only` will be flipped to `True`. This limits the functions that could be executed during

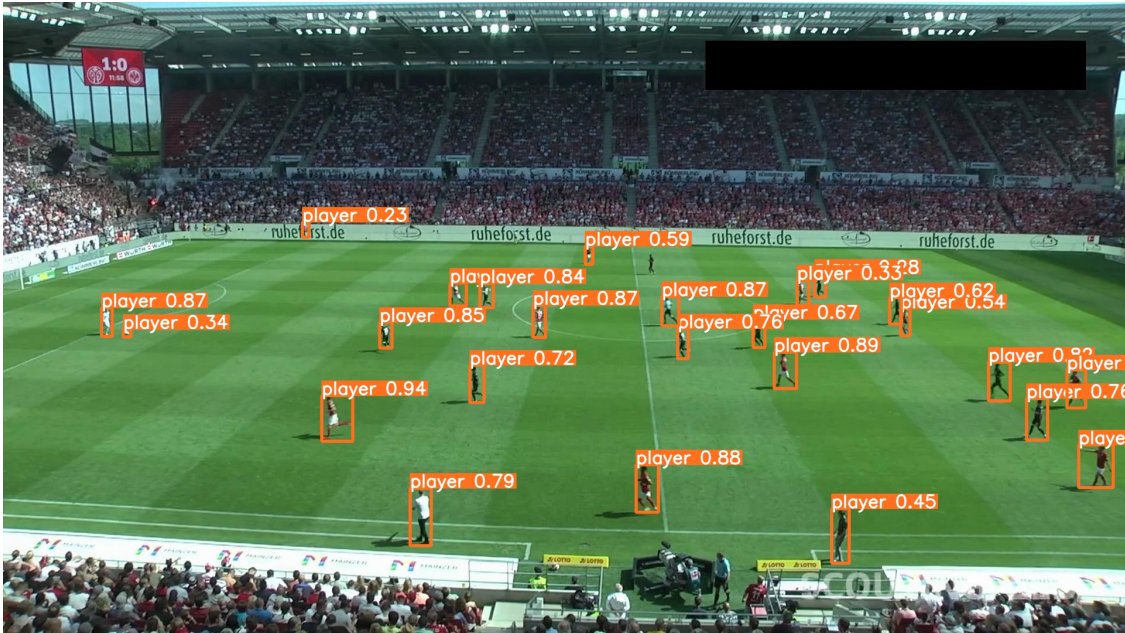
unpickling. Arbitrary objects will no longer be allowed to be loaded via this mode unless they are explicitly allowlisted by the user via ``torch.serialization.add_safe_globals``. We recommend you start setting ``weights_only=True`` for any use case where you don't have full control of the loaded file. Please open an issue on GitHub for any issues related to this experimental feature.

```
ckpt = torch.load(attempt_download(w), map_location='cpu') # load
Fusing layers...
gelan-c summary: 467 layers, 25414044 parameters, 0 gradients, 102.5 GFLOPs
image 1/13 /content/yolov9/football-players-
detection-8/test/images/40cd38_7_6_png.rf.68ef7fcd663cdf0f5b96bacdbcd94e07.jpg:
384x640 25 players, 57.6ms
image 2/13 /content/yolov9/football-players-
detection-8/test/images/42ba34_1_5_png.rf.4337fde8fbe3640cf4351fb41ac9c3ca.jpg:
384x640 24 players, 2 referees, 31.5ms
image 3/13 /content/yolov9/football-players-
detection-8/test/images/42ba34_5_5_png.rf.ceb556bd4c92d41496ae1d8c56600c4a.jpg:
384x640 23 players, 31.5ms
image 4/13 /content/yolov9/football-players-
detection-8/test/images/4b770a_1_4_png.rf.5a45b3b841a06de414ceb802e34c136f.jpg:
384x640 25 players, 1 referee, 31.5ms
image 5/13 /content/yolov9/football-players-
detection-8/test/images/4b770a_3_6_png.rf.d0d9403f2f73ca0da7a6a1373c02b749.jpg:
384x640 25 players, 29.8ms
image 6/13 /content/yolov9/football-players-
detection-8/test/images/573e61_1_9_png.rf.e82af77d907cdc12dccbd6857f53b9b1.jpg:
384x640 23 players, 25.5ms
image 7/13 /content/yolov9/football-players-
detection-8/test/images/573e61_9_6_png.rf.fc52856b5974cb67862c25bae96f25ad.jpg:
384x640 28 players, 3 referees, 25.6ms
image 8/13 /content/yolov9/football-players-
detection-8/test/images/744b27_1_10_png.rf.e6f27d3b66a0c6720b9e9e50265251a6.jpg:
384x640 23 players, 1 referee, 25.5ms
image 9/13 /content/yolov9/football-players-
detection-8/test/images/744b27_7_4_png.rf.3431eaf3ff56847b5076376771bdf954.jpg:
384x640 22 players, 23.8ms
image 10/13 /content/yolov9/football-players-
detection-8/test/images/744b27_9_9_png.rf.b229c5eff4425a17d2f7e4b34cf7edd1.jpg:
384x640 20 players, 23.8ms
image 11/13 /content/yolov9/football-players-
detection-8/test/images/798b45_3_3_png.rf.f3a1db99742364b75a965df8ed33ba8f.jpg:
384x640 27 players, 23.6ms
image 12/13 /content/yolov9/football-players-
detection-8/test/images/a9f16c_2_10_png.rf.cf607320fc980b28b6e14b14fed46e91.jpg:
384x640 24 players, 1 referee, 23.4ms
image 13/13 /content/yolov9/football-players-
detection-8/test/images/a9f16c_2_9_png.rf.ee1080f3ec9bad6ba2b8ae4799f90b59.jpg:
384x640 24 players, 1 referee, 22.6ms
```

Speed: 0.5ms pre-process, 28.9ms inference, 39.6ms NMS per image at shape (1, 3, 640, 640)

Results saved to runs/detect/exp3

```
[ ]: from IPython.display import Image, display
display(Image(filename='/content/yolov9/runs/detect/exp3/40cd38_7_6_png.rf.
↪68ef7fcd663cdf0f5b96bacdbcd94e07.jpg'))
```



```
[ ]: import glob
from IPython.display import Image, display
for image_path in glob.glob('/content/yolov9/runs/detect/exp3/*.jpg')[:5]:
    display(Image(filename=image_path, width=600))
```

```
[ ]: import glob
from IPython.display import Image, display
for image_path in glob.glob('/content/yolov9/runs/detect/exp2/*.jpg')[:5]:
    display(Image(filename=image_path, width=600))
```

```
[ ]:
```