GPU Memory

Attempted to push results to github but it resulted in filesize being too big (>100MB). Therefore, will try to save to drive instead, as downloading the file is ineffective. Github Credential Helper is likely redundant.

Idea: zip everything but the weights, as they are the only thing really using storage. The rest can quickly be downloaded and evaluated, independently. Weights also need to be obtained, so drive is still wanted.

```
import os
HOME = '/content'
from google.colab import drive
DRIVE = HOME+'/drive
drive.mount(DRIVE)
DRIVE = DRIVE+'/MyDrive'

→ Mounted at /content/drive

drive.mount("/content/drive", force_remount=True)
→ Mounted at /content/drive
!nvidia-smi
→ Thu May 30 12:13:11 2024
     | NVIDIA-SMI 535.104.05
                                      Driver Version: 535.104.05 CUDA Version: 12.2
      GPU
                                Persistence-M | Bus-Id
                                                             Disp.A | Volatile Uncorr. ECC |
           Name
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                                                        Memory-Usage |
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        0 Tesla T4
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                                                                                    Default
                                                                                       N/A I
```

Install yolov9 and pretrained weights

CT

Processes:

GPII GT

```
!git clone https://github.com/Hallvaeb/yolov9-masterthesis.git
```

```
Cloning into 'yolov9-masterthesis'...
remote: Enumerating objects: 163, done.
remote: Counting objects: 100% (163/163), done.
remote: Compressing objects: 100% (117/117), done.
remote: Total 163 (delta 50), reused 148 (delta 39), pack-reused 0
Receiving objects: 100% (163/163), 581.46 KiB | 15.30 MiB/s, done.
Resolving deltas: 100% (50/50), done.

%cd yolov9-masterthesis
!pip install -r requirements.txt -q

/content/yolov9-masterthesis

207.3/207.3 kB 5.0 MB/s eta 0:00:00
62.7/62.7 kB 7.5 MB/s eta 0:00:00
1.6/1.6 MB 17.2 MB/s eta 0:00:00
```

PID Type Process name

Download and prepare the dataset for training

```
!mkdir -p {HOME}/dataset
```

!unzip -n -q {DRIVE}/datasets/football-players-yolo.zip -d {HOME}/dataset

- 21.3/21.3 MB 72.3 MB/s eta 0:00:00

```
import os
import random
labels_path = '/content/dataset/football-players-yolo/labels'
output_path = '/content/dataset/football-players-yolo'
# Ratios for splitting the datasets
train_ratio = 1
val_ratio = 0
# test_ratio is implicitly determined
# Get all file names without their extensions
filenames = [os.path.splitext(file)[0] for file in os.listdir(labels_path) if os.path.isfile(os.path.join(labels_path, file)
# Shuffle the list of filenames to ensure random distribution
random.shuffle(filenames)
# Calculate split indices
no_total_files = len(filenames)
train_end = int(no_total_files * train_ratio)
print(train_end)
print(no_total_files)
if(no total files == train end):
 train_end-=1
val_end = train_end + int(no_total_files * val_ratio) +1
# Split the filenames
train_filenames = filenames[:train_end]
val_filenames = filenames[train_end:val_end]
test filenames = filenames[val end:]
print(val_filenames)
# Function to write filenames to a file
def write_filenames_to_file(filenames, file_path):
    with open(file_path, 'w') as file:
        for name in filenames:
            file.write(f'./images/{name}.jpg\n')
# Write the splits to their respective files
write_filenames_to_file(train_filenames, os.path.join(output_path, 'train.txt'))
write_filenames_to_file(val_filenames, os.path.join(output_path, 'val.txt'))
write_filenames_to_file(test_filenames, os.path.join(output_path, 'test.txt'))
print("Files have been split and saved successfully.")
\rightarrow
   663
    663
    ['538438_1_10_png.rf.394f8e55b797bda34d8c5600bc236474']
    Files have been split and saved successfully.
```

Now ensure yolov9-masterthesis/data.yaml is pointing to the right train and val txt files.

Train the model

Prior to running this, <u>/models/detect/yolov9-e.yaml</u> was modified to have no: 1. This file is responsible for the detector architecture. We freeze the backbone, to shorten training time.

```
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch -1 \
--epochs 5 \
--img 640 \
--min-items 0 \
--data /content/dataset/football-players-yolo/data.yaml \
--cfg yolov9-e.yaml \
--project . \
--single-cls \
--noval \
--weights /content/weights/yolov9-e.pt \
--freeze 28
# --device cpu \
# --close-mosaic 15 \
    /content
    2024-05-29 06:17:54.891639: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
```

```
2024-05-29 06:17:54.891687: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-29 06:17:54.893105: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS 2024-05-29 06:17:54.900365: I tensorflow/core/platform/cpu_feature_guard.cc:182] This Tensorflow binary is optimized t To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler 2024-05-29 06:17:56.089820: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find Ten train_dual: weights=/content/weights/yolov9-e.pt, cfg=yolov9-e.yaml, data=/content/dataset/football-players-yolo/data. Y0L0v5 V3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm
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 .', view at http://localhost:6006/
Downloading https://ultralytics.com/assets/Arial.ttf to /root/.config/Ultralytics/Arial.ttf...
100% 755k/755k [00:00<00:00, 15.1MB/s]</pre>

```
from
                             params
                                     module
                                                                                 arguments
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                                     models.common.Silence
                                                                                 []
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                               1856
                                     models.common.Conv
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                                     models.common.Conv
                                                                                 [64, 128, 3, 2]
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                                     models.common.Concat
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```

results_saved_to = "exp"
!zip -r {DRIVE}/football-5e.zip {HOME}/\$results_saved_to

```
adding: content/exp/ (stored 0%)
adding: content/exp/train_batch0.jpg (deflated 7%)
adding: content/exp/F1_curve.png (deflated 16%)
adding: content/exp/labels.jpg (deflated 29%)
adding: content/exp/weights/ (stored 0%) adding: content/exp/weights/last.pt (deflated 8%)
adding: content/exp/weights/best.pt (deflated 8%)
adding: content/exp/R_curve.png (deflated 17%)
adding: content/exp/events.out.tfevents.1716963477.faccc4e149c6.2768.0 (deflated 19%)
adding: content/exp/confusion_matrix.png (deflated 41%)
adding: content/exp/labels_correlogram.jpg (deflated 30%)
adding: content/exp/P_curve.png (deflated 23%) adding: content/exp/PR_curve.png (deflated 29%)
adding: content/exp/hyp.yaml (deflated 43%)
adding: content/exp/train_batch1.jpg (deflated 16%)
adding: content/exp/train_batch2.jpg (deflated 11%)
adding: content/exp/results.csv (deflated 84%)
adding: content/exp/val_batch0_labels.jpg (deflated 7%)
adding: content/exp/val_batch0_pred.jpg (deflated 7%)
adding: content/exp/opt.yaml (deflated 49%)
adding: content/exp/results.png (deflated 13%)
```

```
%cd {HOME}
!python yolov9-masterthesis/train dual.py \
--batch 10 \
--epochs 5 \
--ima 640 \
--min-items 0 ∖
--data /content/dataset/football-players-yolo/data.yaml \
--cfg yolov9-e.yaml \
--project . \
--single-cls \
--noval \
--weights /content/exp/weights/best.pt \
--freeze 28
# --weights /content/weights/yolov9-e.pt \
# --device cpu \
# --close-mosaic 15 \
    /content
     2024-05-29 06:26:51.313090: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
     2024-05-29 06:26:51.313141: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-29 06:26:51.314446: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS
     2024-05-29 06:26:51.321842: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t
     To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler
     2024-05-29 06:26:52.483608: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find Ten
     train_dual: weights=/content/exp/weights/best.pt, cfg=yolov9-e.yaml, data=/content/dataset/football-players-yolo/data.
YOLOv5 
v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm
     TensorBoard: Start with 'tensorboard --logdir .', view at <a href="http://localhost:6006/">http://localhost:6006/</a>
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                                            models.common.SPPELAN
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      36
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                                            torch.nn.modules.upsampling.Upsample
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                                            torch.nn.modules.upsampling.Upsample
                                                                                        [None, 2, 'nearest']
results_saved_to = "exp3"
!zip -r {DRIVE}/football-10e.zip {HOME}/$results saved to
```

```
adding: content/exp3/ (stored 0%)
adding: content/exp3/train_batch0.jpg (deflated 7%)
adding: content/exp3/F1_curve.png (deflated 17%)
adding: content/exp3/labels.jpg (deflated 29%)
adding: content/exp3/weights/ (stored 0%)
adding: content/exp3/weights/last.pt (deflated 8%)
adding: content/exp3/weights/best.pt (deflated 8%)
adding: content/exp3/R_curve.png (deflated 17%)
```

```
adding: content/exp3/events.out.tfevents.1716964013.faccc4e149c6.5438.0 (deflated 19%) adding: content/exp3/confusion_matrix.png (deflated 41%) adding: content/exp3/labels_correlogram.jpg (deflated 30%) adding: content/exp3/PR_curve.png (deflated 24%) adding: content/exp3/PR_curve.png (deflated 30%) adding: content/exp3/PR_curve.png (deflated 30%) adding: content/exp3/train_batchl.jpg (deflated 16%) adding: content/exp3/train_batchl.jpg (deflated 11%) adding: content/exp3/results.csv (deflated 83%) adding: content/exp3/results.csv (deflated 83%) adding: content/exp3/val_batch0_labels.jpg (deflated 7%) adding: content/exp3/val_batch0_pred.jpg (deflated 7%) adding: content/exp3/val_wall (deflated 49%) adding: content/exp3/results.png (deflated 13%)
```

→ PRW

```
!unzip -n -q {DRIVE}/datasets/PRW-yolo.zip -d {HOME}/dataset
import os
import random
labels_path = '/content/dataset/PRW-yolo/labels'
output_path = '/content/dataset/PRW-yolo'
# Ratios for splitting the datasets
train ratio = 1
val ratio = 0
# test_ratio is implicitly determined
# Get all file names without their extensions
filenames = [os.path.splitext(file)[0] for file in os.listdir(labels path) if os.path.isfile(os.path.join(labels path, file)
# Shuffle the list of filenames to ensure random distribution
random.shuffle(filenames)
# Calculate split indices
no_total_files = len(filenames)
train_end = int(no_total_files * train_ratio)
print(train end)
print(no_total_files)
if(no_total_files == train_end):
  train_end-=1
val_end = train_end + int(no_total_files * val_ratio) +1
# Split the filenames
train_filenames = filenames[:train_end]
val_filenames = filenames[train end:val end]
test_filenames = filenames[val_end:]
print(val_filenames)
# Function to write filenames to a file
def write filenames to file(filenames, file path):
    with open(file_path, 'w') as file:
        for name in filenames:
            file.write(f'./images/{name}.jpg\n')
# Write the splits to their respective files
write_filenames_to_file(train_filenames, os.path.join(output_path, 'train.txt'))
write_filenames_to_file(val_filenames, os.path.join(output_path, 'val.txt'))
write filenames to file(test filenames, os.path.join(output path, 'test.txt'))
print("Files have been split and saved successfully.")
<del>→</del> 11816
     11816
     ['c3s1 117783']
     Files have been split and saved successfully.
!cp /content/drive/MyDrive/datasets/PRW-5e.pt /content/weights/PRW-5e.pt
```

```
%cd {HOME}
!python yolov9-masterthesis/train dual.py \
--batch -1 \
--epochs 5 \
--ima 640 \
--min-items 0 ∖
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project . ∖
--single-cls \
--noval \
--weights /content/weights/PRW-5e.pt \
--freeze 28
# --device cpu \
# --close-mosaic 15 \
     2024-05-29 06:39:30.465371: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
     2024-05-29 06:39:30.465427: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-29 06:39:30.466927: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS 2024-05-29 06:39:30.474190: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t
     To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler
     2024-05-29 06:39:31.639946: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find Ten
     train_dual: weights=/content/weights/PRW-5e.pt, cfg=yolov9-e.yaml, data=/content/yolov9-masterthesis/data.yaml, hyp=yo
     YOLOV5 🚀 v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm
     ClearML: run 'pip install clearml' to automatically track, visualize and remotely train YOLO of in ClearML Comet: run 'pip install comet_ml' to automatically track and visualize YOLO of runs in Comet
     TensorBoard: Start with 'tensorboard --logdir .', view at <a href="http://localhost:6006/">http://localhost:6006/</a>
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                                               torch.nn.modules.upsampling.Upsample
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results_saved_to = "exp4"
!zip -r {DRIVE}/PRW-5e.zip {HOME}/$results saved to
```

```
adding: content/exp4/ (stored 0%)
adding: content/exp4/train_batch0.jpg (deflated 7%)
adding: content/exp4/events.out.tfevents.1716964772.faccc4e149c6.8833.0 (deflated 18%)
adding: content/exp4/F1_curve.png (deflated 17%)
adding: content/exp4/labels.jpg (deflated 35%)
adding: content/exp4/weights/ (stored 0%)
adding: content/exp4/weights/last.pt (deflated 8%)
adding: content/exp4/weights/best.pt (deflated 8%)
adding: content/exp4/R_curve.png (deflated 19%)
```

```
adding: content/exp4/confusion_matrix.png (deflated 43%) adding: content/exp4/labels_correlogram.jpg (deflated 33%) adding: content/exp4/P_curve.png (deflated 21%) adding: content/exp4/PR_curve.png (deflated 29%) adding: content/exp4/PR_curve.png (deflated 43%) adding: content/exp4/train_batch1.jpg (deflated 17%) adding: content/exp4/train_batch2.jpg (deflated 11%) adding: content/exp4/results.csv (deflated 83%) adding: content/exp4/val_batch0_labels.jpg (deflated 7%) adding: content/exp4/val_batch0_pred.jpg (deflated 7%) adding: content/exp4/yal_vaml (deflated 49%) adding: content/exp4/results.png (deflated 12%)
```

FIMUS resume training until 50 and 100 epochs

```
!unzip -n -q {DRIVE}/FIMUSDataset/Inconsistent.zip -d {HOME}/dataset
import os
import random
labels_path = '/content/dataset/Inconsistent/labels'
output_path = '/content/dataset/Inconsistent
# Ratios for splitting the datasets
train ratio = 1
val_ratio = 0
# test ratio is implicitly determined
# Get all file names without their extensions
filenames = [os.path.splitext(file)[0] for file in os.listdir(labels_path) if os.path.isfile(os.path.join(labels_path, file)
# Shuffle the list of filenames to ensure random distribution
random.shuffle(filenames)
# Calculate split indices
no total files = len(filenames)
train_end = int(no_total_files * train_ratio)
print(train_end)
print(no_total_files)
if(no_total_files == train_end):
 train end-=1
val end = train end + int(no total files * val ratio) +1
# Split the filenames
train_filenames = filenames[:train_end]
val_filenames = filenames[train_end:val_end]
test_filenames = filenames[val_end:]
print(val filenames)
# Function to write filenames to a file
def write_filenames_to_file(filenames, file_path):
    with open(file_path, 'w') as file:
        for name in filenames:
            file.write(f'./images/{name}.jpg\n')
# Write the splits to their respective files
write filenames to file(train filenames, os.path.join(output path, 'train.txt'))
write_filenames_to_file(val_filenames, os.path.join(output_path, 'val.txt'))
write_filenames_to_file(test_filenames, os.path.join(output_path, 'test.txt'))
print("Files have been split and saved successfully.")
→ 2637
    2637
    ['120324-164120-right']
    Files have been split and saved successfully.
!cp /content/drive/MyDrive/FIMUSDataset/Inconsistent-50e.pt /content/weights/Inconsistent-50e.pt
```

```
%cd {HOME}
!python yolov9-masterthesis/train dual.py \
--batch 10 \
--epochs 10 ∖
--ima 640 \
--min-items 0 ∖
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/80e \
--single-cls \
--noval \
--weights /content/70e/exp/weights/best.pt \
--freeze 28
# --device cpu \
# --close-mosaic 15 \
     2024-05-30 14:26:33.523083: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
     2024-05-30 14:26:33.523155: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-30 14:26:33.524729: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS 2024-05-30 14:26:33.532259: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t
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     2024-05-30 14:26:34.709876: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find Ten
     train_dual: weights=/content/70e/exp/weights/best.pt, cfg=yolov9-e.yaml, data=/content/yolov9-masterthesis/data.yaml,
     YOLOv5 🚀 v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm
     ClearML: run 'pip install clearml' to automatically track, visualize and remotely train YOLO of in ClearML Comet: run 'pip install comet_ml' to automatically track and visualize YOLO of runs in Comet
     TensorBoard: Start with 'tensorboard --logdir /content/80e', view at <a href="http://localhost:6006/">http://localhost:6006/</a>
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results saved to = 80e/exp
!zip -r {DRIVE}/80e.zip {HOME}/$results saved to
```

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adding: content/80e/exp/ (stored 0%)
adding: content/80e/exp/confusion_matrix.png (deflated 43%)
adding: content/80e/exp/train_batchl.jpg (deflated 25%)
adding: content/80e/exp/labels_correlogram.jpg (deflated 41%)
adding: content/80e/exp/R_curve.png (deflated 24%)
adding: content/80e/exp/PR_curve.png (deflated 29%)
adding: content/80e/exp/weights/ (stored 0%)
adding: content/80e/exp/weights/best.pt (deflated 8%)
adding: content/80e/exp/weights/last.pt (deflated 8%)
```

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adding: content/80e/exp/val_batch0_pred.jpg (deflated 22%)
       adding: content/80e/exp/hyp.yaml (deflated 43%)
       adding: content/80e/exp/train_batch0.jpg (deflated 14%)
       adding: content/80e/exp/labels.jpg (deflated 33%)
       adding: content/80e/exp/P_curve.png (deflated 24%)
       adding: content/80e/exp/opt.yaml (deflated 50%)
       adding: content/80e/exp/results.csv (deflated 87%)
       adding: content/80e/exp/train_batch2.jpg (deflated 21%)
       adding: content/80e/exp/F1_curve.png (deflated 20%) adding: content/80e/exp/val_batch0_labels.jpg (deflated 22%)
       adding: content/80e/exp/events.out.tfevents.1717079195.68b1c5c90573.34903.0 (deflated 20%)
       adding: content/80e/exp/results.png (deflated 12%)
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 10 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/90e \
--single-cls \
--noval \
--weights /content/80e/exp/weights/best.pt \
--freeze 28
# --device cpu \
# --close-mosaic 15 \
     /content
     2024-05-30 15:15:29.183726: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
     2024-05-30 15:15:29.183779: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-30 15:15:29.185115: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS
     2024-05-30 15:15:29.192802: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate c
     2024-05-30 15:15:30.448814: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find Ten
     train_dual: weights=/content/80e/exp/weights/best.pt, cfg=yolov9-e.yaml, data=/content/yolov9-masterthesis/data.yaml,
     YOLOv5 🚀 v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm
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     Comet: run 'pip install comet_ml' to automatically track and visualize YOLO 🚀 runs in Comet
     TensorBoard: Start with 'tensorboard --logdir /content/90e', view at http://localhost:6006/
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                                                                                            [[1, 1, 1, 1]]
                          - 1
                                    252160
                                            models.common.RepNCSPELAN4
                                                                                          [128, 256, 128, 64, 2]
                                             models.common.ADown
                                                                                          [256, 256]
      20
                          - 1
                              1
                                    164352
                                             models.common.CBFuse
                                                                                          [[2, 2, 2]]
[256, 512, 256, 128, 2]
      21
          [12, 13, 14, -1]
                                          0
                                             models.common.RepNCSPELAN4
      22
                                   1004032
                          - 1
                                    656384
                                                                                          [512, 512]
      23
                                             models.common.ADown
                          - 1
                              1
      24
               [13, 14, -1]
                              1
                                             models.common.CBFuse
                                                                                          [[3, 3]]
                                                                                          [512, 1024, 512, 256, 2]
      25
                          - 1
                              1
                                   4006912
                                             models.common.RepNCSPELAN4
      26
                          - 1
                              1
                                   2623488
                                             models.common.ADown
                                                                                          [1024, 1024]
      27
                   [14, -1]
                                             models.common.CBFuse
                                                                                          [[4]]
                              1
      28
                                   4269056
                                                                                          [1024, 1024, 512, 256, 2]
                          -1
                              1
                                             models.common.RepNCSPELAN4
                           9
                              1
                                    787968
                                             models.common.SPPELAN
                                                                                          [1024, 512, 256]
      30
                                          0
                                             torch.nn.modules.upsampling.Upsample
                                                                                          [None, 2, 'nearest']
                           - 1
                              1
                    [-1, 7]
      31
                                             models.common.Concat
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                                                                                          [1536, 512, 512, 256, 2]
[None, 2, 'nearest']
                                   4005888
                                             {\tt models.common.RepNCSPELAN4}
      32
                          - 1
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                                             torch.nn.modules.upsampling.Upsample
                          - 1
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      34
                     [-1, 5]
                              1
                                          0
                                             models.common.Concat
                                                                                          [1]
      35
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                                   1069056
                                             models.common.RepNCSPELAN4
                                                                                          [1024, 256, 256, 128, 2]
                                             models.common.SPPELAN
      36
                          28
                              1
                                    787968
                                                                                          [1024, 512, 256]
      37
                          - 1
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                                         0
                                             torch.nn.modules.upsampling.Upsample
                                                                                          [None, 2, 'nearest']
      38
                    [-1, 25]
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                                          0
                                             models.common.Concat
                                                                                          [1]
                                                                                          [1536, 512, 512, 256, 2]
      39
                          - 1
                                   4005888
                                             models.common.RepNCSPELAN4
                                             torch.nn.modules.upsampling.Upsample
                                                                                          [None, 2, 'nearest']
```

```
results saved to = "90e/exp"
!zip -r {DRIVE}/90e.zip {HOME}/$results_saved_to
       adding: content/90e/exp/ (stored 0%)
       adding: content/90e/exp/confusion_matrix.png (deflated 43%)
       adding: content/90e/exp/train_batch1.jpg (deflated 25%)
       adding: content/90e/exp/labels_correlogram.jpg (deflated 41%)
       adding: content/90e/exp/R curve.png (deflated 22%)
       adding: content/90e/exp/PR_curve.png (deflated 30%) adding: content/90e/exp/weights/ (stored 0%) adding: content/90e/exp/weights/best.pt (deflated 8%)
       adding: content/90e/exp/weights/last.pt (deflated 8%)
       adding: content/90e/exp/val_batch0_pred.jpg (deflated 22%)
       adding: content/90e/exp/hyp.yaml (deflated 43%)
       adding: \ content/90e/exp/events.out.tfevents.1717082131.68b1c5c90573.47525.0 \ (deflated \ 20\%)
       adding: content/90e/exp/train_batch0.jpg (deflated 14%)
       adding: content/90e/exp/labels.jpg (deflated 33%)
       adding: content/90e/exp/P_curve.png (deflated 22%)
       adding: content/90e/exp/opt.yaml (deflated 50%)
       adding: content/90e/exp/results.csv (deflated 87%)
       adding: content/90e/exp/resutts.csv (deflated 21%) adding: content/90e/exp/fl_curve.png (deflated 18%)
       adding: content/90e/exp/val_batch0_labels.jpg (deflated 22%)
       adding: content/90e/exp/results.png (deflated 12%)
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 10 \
--img 640 \
--min-items 0 ∖
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/100e \
--single-cls ∖
--noval \
--weights /content/90e/exp/weights/best.pt \
--freeze 28
₹
```

```
1⊍ epocns completed in ⊎./// nours.
     Optimizer stripped from /content/100e/exp/weights/last.pt, 139.9MB
     Optimizer stripped from /content/100e/exp/weights/best.pt, 139.9MB
     Validating /content/100e/exp/weights/best.pt...
     Fusing layers..
     yolov9-e summary: 839 layers, 68547814 parameters, 0 gradients, 240.7 GFLOPs
                        Class
                                                                              R
                                                                                      mAP50
                                                                                              mAP50-95: 100% 1/1 [00:00<00:00, 4.56
                                   Images Instances
                                                                 Ρ
                          all
                                         1
                                                     1
                                                             0.972
                                                                              1
                                                                                      0.995
                                                                                                  0.895
     Results saved to /content/100e/exp
results_saved_to = "100e/exp"
!zip -r {DRIVE}/100e.zip {HOME}/$results saved to
       adding: content/100e/exp/ (stored 0%)
       adding: content/100e/exp/confusion_matrix.png (deflated 43%)
       adding: content/100e/exp/events.out.tfevents.1717084996.68b1c5c90573.59839.0 (deflated 20%)
       adding: content/100e/exp/train_batch1.jpg (deflated 25%)
       adding: content/100e/exp/labels_correlogram.jpg (deflated 41%)
       adding: content/100e/exp/R curve.png (deflated 23%)
       adding: content/100e/exp/PR_curve.png (deflated 27%) adding: content/100e/exp/weights/ (stored 0%)
       adding: content/100e/exp/weights/best.pt (deflated 8%) adding: content/100e/exp/weights/last.pt (deflated 8%)
       adding: content/100e/exp/val_batch0_pred.jpg (deflated 22%)
       adding: content/100e/exp/hyp.yaml (deflated 43%)
       adding: content/100e/exp/train_batch0.jpg (deflated 14%)
       adding: content/100e/exp/labels.jpg (deflated 33%)
       adding: content/100e/exp/P_curve.png (deflated 21%)
       adding: content/100e/exp/opt.yaml (deflated 50%)
       adding: content/100e/exp/results.csv (deflated 87%)
       adding: content/100e/exp/train_batch2.jpg (deflated 21%)
       adding: content/100e/exp/F1_curve.png (deflated 19%)
       adding: content/100e/exp/val_batch0_labels.jpg (deflated 22%) adding: content/100e/exp/results.png (deflated 12%)
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 25 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/125e \
--single-cls \
--noval \
--weights /content/100e/exp/weights/best.pt \
--freeze 28
     /content
     2024-05-30 16:50:34.260224: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
     2024-05-30 16:50:34.260274: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa
     2024-05-30 16:50:34.261611: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS
     2024-05-30 16:50:34.270221: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t
     To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate c
     2024-05-30 16:50:35.554702: W tensorflow/compiler/tf2tensorrt/utils/py utils.cc:38] TF-TRT Warning: Could not find Ten
     train_dual: weights=/content/100e/exp/weights/best.pt, cfg=yolov9-e.yaml, data=/content/yolov9-masterthesis/data.yaml,
     YOLOv5 🚀 v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm 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 /content/125e', view at http://localhost:6006/
                                    params
                        from
                                             module
                                                                                          arguments
       0
                          - 1
                              1
                                         0
                                             models.common.Silence
                                                                                          []
       1
                          - 1
                              1
                                      1856
                                             models.common.Conv
                                                                                          [3, 64, 3, 2]
                          - 1
                              1
                                     73984
                                             models.common.Conv
                                                                                          [64, 128, 3, 2]
       3
                                                                                          [128, 256, 128, 64, 2]
                          -1
                                    252160
                                             models.common.RepNCSPELAN4
                              1
                                                                                          [256, 256]
                                             models.common.ADown
                          - 1
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                                    164352
       5
                                   1004032
                                             models.common.RepNCSPELAN4
                                                                                          [256, 512, 256, 128, 2]
                              1
                          - 1
                                    656384
       6
                                                                                          [512, 512]
                          - 1
                              1
                                             models.common.ADown
                                             models.common.RepNCSPELAN4
                          - 1
                              1
                                   4006912
                                                                                          [512, 1024, 512, 256, 2]
       8
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                                   2623488
                                             models.common.ADown
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                                             models.common.RepNCSPELAN4
       a
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                                   4269056
                                                                                          [1024, 1024, 512, 256, 2]
      10
                           1
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                                      4160
                                             models.common.CBLinear
                                                                                          [64, [64]]
                                                                                          [256, [64, 128]]
[512, [64, 128, 256]]
      11
                           3
                                     49344
                                             models.common.CBLinear
                           5
                                    229824
                                             models.common.CBLinear
                                                                                          [1024, [64, 128, 256, 512]]
[1024, [64, 128, 256, 512, 1024]]
      13
                                    984000
                                             models.common.CBLinear
      14
                           9
                                   2033600
                                             models.common.CBLinear
                                                                                          [3, 64, 3, 2]
                                             models.common.Conv
      15
                           0
                              1
                                      1856
                                                                                          [[0, 0, 0, 0, 0]]
[64, 128, 3, 2]
      16[10, 11, 12, 13, 14,
                                                0 models.common.CBFuse
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                                             models.common.Conv
      17
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                                            0 models.common.CBFuse
      18[11, 12, 13, 14,
                           -1]
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      19
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                                            models.common.RepNCSPELAN4
                                                                                          [128, 256, 128, 64, 2]
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                                    164352
                                             models.common.ADown
                                                                                          [256, 256]
```

```
6/19/24, 1:09 PM
```

```
0 models.common.CBFuse
      21 [12, 13, 14, -1]
                                                                                      [256, 512, 256, 128, 2]
                                 1004032
                                           models.common.RepNCSPELAN4
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                                  656384
                                           models.common.ADown
                                                                                      [512, 512]
                                           models.common.CBFuse
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              [13, 14, -1]
      25
                                 4006912
                                           models.common.RepNCSPELAN4
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                                 2623488
                                           models.common.ADown
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      27
                   [14, -1]
                                           models.common.CBFuse
                                                                                      [[4]]
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                                           models.common.RepNCSPELAN4
                                                                                      [1024, 1024, 512, 256, 2]
      28
                         - 1
                                                                                      [1024, 512, 256]
[None, 2, 'nearest']
                                  787968
                          9
                                           models.common.SPPELAN
      29
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      30
                                           torch.nn.modules.upsampling.Upsample
                         - 1
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                   [-1, 7]
                                           models.common.Concat
      31
                             1
                                        0
                                                                                      [1]
                                           models.common.RepNCSPELAN4
                                                                                      [1536, 512, 512, 256, 2]
      32
                         - 1
                             1
                                 4005888
      33
                         -1
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                                           torch.nn.modules.upsampling.Upsample
                                                                                      [None, 2, 'nearest']
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                                           models.common.Concat
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                                 1069056
                                                                                      [1024, 256, 256, 128, 2]
[1024, 512, 256]
      35
                                           models.common.RepNCSPELAN4
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                         28
                                  787968
                                           models.common.SPPELAN
      36
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                                                                                      [None, 2, 'nearest']
      37
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                                           torch.nn.modules.upsampling.Upsample
                   [-1, 25]
                                        0
                                           models.common.Concat
      38
                             1
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                                           models.common.RepNCSPELAN4
                                 4005888
                                                                                      [1536, 512, 512, 256, 2]
      39
                             1
                         - 1
                                        0
                                           torch.nn.modules.upsampling.Upsample
                                                                                      [None, 2, 'nearest']
      40
                         - 1
results_saved_to = "125e/exp"
!zip -r {DRIVE}/125e.zip {HOME}/$results_saved_to
       adding: content/125e/exp/ (stored 0%)
       adding: content/125e/exp/confusion_matrix.png (deflated 43%)
       adding: content/125e/exp/train_batch1.jpg (deflated 25%)
       adding: content/125e/exp/labels_correlogram.jpg (deflated 41%)
       adding: content/125e/exp/R_curve.png (deflated 23%)
       adding: content/125e/exp/PR_curve.png (deflated 27%)
       adding: content/125e/exp/weights/ (stored 0%)
       adding: content/125e/exp/weights/best.pt (deflated 8%)
       adding: content/125e/exp/weights/last.pt (deflated 8%)
       adding: content/125e/exp/val_batch0_pred.jpg (deflated 22%)
       adding: content/125e/exp/hyp.yaml (deflated 43%)
       adding: content/125e/exp/events.out.tfevents.1717087836.68b1c5c90573.72056.0 (deflated 21%)
       adding: content/125e/exp/train_batch0.jpg (deflated 14%)
       adding: content/125e/exp/labels.jpg (deflated 33%)
       adding: content/125e/exp/P_curve.png (deflated 22%)
       adding: content/125e/exp/opt.yaml (deflated 50%)
       adding: content/125e/exp/results.csv (deflated 90%)
       adding: content/125e/exp/train_batch2.jpg (deflated 21%)
       adding: content/125e/exp/F1_curve.png (deflated 19%)
       adding: content/125e/exp/val batch0_labels.jpg (deflated 22%)
       adding: content/125e/exp/results.png (deflated 13%)
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 25 \
--img 640 \
--min-items 0 ∖
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/150e \
--single-cls \
--noval \
--weights /content/125e/exp/weights/best.pt \
--freeze 28
    /content
    2024-05-30 18:48:08.338077: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f 2024-05-30 18:48:08.338129: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-30 18:48:08.339569: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS
    2024-05-30 18:48:08.347273: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t
     To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate c
    2024-05-30 18:48:09.527928: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find Ten
     train_dual: weights=/content/125e/exp/weights/best.pt, cfg=yolov9-e.yaml, data=/content/yolov9-masterthesis/data.yaml,
     YOLOv5 🚀 v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
    from n
                                  params module
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                                           models.common.Silence
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                                  252160
                                           models.common.RepNCSPELAN4
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                                           models.common.ADown
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4269056

4160

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models.common.RepNCSPELAN4

models.common.CBLinear

[1024, 1024, 512, 256, 2]

[64, [64]]

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11
                    3
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                              49344
                                     models.common.CBLinear
                                                                                 [256, [64, 128]]
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12
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                             229824
                                     models.common.CBLinear
13
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                       1
                             984000
                                      models.common.CBLinear
                                                                                  [1024, [64, 128, 256, 512]]
                    9
                            2033600
                                      models.common.CBLinear
                                                                                  [1024, [64, 128, 256, 512, 1024]]
14
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                               1856
                                      models.common.Conv
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16[10, 11, 12, 13, 14, -1]
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                                      models.common.ADown
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21
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                                     models.common.RepNCSPELAN4
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                                      models.common.ADown
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24
        [13, 14, -1]
                                      models.common.CBFuse
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                                      models.common.RepNCSPELAN4
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                                      models.common.ADown
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27
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                                     models.common.CBFuse
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                                     models.common.RepNCSPELAN4
                                                                                  [1024, 1024, 512, 256, 2]
28
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29
                    9
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                                     models.common.SPPELAN
                                      torch.nn.modules.upsampling.Upsample
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                                      models.common.Concat
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                                      torch.nn.modules.upsampling.Upsample
                                                                                  [None, 2, 'nearest']
34
              [-1, 5]
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                                      models.common.Concat
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                            1069056
                                      models.common.RepNCSPELAN4
                                                                                  [1024, 256, 256, 128, 2]
35
                   28
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36
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37
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                                      torch.nn.modules.upsampling.Upsample
                                                                                  [None, 2, 'nearest']
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38
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                                                                                 [1536, 512, 512, 256, 2]
[None, 2, 'nearest']
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                                     models.common.RepNCSPELAN4
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                                     torch.nn.modules.upsampling.Upsample
adding: content/150e/exp/ (stored 0%)
```

```
results saved to = "150e/exp"
!zip -r {DRIVE}/150e.zip {HOME}/$results_saved_to
\rightarrow
       adding: content/150e/exp/confusion matrix.png (deflated 43%)
       adding: content/150e/exp/train_batch1.jpg (deflated 25%)
       adding: content/150e/exp/events.out.tfevents.1717094890.68b1c5c90573.102163.0 (deflated 21%)
       adding: content/150e/exp/labels_correlogram.jpg (deflated 41%)
       adding: content/150e/exp/R_curve.png (deflated 23%)
       adding: content/150e/exp/PR_curve.png (deflated 30%)
       adding: content/150e/exp/weights/ (stored 0%)
       adding: content/150e/exp/weights/best.pt (deflated 8%)
       adding: content/150e/exp/weights/last.pt (deflated 8%)
       adding: content/150e/exp/val_batch0_pred.jpg (deflated 22%) adding: content/150e/exp/hyp.yaml (deflated 43%)
       adding: content/150e/exp/train_batch0.jpg (deflated 14%)
       adding: content/150e/exp/labels.jpg (deflated 33%)
       adding: content/150e/exp/P_curve.png (deflated 22%)
       adding: content/150e/exp/opt.yaml (deflated 50%)
       adding: content/150e/exp/results.csv (deflated 90%)
       adding: content/150e/exp/train_batch2.jpg (deflated 21%)
       adding: content/150e/exp/F1_curve.png (deflated 19%)
       adding: content/150e/exp/val_batch0_labels.jpg (deflated 22%)
       adding: content/150e/exp/results.png (deflated 13%)
!cp /content/drive/MyDrive/FIMUSDataset/Inconsistent-20e.pt /content/weights/Inconsistent-20e.pt
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 10 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/30e \
--single-cls \
--noval \
--weights /content/weights/Inconsistent-20e.pt \
--freeze 28
     /content
     2024-05-30 20:45:44.849381: E external/local_xla/xla/stream_executor/cuda/cuda_dnn.cc:9261] Unable to register cuDNN f
     2024-05-30 20:45:44.849440: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa 2024-05-30 20:45:44.851001: E external/local_xla/xla/stream_executor/cuda/cuda_blas.cc:1515] Unable to register cuBLAS
     2024-05-30 20:45:44.859048: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized t To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate c
     2024-05-30\ 20:45:45.97\overline{7}668:\ W\ tensorflow/compiler/tf2tensorrt/utils/py\_utils.cc:38]\ TF-TRT\ Warning:\ Could\ not\ find\ Tensorrt/utils/py\_utils.cc:38
     train_dual: weights=/content/weights/Inconsistent-20e.pt, cfg=yolov9-e.yaml, data=/content/yolov9-masterthesis/data.ya
     YOLOv5 	₹ v3.0-4-g3c5307c Python-3.10.12 torch-2.3.0+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, warm
```

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 औ runs in Comet TensorBoard: Start with 'tensorboard --logdir /content/30e', view at http://localhost:6006/

https://colab.research.google.com/drive/1DtQWYp2Tp ihC5-CF3aMKOPcDPSfsd3m#printMode=true

```
params module
                      from n
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      0
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                                           torch.nn.modules.upsampling.Upsample
                                                                                      [None, 2, 'nearest']
!zip -r {DRIVE}/30e.zip {HOME}/$results_saved_to
      adding: content/30e/exp/ (stored 0%)
      adding: content/30e/exp/confusion_matrix.png (deflated 43%)
      adding: content/30e/exp/train_batch1.jpg (deflated 25%)
```

results_saved_to = "30e/exp"

```
\rightarrow
      adding: content/30e/exp/labels_correlogram.jpg (deflated 41%)
      adding: content/30e/exp/R_curve.png (deflated 23%) adding: content/30e/exp/PR_curve.png (deflated 29%)
      adding: content/30e/exp/weights/ (stored 0%)
      adding: content/30e/exp/weights/best.pt (deflated 8%)
      adding: content/30e/exp/weights/last.pt (deflated 8%)
      adding: content/30e/exp/val batch0 pred.jpg (deflated 22%)
      adding: content/30e/exp/events.out.tfevents.1717101946.68b1c5c90573.132286.0 (deflated 20%)
      adding: content/30e/exp/hyp.yaml (deflated 43%)
      adding: content/30e/exp/train_batch0.jpg (deflated 14%)
      adding: content/30e/exp/labels.jpg (deflated 33%)
      adding: content/30e/exp/P_curve.png (deflated 22%)
      adding: content/30e/exp/opt.yaml (deflated 50%)
      adding: content/30e/exp/results.csv (deflated 87%)
      adding: content/30e/exp/train_batch2.jpg (deflated 21%)
      adding: content/30e/exp/F1_curve.png (deflated 20%)
      adding: content/30e/exp/val_batch0_labels.jpg (deflated 22%)
      adding: content/30e/exp/results.png (deflated 13%)
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 ∖
--epochs 10 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data.yaml \
--cfg yolov9-e.yaml \
--project /content/40e \
--single-cls \
--noval \
--weights /content/30e/exp/weights/best.pt \
--freeze 28
₹
    /content
     2024-05-30 21:35:07.957411: E external/local xla/xla/stream executor/cuda/cuda dnn.cc:9261] Unable to register cuDNN f
```

2024-05-30 21:35:07.957466: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:607] Unable to register cuFFT fa

hyperparameters: lr0=0.01, lrf=0.01, momentum=0.937, weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warm 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

in ClearML

TensorBoard: Start with 'tensorboard --logdir /content/40e', view at http://localhost:6006/

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from n
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                                    models.common.SPPELAN
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                                    models.common.Concat
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39
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                                    models.common.RepNCSPELAN4
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                                    torch nn modules unsampling Unsample
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```

```
results_saved_to = "40e/exp"
!zip -r {DRIVE}/40e.zip {HOME}/$results_saved_to
```

```
adding: content/40e/exp/ (stored 0%)
adding: content/40e/exp/confusion_matrix.png (deflated 43%)
adding: content/40e/exp/train batch1.jpg (deflated 25%)
adding: content/40e/exp/labels_correlogram.jpg (deflated 41%)
adding: content/40e/exp/R curve.png (deflated 24%)
adding: content/40e/exp/PR curve.png (deflated 29%)
adding: content/40e/exp/events.out.tfevents.1717104910.68b1c5c90573.145018.0 (deflated 20%)
adding: content/40e/exp/weights/ (stored 0%) adding: content/40e/exp/weights/best.pt (deflated 8%) adding: content/40e/exp/weights/last.pt (deflated 8%)
adding: content/40e/exp/val_batch0_pred.jpg (deflated 22%)
adding: content/40e/exp/hyp.yaml (deflated 43%)
adding: content/40e/exp/train_batch0.jpg (deflated 14%)
adding: content/40e/exp/labels.jpg (deflated 33%)
adding: content/40e/exp/P_curve.png (deflated 22%)
adding: content/40e/exp/opt.yaml (deflated 50%)
adding: content/40e/exp/results.csv (deflated 87%)
adding: content/40e/exp/train_batch2.jpg (deflated 21%)
adding: content/40e/exp/F1_curve.png (deflated 19%)
adding: content/40e/exp/val_batch0_labels.jpg (deflated 22%)
adding: content/40e/exp/results.png (deflated 13%)
```

FIMUS Consistent-2 training for Consistent-1 Evaluation, more epochs

!unzip -n -q {DRIVE}/FIMUSDataset/Consistent-2.zip -d {HOME}/dataset

```
6/19/24, 1:09 PM
```

```
import os
import random
labels_path = '/content/dataset/Consistent-2/labels'
output path = '/content/dataset/Consistent-2'
# Ratios for splitting the datasets
train_ratio = 1
val_ratio = 0
# test_ratio is implicitly determined
# Get all file names without their extensions
filenames = [os.path.splitext(file)[0] for file in os.listdir(labels_path) if os.path.isfile(os.path.join(labels_path, file)
# Shuffle the list of filenames to ensure random distribution
random.shuffle(filenames)
# Calculate split indices
no_total_files = len(filenames)
train_end = int(no_total_files * train_ratio)
print(train_end)
print(no_total_files)
if(no_total_files == train_end):
 train end-=1
val_end = train_end + int(no_total_files * val_ratio) +1
# Split the filenames
train_filenames = filenames[:train_end]
val_filenames = filenames[train_end:val_end]
test filenames = filenames[val end:]
print(val_filenames)
# Function to write filenames to a file
def write_filenames_to_file(filenames, file_path):
    with open(file_path, 'w') as file:
       for name in filenames:
            file.write(f'./images/{name}.jpg\n')
# Write the splits to their respective files
write_filenames_to_file(train_filenames, os.path.join(output_path, 'train.txt'))
write_filenames_to_file(val_filenames, os.path.join(output_path, 'val.txt'))
write_filenames_to_file(test_filenames, os.path.join(output_path, 'test.txt'))
print("Files have been split and saved successfully.")
!cp /content/drive/MyDrive/FIMUSDataset/Consistent-2-20e.pt /content/weights/Consistent-2-20e.pt
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 30 \
--img 640 \
--min-items 0 ∖
--data /content/yolov9-masterthesis/data-Consistent-2.yaml \
--cfg yolov9-e.yaml \
--project /content/Consistent-2-50e \
--single-cls \
--noval \
--weights /content/weights/Consistent-2-20e.pt \
--freeze 28
results saved to = "Consistent-2-50e/exp"
!zip -r {DRIVE}/Consistent-2-50e.zip {HOME}/$results_saved_to
```

```
%cd {HOME}
results_saved_to = "Consistent-2-75e/exp"
!zip -r {DRIVE}/Consistent-2-75e.zip {HOME}/$results_saved_to
--1ma 640 \
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 ∖
--epochs 25 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data-Consistent-2.yaml \
--cfg yolov9-e.yaml \
--project /content/Consistent-2-100e \
--single-cls \
--noval \
--weights /content/Consistent-2-75e/exp/weights/best.pt \
--freeze 28
results_saved_to = "Consistent-2-100e/exp"
!zip -r {DRIVE}/Consistent-2-100e.zip {HOME}/$results_saved_to
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 25 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data-Consistent-2.yaml \
--cfg yolov9-e.yaml \
--project /content/Consistent-2-125e \
--single-cls \
--noval \
--weights /content/Consistent-2-100e/exp/weights/best.pt \
--freeze 28
results_saved_to = "Consistent-2-125e/exp"
!zip -r {DRIVE}/Consistent-2-125e.zip {HOME}/$results_saved_to
%cd {HOME}
!python yolov9-masterthesis/train_dual.py \
--batch 10 \
--epochs 25 \
--img 640 \
--min-items 0 \
--data /content/yolov9-masterthesis/data-Consistent-2.yaml \
--cfg yolov9-e.yaml \
--project /content/Consistent-2-150e \
--single-cls \
--noval \
--weights /content/Consistent-2-125e/exp/weights/best.pt \
--freeze 28
results_saved_to = "Consistent-2-150e/exp"
!zip -r {DRIVE}/Consistent-2-150e.zip {HOME}/$results_saved_to
```