trackvigil

October 15, 2024

[1]:
```
!git clone https://github.com/ultralytics/yolov5  # clone
%cd yolov5
%pip install -qr requirements.txt comet_ml  # install

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

```
YOLOv5  v7.0-373-gabdfbd68 Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4,
15102MiB)

Setup complete  (2 CPUs, 12.7 GB RAM, 29.2/112.6 GB disk)
```

[2]:
```
from IPython.display import Image,clear_output
clear_output()
print('SetUp Complete')
```

```
SetUp Complete
```

[3]:
```
from google.colab import drive
import zipfile
import os

# Mount Google Drive
drive.mount('/content/drive')
```

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

[4]:
```
# Path to the zip file in your Google Drive
zip_file_path = '/content/drive/My Drive/srpdataset.zip'
# Directory to extract the dataset
extracted_dir_path = '/content/'
```

[5]:
```
# Unzip the file
with zipfile.ZipFile(zip_file_path, 'r') as zip_ref:
    zip_ref.extractall(extracted_dir_path)

# List the contents of the extracted directory
```

```
extracted_files = os.listdir(extracted_dir_path)
print("Extracted files:", extracted_files)
```

```
Extracted files: ['.config', 'drive', 'yolov5', 'srpdataset']
```

[7]:
```
!python train.py --img 640 --batch 2 --epochs 20 --data custom_data1.yaml␣
↪--weights yolov5x.pt --nosave --cache
```

```
2024-10-15 15:26:55.321231: 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
2024-10-15 15:26:55.361418: 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
2024-10-15 15:26:55.372947: 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
train: weights=yolov5x.pt, cfg=, data=custom_data1.yaml,
hyp=data/hyps/hyp.scratch-low.yaml, epochs=20, batch_size=2, imgsz=640,
rect=False, resume=False, nosave=True, noval=False, noautoanchor=False,
noplots=False, evolve=None, evolve_population=data/hyps, resume_evolve=None,
bucket=, cache=ram, image_weights=False, device=, multi_scale=False,
single_cls=False, optimizer=SGD, sync_bn=False, workers=8, project=runs/train,
name=exp, exist_ok=False, quad=False, cos_lr=False, label_smoothing=0.0,
patience=100, freeze=[0], save_period=-1, seed=0, local_rank=-1, entity=None,
upload_dataset=False, bbox_interval=-1, artifact_alias=latest,
ndjson_console=False, ndjson_file=False
github: up to date with https://github.com/ultralytics/yolov5
YOLOv5  v7.0-373-gabdfbd68 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=0.05, cls=0.5, cls_pw=1.0, obj=1.0, obj_pw=1.0, iou_t=0.2, anchor_t=4.0,
fl_gamma=0.0, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1,
scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, mosaic=1.0,
mixup=0.0, copy_paste=0.0
TensorBoard: Start with 'tensorboard --logdir runs/train', view at
http://localhost:6006/
COMET WARNING: Comet credentials have not been set. Comet will default to
offline logging. Please set your credentials to enable online logging.
COMET INFO: Using '/content/yolov5/.cometml-runs' path as
offline directory. Pass 'offline_directory' parameter into constructor or set
the 'COMET_OFFLINE_DIRECTORY' environment variable to manually choose where to
store offline experiment archives.
```

```
Downloading
https://github.com/ultralytics/yolov5/releases/download/v7.0/yolov5x.pt to
yolov5x.pt…
100%|      | 166M/166M [00:00<00:00, 301MB/s]

Overriding model.yaml nc=80 with nc=7

                 from  n    params  module
arguments
  0                -1  1      8800  models.common.Conv                      [3,
80, 6, 2, 2]
  1                -1  1    115520  models.common.Conv                      [80,
160, 3, 2]
  2                -1  4    309120  models.common.C3
[160, 160, 4]
  3                -1  1    461440  models.common.Conv
[160, 320, 3, 2]
  4                -1  8   2259200  models.common.C3
[320, 320, 8]
  5                -1  1   1844480  models.common.Conv
[320, 640, 3, 2]
  6                -1 12  13125120  models.common.C3
[640, 640, 12]
  7                -1  1   7375360  models.common.Conv
[640, 1280, 3, 2]
  8                -1  4  19676160  models.common.C3
[1280, 1280, 4]
  9                -1  1   4099840  models.common.SPPF
[1280, 1280, 5]
 10                -1  1    820480  models.common.Conv
[1280, 640, 1, 1]
 11                -1  1         0  torch.nn.modules.upsampling.Upsample
[None, 2, 'nearest']
 12           [-1, 6]  1         0  models.common.Concat                    [1]
 13                -1  4   5332480  models.common.C3
[1280, 640, 4, False]
 14                -1  1    205440  models.common.Conv
[640, 320, 1, 1]
 15                -1  1         0  torch.nn.modules.upsampling.Upsample
[None, 2, 'nearest']
 16           [-1, 4]  1         0  models.common.Concat                    [1]
 17                -1  4   1335040  models.common.C3
[640, 320, 4, False]
 18                -1  1    922240  models.common.Conv
[320, 320, 3, 2]
 19          [-1, 14]  1         0  models.common.Concat                    [1]
 20                -1  4   4922880  models.common.C3
[640, 640, 4, False]
```

```
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G    0.05986    0.04477    0.02088          5        640:
88%|      | 53/60 [00:12<00:01,  5.03it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G    0.05976    0.04464    0.02112          7        640:
90%|      | 54/60 [00:13<00:01,  5.09it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G    0.05999     0.0444    0.02105          8        640:
92%|      | 55/60 [00:13<00:01,  4.98it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G    0.05967    0.04412    0.02085          7        640:
93%|      | 56/60 [00:13<00:00,  5.08it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G    0.05984     0.0447    0.02076         16        640:
95%|      | 57/60 [00:13<00:00,  5.00it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G    0.05981    0.04497    0.02057         14        640:
97%|      | 58/60 [00:13<00:00,  5.09it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G       0.06    0.04499     0.0209          7        640:
98%|      | 59/60 [00:14<00:00,  5.09it/s]/content/yolov5/train.py:412:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with torch.cuda.amp.autocast(amp):
      19/19      3.42G       0.06    0.04507    0.02107         10        640:
100%|      | 60/60 [00:14<00:00,  4.20it/s]
                 Class     Images  Instances          P          R      mAP50
mAP50-95: 100%|      | 9/9 [00:01<00:00,  6.19it/s]
                   all         35         85      0.393      0.517      0.336
0.121

20 epochs completed in 0.087 hours.
Optimizer stripped from runs/train/exp/weights/last.pt, 173.1MB
Optimizer stripped from runs/train/exp/weights/best.pt, 173.1MB
```

```
Validating runs/train/exp/weights/best.pt…
Fusing layers…
Model summary: 322 layers, 86213788 parameters, 0 gradients, 203.9 GFLOPs
                 Class     Images  Instances          P          R      mAP50
mAP50-95: 100%|      | 9/9 [00:01<00:00,  5.62it/s]
                   all         35         85      0.393      0.517      0.336
0.121
        bolthole crack         35          9          1          0    0.00213
0.000891
          bolt missing         35          7      0.267          1       0.84
0.378
      rail corrugation         35         27      0.111       0.63      0.209
0.0624
      fastener missing         35          6      0.647      0.314      0.458
0.175
    track misalignment         35         11      0.217      0.545      0.226
0.0545
            rail crack         35          6      0.458        0.5      0.455
0.144
vegetation encroachment         35         19     0.0517      0.632      0.162
0.0306
Results saved to runs/train/exp
COMET INFO: ---------------------------------------------------
----------------------------------
COMET INFO: Comet.ml OfflineExperiment Summary
COMET INFO: ---------------------------------------------------
----------------------------------
COMET INFO:   Data:
COMET INFO:     display_summary_level : 1
COMET INFO:     name                  : exp
COMET INFO:     url                   : [OfflineExperiment will
get URL after upload]
COMET INFO:   Metrics [count] (min, max):
COMET INFO:     loss [102]                :
(0.14140461385250092, 0.499429851770401)
COMET INFO:     metrics/mAP_0.5 [40]      :
(0.001409850148442794, 0.336052405370907)
COMET INFO:     metrics/mAP_0.5:0.95 [40] :
(0.00025778248208676994, 0.12072437403950072)
COMET INFO:     metrics/precision [40]    :
(0.0014862595127940381, 0.671817635577949)
COMET INFO:     metrics/recall [40]       :
(0.10080757449178501, 0.6943621680463786)
COMET INFO:     train/box_loss [40]       :
(0.05842897295951843, 0.10746479779481888)
COMET INFO:     train/cls_loss [40]       :
(0.01726740598678589, 0.054842524230480194)
```

```
COMET INFO:     optimizer           : SGD
COMET INFO:     patience            : 100
COMET INFO:     perspective         : 0.0
COMET INFO:     project             : runs/train
COMET INFO:     quad                : False
COMET INFO:     rect                : False
COMET INFO:     resume              : False
COMET INFO:     resume_evolve       : None
COMET INFO:     save_dir            : runs/train/exp
COMET INFO:     save_period         : -1
COMET INFO:     scale               : 0.5
COMET INFO:     seed                : 0
COMET INFO:     shear               : 0.0
COMET INFO:     single_cls          : False
COMET INFO:     sync_bn             : False
COMET INFO:     translate           : 0.1
COMET INFO:     upload_dataset      : False
COMET INFO:     val_conf_threshold  : 0.001
COMET INFO:     val_iou_threshold   : 0.6
COMET INFO:     warmup_bias_lr      : 0.1
COMET INFO:     warmup_epochs       : 3.0
COMET INFO:     warmup_momentum     : 0.8
COMET INFO:     weight_decay        : 0.0005
COMET INFO:     workers             : 8
COMET INFO:   Uploads:
COMET INFO:     asset               : 13 (1.64 MB)
COMET INFO:     confusion-matrix    : 1
COMET INFO:     environment details : 1
COMET INFO:     git metadata        : 1
COMET INFO:     images              : 23
COMET INFO:     installed packages  : 1
COMET INFO:     model graph         : 1
COMET INFO:     os packages         : 1
COMET INFO:
COMET INFO: Still saving offline stats to messages file before
program termination (may take up to 120 seconds)
COMET INFO: Starting saving the offline archive
COMET INFO: To upload this offline experiment, run:
    comet upload /content/yolov5/.cometml-
runs/a0c30debc4b84f32ab3049fb963180a1.zip
```

[13]:
```
from PIL import Image
image1_path = '/content/drive/My Drive/testing_image.jpg'
image2_path= '/content/drive/My Drive/mischeck.jpg'
```

[14]:
```
model = torch.hub.load('ultralytics/yolov5', 'custom', path='runs/train/exp/
  ↪weights/best.pt')
```

```
Using cache found in /root/.cache/torch/hub/ultralytics_yolov5_master
YOLOv5  v7.0-373-gabdfbd68 Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4,
15102MiB)

Fusing layers…
Model summary: 322 layers, 86213788 parameters, 0 gradients, 203.9 GFLOPs
Adding AutoShape…
```

[15]:
```
image_paths = [image1_path,image2_path]
```

[16]:
```
# Loop through the image paths
for image_path in image_paths:
    # Load image
    img = Image.open(image_path)

    # Perform inference
    results = model(img)

    # Display results
    results.show()
```

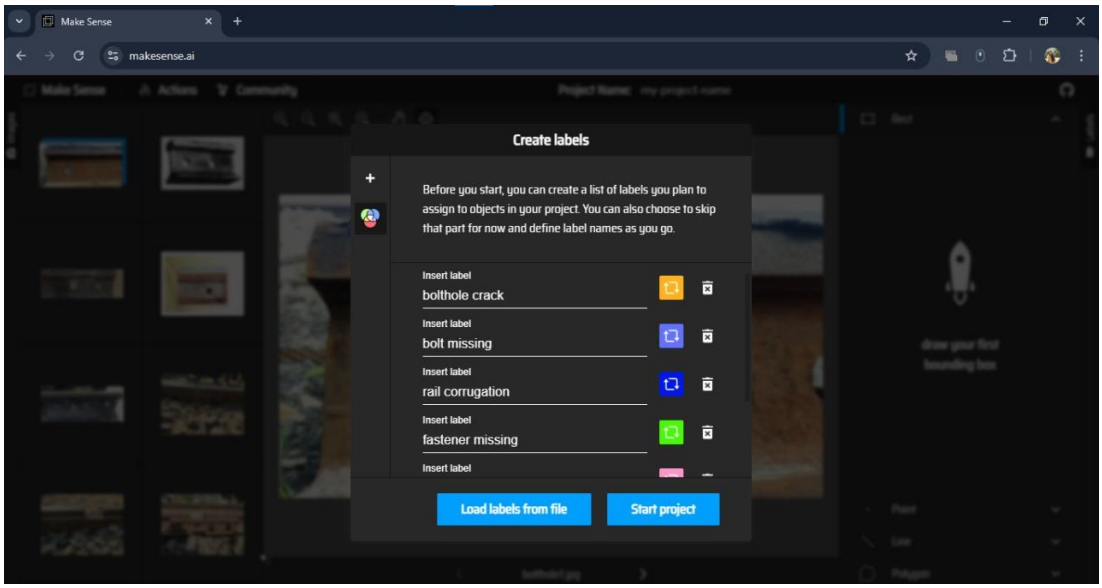
```
/root/.cache/torch/hub/ultralytics_yolov5_master/models/common.py:892:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with amp.autocast(autocast):
```

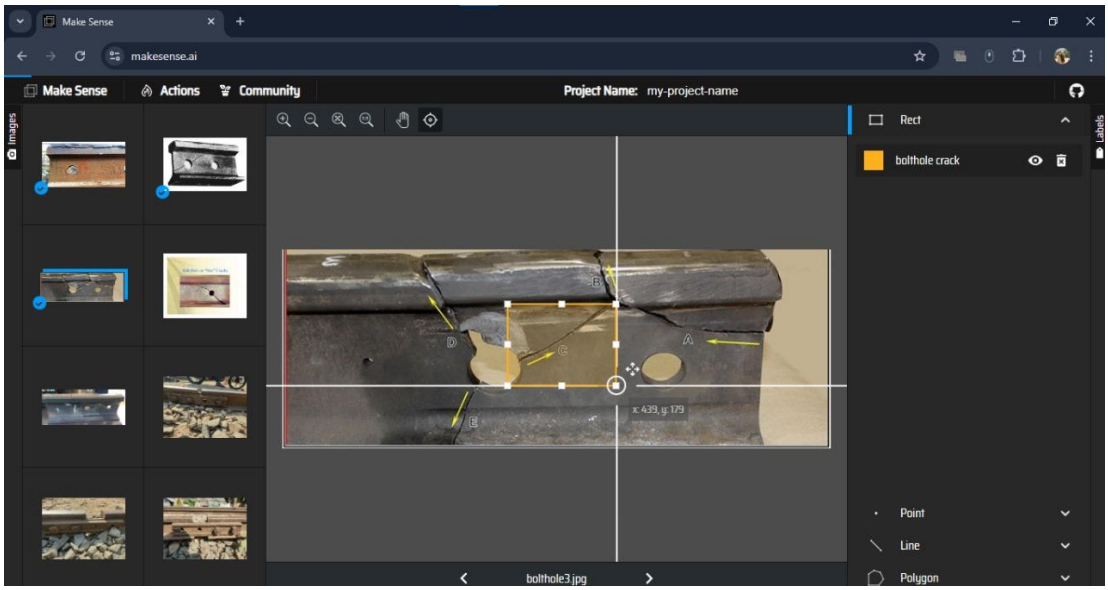
```
/root/.cache/torch/hub/ultralytics_yolov5_master/models/common.py:892:
FutureWarning: `torch.cuda.amp.autocast(args…)` is deprecated. Please use
`torch.amp.autocast('cuda', args…)` instead.
  with amp.autocast(autocast):
```

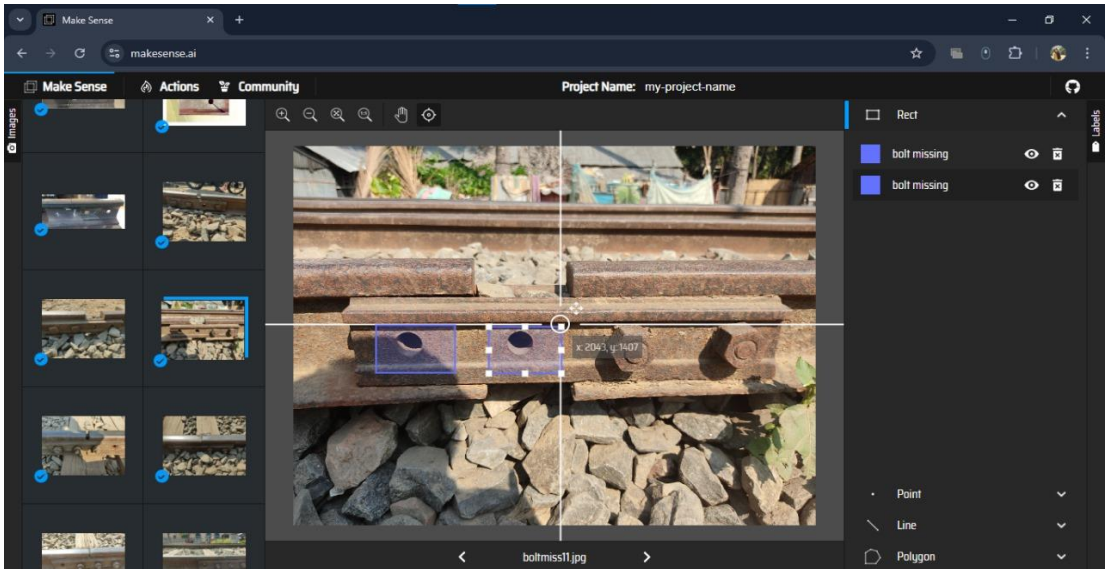
[12]:
```
!python detect.py --weights runs/train/exp/weights/best.pt --img 512 --conf 0.
↪25 --source ../testing_video.mp4
```

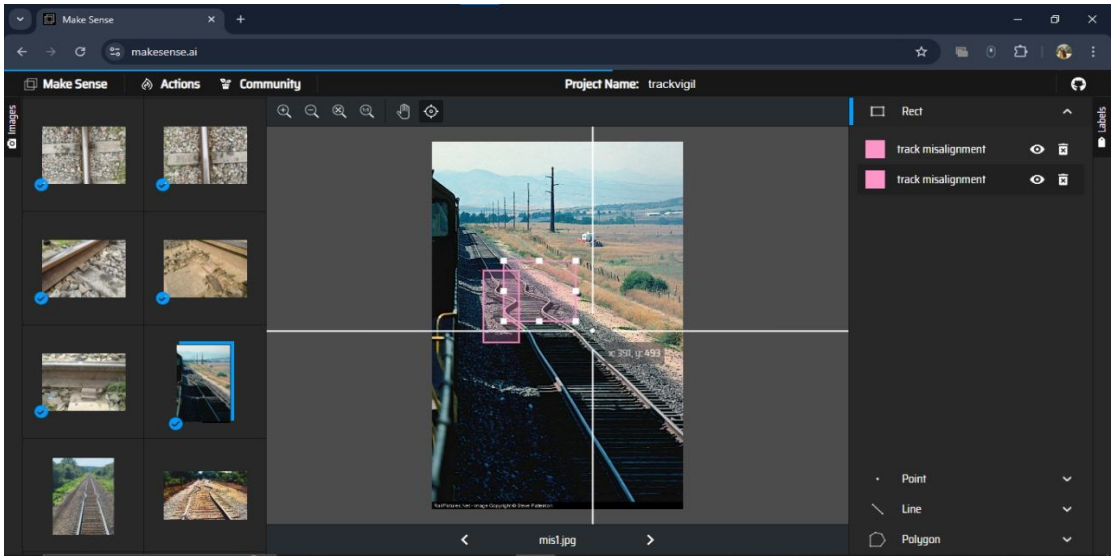
```
detect: weights=['runs/train/exp/weights/best.pt'],
source=../testing_video.mp4, data=data/coco128.yaml, imgsz=[512, 512],
conf_thres=0.25, iou_thres=0.45, max_det=1000, device=, view_img=False,
save_txt=False, save_format=0, save_csv=False, save_conf=False, save_crop=False,
nosave=False, classes=None, 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  v7.0-373-gabdfbd68 Python-3.10.12 torch-2.4.1+cu121 CUDA:0 (Tesla T4,
15102MiB)

Fusing layers…
Model summary: 322 layers, 86213788 parameters, 0 gradients, 203.9 GFLOPs
WARNING  NMS time limit 0.550s exceeded
video 1/1 (1/483) /content/testing_video.mp4: 512x256 1 vegetation encroachment,
90.8ms
video 1/1 (2/483) /content/testing_video.mp4: 512x256 1 vegetation encroachment,
31.2ms
video 1/1 (3/483) /content/testing_video.mp4: 512x256 2 vegetation
encroachments, 31.1ms
video 1/1 (4/483) /content/testing_video.mp4: 512x256 2 vegetation
```

DATA ANNOTATION:

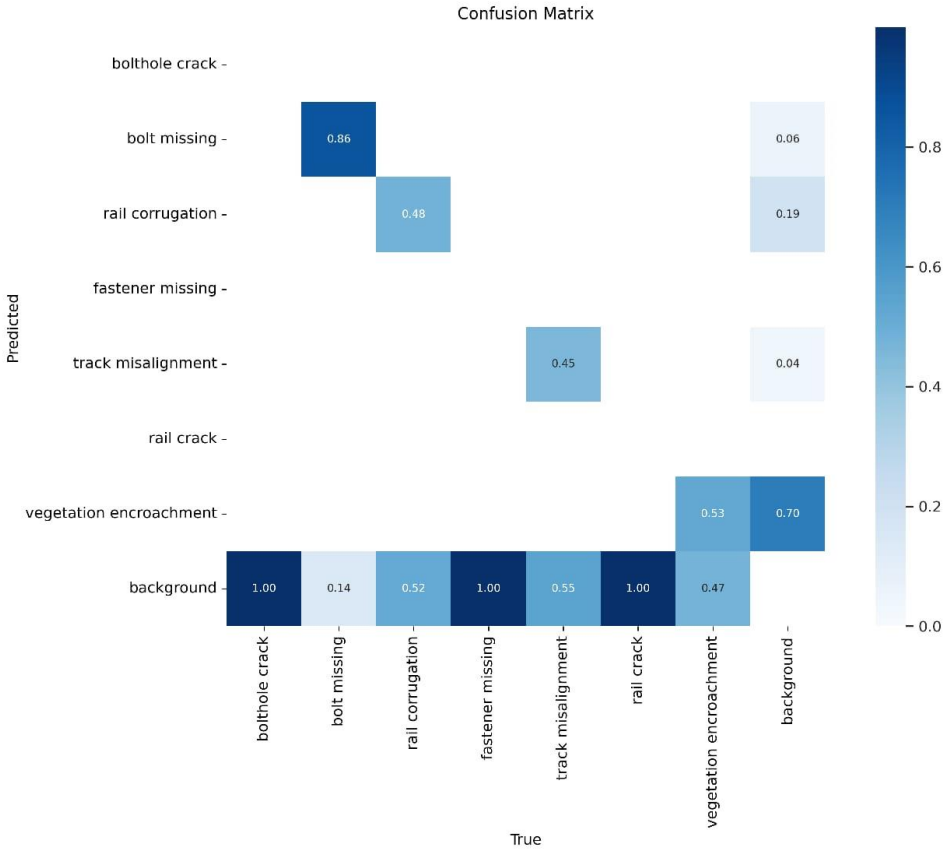


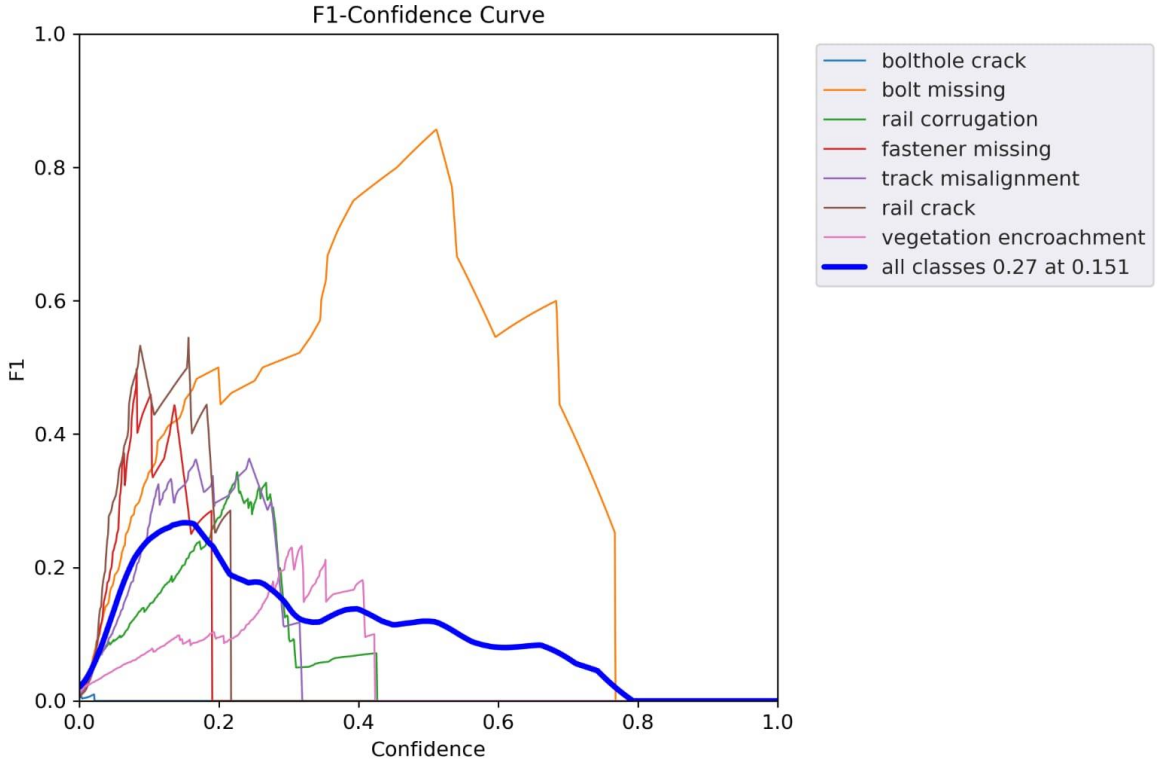


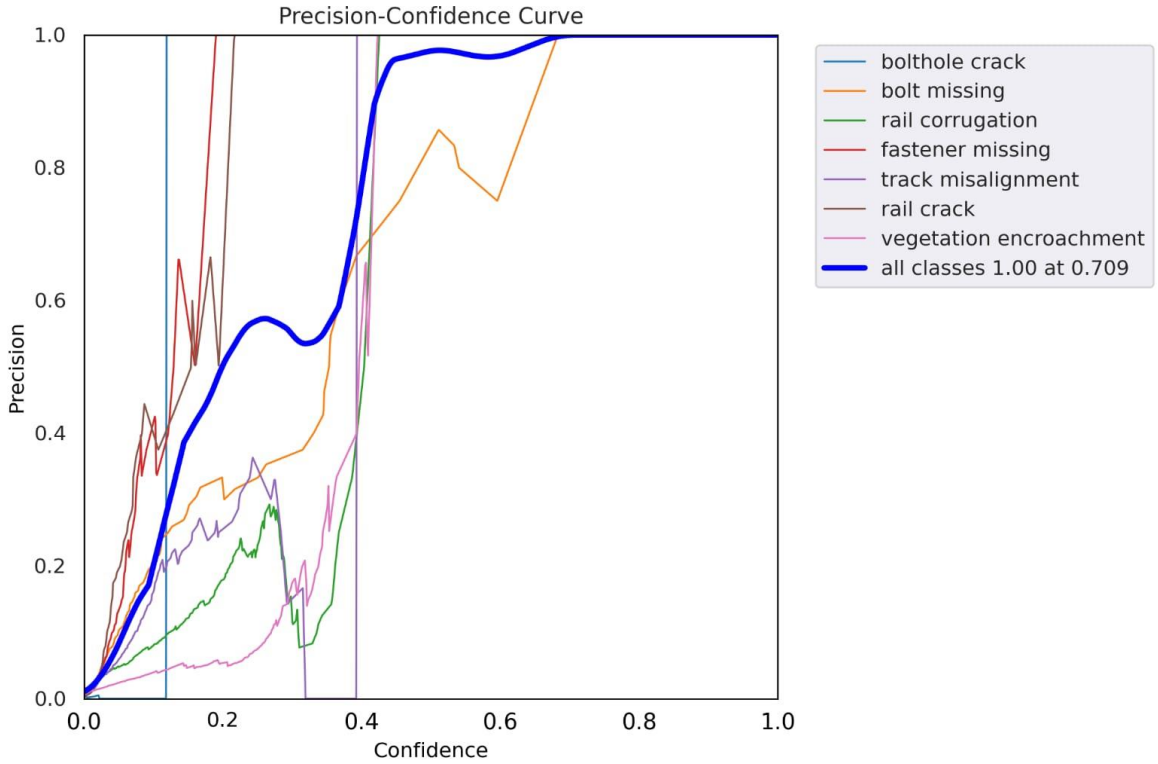


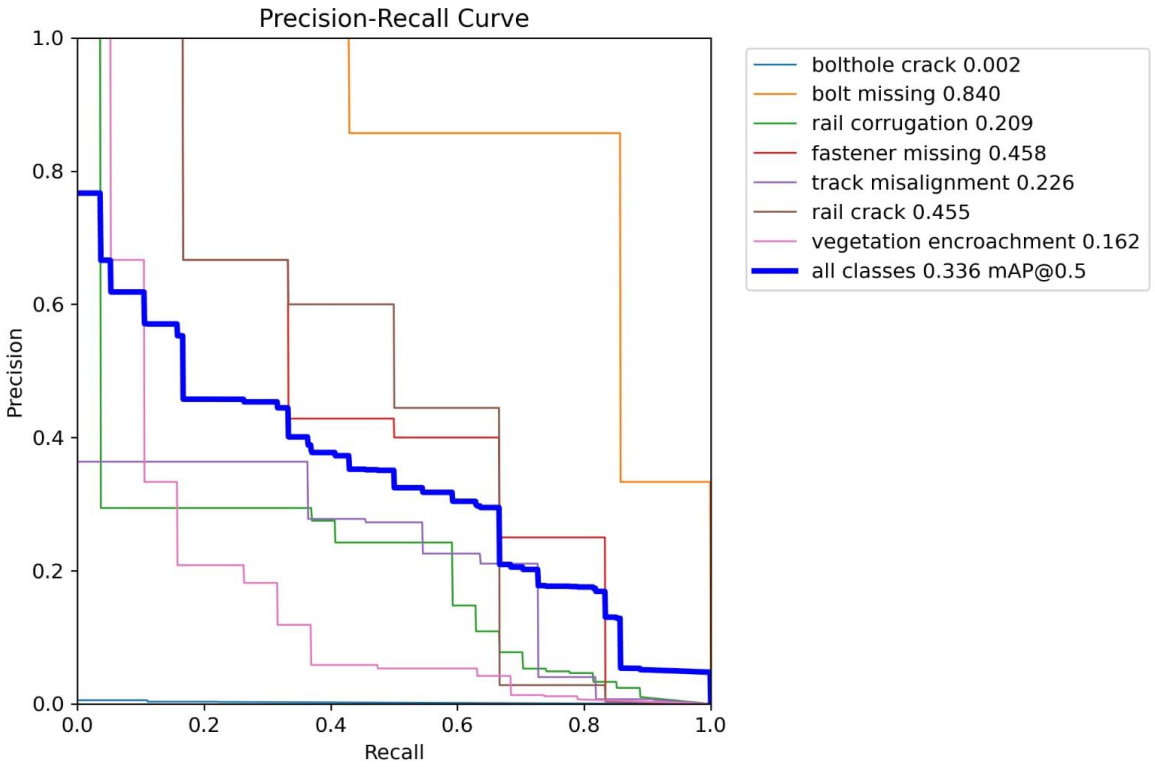

Make Sense
makesense.ai
Make Sense
Actions
Community
Project Name: trackvigil
Images
Labels
Rect
track misalignment
track misalignment
Point
Line
Polygon
mis1.jpg

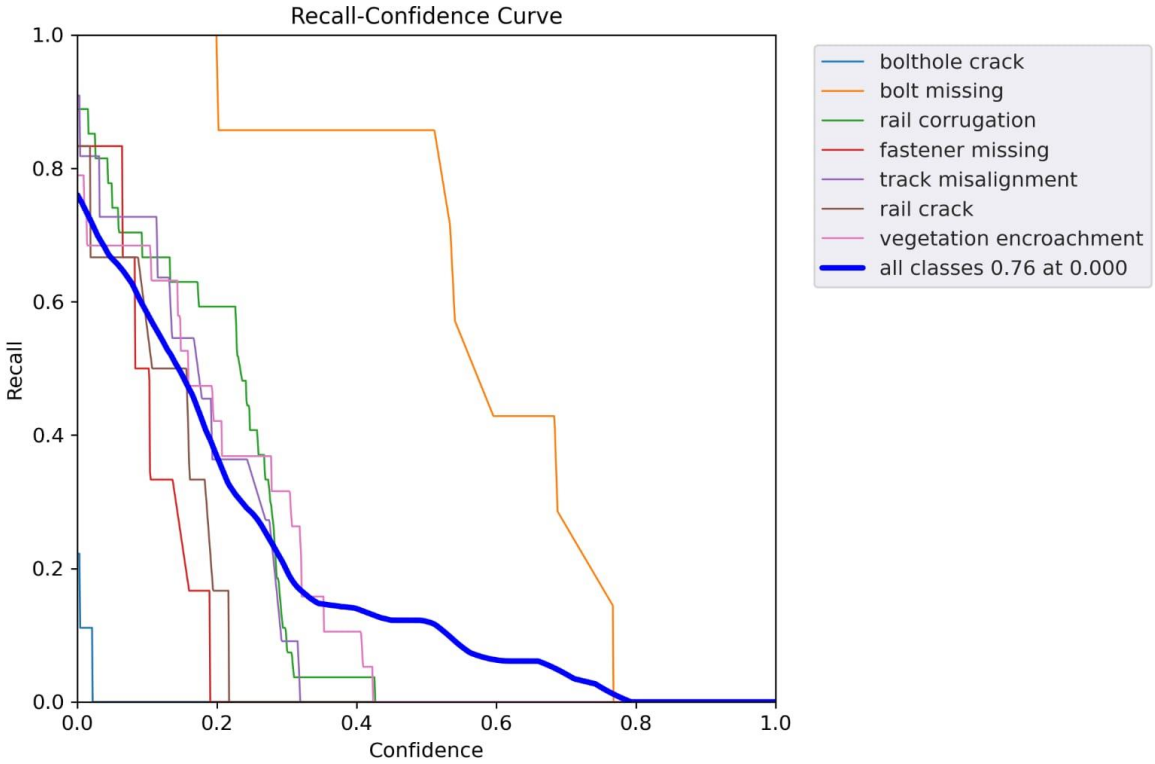
METRICS:

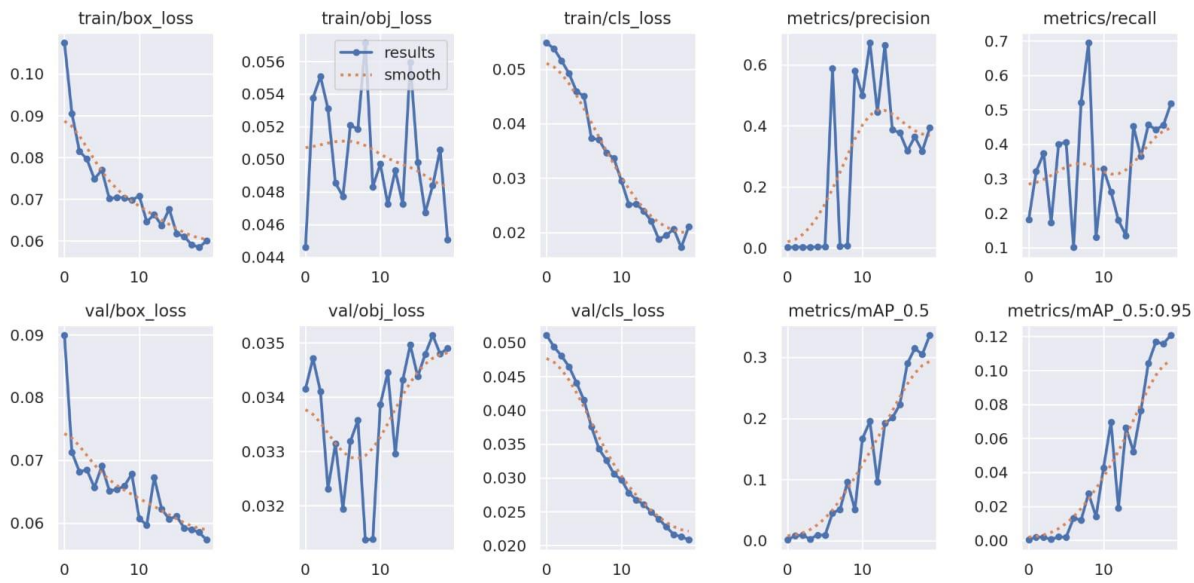

Confusion Matrix
bolthole crack
bolt missing
rail corrugation
fastener missing
track misalignment
rail crack
vegetation encroachment
background
Predicted
0.86
0.06
0.48
0.19
0.45
0.04
0.53
0.70
1.00
0.14
0.52
1.00
0.55
1.00
0.47
0.8
0.6
0.4
0.2
0.0
bolthole crack
bolt missing
rail corrugation
fastener missing
track misalignment
rail crack
vegetation encroachment
background
True


F1-Confidence Curve
F1
Confidence
0.0
0.2
0.4
0.6
0.8
1.0
bolthole crack
bolt missing
rail corrugation
fastener missing
track misalignment
rail crack
vegetation encroachment
all classes 0.27 at 0.151


Precision-Confidence Curve
Precision
Confidence
0.0
0.2
0.4
0.6
0.8
1.0
bolthole crack
bolt missing
rail corrugation
fastener missing
track misalignment
rail crack
vegetation encroachment
all classes 1.00 at 0.709


Precision-Recall Curve
Precision
Recall
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
bolthole crack 0.002
bolt missing 0.840
rail corrugation 0.209
fastener missing 0.458
track misalignment 0.226
rail crack 0.455
vegetation encroachment 0.162
all classes 0.336 mAP@0.5


Recall-Confidence Curve
Recall
Confidence
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
bolthole crack
bolt missing
rail corrugation
fastener missing
track misalignment
rail crack
vegetation encroachment
all classes 0.76 at 0.000


train/box_loss
train/obj_loss
results
smooth
train/cls_loss
metrics/precision
metrics/recall
val/box_loss
val/obj_loss
val/cls_loss
metrics/mAP_0.5
metrics/mAP_0.5:0.95