

assignment_5_2

October 7, 2022

```
[1]: gpu_info = !nvidia-smi
gpu_info = '\n'.join(gpu_info)
if gpu_info.find('failed') >= 0:
    print('Not connected to a GPU')
else:
    print(gpu_info)
```

Thu Oct 6 12:17:28 2022

```
+-----+
| NVIDIA-SMI 460.32.03      Driver Version: 460.32.03      CUDA Version: 11.2      |
+-----+-----+-----+-----+-----+-----+
| GPU  Name           Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|      Memory-Usage | GPU-Util  Compute M. |
|                                           MIG M. |
+-----+-----+-----+-----+-----+-----+
|   0   Tesla V100-SXM2...    Off   | 00000000:00:04:0 Off  |           0         |
| N/A   33C    P0     23W / 300W |      0MiB / 16160MiB |      0%      Default |
|                                           N/A         |
+-----+-----+-----+-----+-----+-----+

+-----+
| Processes:
| GPU   GI    CI          PID    Type    Process name                  GPU Memory
|      ID    ID                                   Usage
+-----+
| No running processes found
+-----+
```

```
[2]: !git clone https://github.com/ultralytics/yolov5 # clone
!pip install -r yolov5/requirements.txt # install
```

```
fatal: destination path 'yolov5' already exists and is not an empty directory.
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-
wheels/public/simple/
Requirement already satisfied: matplotlib>=3.2.2 in
/usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line
5)) (3.2.2)
Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.7/dist-
packages (from -r yolov5/requirements.txt (line 6)) (1.21.6)
```

Requirement already satisfied: opencv-python>=4.1.1 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 7)) (4.6.0.66)

Requirement already satisfied: Pillow>=7.1.2 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 8)) (7.1.2)

Requirement already satisfied: PyYAML>=5.3.1 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 9)) (6.0)

Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 10)) (2.23.0)

Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 11)) (1.7.3)

Requirement already satisfied: torch>=1.7.0 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 12)) (1.12.1+cu113)

Requirement already satisfied: torchvision>=0.8.1 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 13)) (0.13.1+cu113)

Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 14)) (4.64.1)

Requirement already satisfied: tensorboard>=2.4.1 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 18)) (2.8.0)

Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 23)) (1.3.5)

Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 24)) (0.11.2)

Requirement already satisfied: ipython in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 41)) (7.9.0)

Requirement already satisfied: psutil in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 42)) (5.4.8)

Requirement already satisfied: thop>=0.1.1 in /usr/local/lib/python3.7/dist-packages (from -r yolov5/requirements.txt (line 43)) (0.1.1.post2209072238)

Requirement already satisfied: cycycler>=0.10 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r yolov5/requirements.txt (line 5)) (0.11.0)

Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r yolov5/requirements.txt (line 5)) (3.0.9)

Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r yolov5/requirements.txt (line 5)) (2.8.2)

Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib>=3.2.2->-r yolov5/requirements.txt (line 5)) (1.4.4)

Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r yolov5/requirements.txt (line 10)) (1.24.3)

Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r yolov5/requirements.txt (line 10)) (2.10)

Requirement already satisfied: certifi>=2017.4.17 in
 /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r
 yolov5/requirements.txt (line 10)) (2022.6.15)

Requirement already satisfied: chardet<4,>=3.0.2 in
 /usr/local/lib/python3.7/dist-packages (from requests>=2.23.0->-r
 yolov5/requirements.txt (line 10)) (3.0.4)

Requirement already satisfied: typing-extensions in
 /usr/local/lib/python3.7/dist-packages (from torch>=1.7.0->-r
 yolov5/requirements.txt (line 12)) (4.1.1)

Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in
 /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (0.6.1)

Requirement already satisfied: wheel>=0.26 in /usr/local/lib/python3.7/dist-
 packages (from tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18))
 (0.37.1)

Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.7/dist-
 packages (from tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (1.2.0)

Requirement already satisfied: werkzeug>=0.11.15 in
 /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (1.0.1)

Requirement already satisfied: protobuf>=3.6.0 in /usr/local/lib/python3.7/dist-
 packages (from tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18))
 (3.17.3)

Requirement already satisfied: google-auth<3,>=1.6.3 in
 /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (1.35.0)

Requirement already satisfied: setuptools>=41.0.0 in
 /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (57.4.0)

Requirement already satisfied: grpcio>=1.24.3 in /usr/local/lib/python3.7/dist-
 packages (from tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18))
 (1.48.1)

Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in
 /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (0.4.6)

Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in
 /usr/local/lib/python3.7/dist-packages (from tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (1.8.1)

Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.7/dist-
 packages (from tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (3.4.1)

Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-
 packages (from pandas>=1.1.4->-r yolov5/requirements.txt (line 23)) (2022.2.1)

Requirement already satisfied: six>=1.9.0 in /usr/local/lib/python3.7/dist-
 packages (from google-auth<3,>=1.6.3->tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (1.15.0)

Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.7/dist-
 packages (from google-auth<3,>=1.6.3->tensorboard>=2.4.1->-r
 yolov5/requirements.txt (line 18)) (4.9)

Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (0.2.8)

Requirement already satisfied: cachetools<5.0,>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (4.2.4)

Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.7/dist-packages (from google-auth-oauthlib<0.5,>=0.4.1->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (1.3.1)

Requirement already satisfied: importlib-metadata>=4.4 in /usr/local/lib/python3.7/dist-packages (from markdown>=2.6.8->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (4.12.0)

Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata>=4.4->markdown>=2.6.8->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (3.8.1)

Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /usr/local/lib/python3.7/dist-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (0.4.8)

Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.7/dist-packages (from requests-oauthlib>=0.7.0->google-auth-oauthlib<0.5,>=0.4.1->tensorboard>=2.4.1->-r yolov5/requirements.txt (line 18)) (3.2.0)

Requirement already satisfied: pexpect in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (4.8.0)

Requirement already satisfied: pygments in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (2.6.1)

Requirement already satisfied: decorator in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (4.4.2)

Requirement already satisfied: backcall in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (0.2.0)

Requirement already satisfied: traitlets>=4.2 in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (5.1.1)

Requirement already satisfied: prompt-toolkit<2.1.0,>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (2.0.10)

Requirement already satisfied: pickleshare in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (0.7.5)

Requirement already satisfied: jedi>=0.10 in /usr/local/lib/python3.7/dist-packages (from ipython->-r yolov5/requirements.txt (line 41)) (0.18.1)

Requirement already satisfied: parso<0.9.0,>=0.8.0 in /usr/local/lib/python3.7/dist-packages (from jedi>=0.10->ipython->-r yolov5/requirements.txt (line 41)) (0.8.3)

Requirement already satisfied: wcwidth in /usr/local/lib/python3.7/dist-packages

(from prompt-toolkit<2.1.0,>=2.0.0->ipython->-r yolov5/requirements.txt (line 41)) (0.2.5)

Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.7/dist-packages (from pexpect->ipython->-r yolov5/requirements.txt (line 41)) (0.7.0)

```
[34]: import torch
from IPython.display import Image # for displaying images
import os
import random
import shutil
from sklearn.model_selection import train_test_split
import xml.etree.ElementTree as ET
from xml.dom import minidom
from tqdm import tqdm
from PIL import Image, ImageDraw
import numpy as np
import matplotlib.pyplot as plt
import glob
import cv2
```

```
[4]: from google.colab import drive
drive.mount('/content/gdrive')
!cp -f '/content/gdrive/MyDrive/sit789_assignment_5_2_data/
↳RoadSignDetectionDataset.zip' '/content/'
!rm -rf RoadSignDetectionDataset
!mkdir RoadSignDetectionDataset
!unzip /content/RoadSignDetectionDataset.zip -d /content/
↳RoadSignDetectionDataset/
```

Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive.mount("/content/gdrive", force_remount=True).

Archive: /content/RoadSignDetectionDataset.zip

```
inflating: /content/RoadSignDetectionDataset/annotations/road0.xml
inflating: /content/RoadSignDetectionDataset/annotations/road1.xml
inflating: /content/RoadSignDetectionDataset/annotations/road10.xml
inflating: /content/RoadSignDetectionDataset/annotations/road100.xml
inflating: /content/RoadSignDetectionDataset/annotations/road101.xml
inflating: /content/RoadSignDetectionDataset/annotations/road102.xml
inflating: /content/RoadSignDetectionDataset/annotations/road103.xml
inflating: /content/RoadSignDetectionDataset/annotations/road104.xml
inflating: /content/RoadSignDetectionDataset/annotations/road105.xml
inflating: /content/RoadSignDetectionDataset/annotations/road106.xml
inflating: /content/RoadSignDetectionDataset/annotations/road107.xml
inflating: /content/RoadSignDetectionDataset/annotations/road108.xml
inflating: /content/RoadSignDetectionDataset/annotations/road109.xml
inflating: /content/RoadSignDetectionDataset/annotations/road11.xml
inflating: /content/RoadSignDetectionDataset/annotations/road110.xml
inflating: /content/RoadSignDetectionDataset/annotations/road111.xml
```


[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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[illegible]

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[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
inflating: /content/RoadSignDetectionDataset/images/road90.png
inflating: /content/RoadSignDetectionDataset/images/road91.png
inflating: /content/RoadSignDetectionDataset/images/road92.png
inflating: /content/RoadSignDetectionDataset/images/road93.png
inflating: /content/RoadSignDetectionDataset/images/road94.png
inflating: /content/RoadSignDetectionDataset/images/road95.png
inflating: /content/RoadSignDetectionDataset/images/road96.png
inflating: /content/RoadSignDetectionDataset/images/road97.png
inflating: /content/RoadSignDetectionDataset/images/road98.png
inflating: /content/RoadSignDetectionDataset/images/road99.png
```

```
[5]: def extract_info_from_xml(xml_file):
    root = ET.parse(xml_file).getroot()

    # Initialise the info dict
    info_dict = {}
    info_dict['bboxes'] = []

    # Parse the XML Tree
    for elem in root:
        # Get the file name
        if elem.tag == "filename":
            info_dict['filename'] = elem.text

        # Get the image size
        elif elem.tag == "size":
            image_size = []
            for subelem in elem:
                image_size.append(int(subelem.text))

            info_dict['image_size'] = tuple(image_size)

        # Get details of the bounding box
        elif elem.tag == "object":
            bbox = {}
            for subelem in elem:
                if subelem.tag == "name":
                    bbox["class"] = subelem.text

                elif subelem.tag == "bndbox":
                    for subsubelem in subelem:
                        bbox[subsubelem.tag] = int(subsubelem.text)
            info_dict['bboxes'].append(bbox)

    return info_dict
```

```
[6]: print(extract_info_from_xml('/content/RoadSignDetectionDataset/annotations/
↳road4.xml'))
```

```
{'bboxes': [{'class': 'trafficlight', 'xmin': 20, 'ymin': 109, 'xmax': 81,
'ymax': 237}, {'class': 'trafficlight', 'xmin': 116, 'ymin': 162, 'xmax': 163,
'ymax': 272}, {'class': 'trafficlight', 'xmin': 189, 'ymin': 189, 'xmax': 233,
'ymax': 295}], 'filename': 'road4.png', 'image_size': (267, 400, 3)}
```

```
[7]: # Dictionary that maps class names to IDs
class_name_to_id_mapping = {"trafficlight": 0,
                             "stop": 1,
                             "speedlimit": 2,
                             "crosswalk": 3}

# Convert the info dict to the required yolo format and write it to disk
def convert_to_yolov5(info_dict):
    print_buffer = []

    # For each bounding box
    for b in info_dict["bboxes"]:
        try:
            class_id = class_name_to_id_mapping[b["class"]]
        except KeyError:
            print("Invalid Class. Must be one from ", class_name_to_id_mapping.
↳keys())

        # Transform the bbox co-ordinates as per the format required by YOLO v5
        b_center_x = (b["xmin"] + b["xmax"]) / 2
        b_center_y = (b["ymin"] + b["ymax"]) / 2
        b_width = (b["xmax"] - b["xmin"])
        b_height = (b["ymax"] - b["ymin"])

        # Normalise the co-ordinates by the dimensions of the image
        image_w, image_h, image_c = info_dict["image_size"]
        b_center_x /= image_w
        b_center_y /= image_h
        b_width /= image_w
        b_height /= image_h

        #Write the bbox details to the file
        print_buffer.append("{} {:.3f} {:.3f} {:.3f} {:.3f}".format(class_id,
↳b_center_x, b_center_y, b_width, b_height))

    # Name of the file which we have to save
    save_file_name = os.path.join("./annotations", info_dict["filename"].
↳replace("png", "txt"))
```

```

# Save the annotation to disk
print("\n".join(print_buffer), file= open(save_file_name, "w"))

```

```
[11]: %cd /content/RoadSignDetectionDataset
```

```

/content/RoadSignDetectionDataset
/content/RoadSignDetectionDataset

```

```

[12]: # Get the annotations
annotations = [os.path.join('./annotations', x) for x in os.listdir('./
↳annotations') if x[-3:] == ".xml"]
annotations.sort()

# Convert and save the annotations
for ann in tqdm(annotations):
    info_dict = extract_info_from_xml(ann)
    convert_to_yolov5(info_dict)
annotations = [os.path.join('./annotations', x) for x in os.listdir('./
↳annotations') if x[-3:] == ".txt"]

```

```
100%|          | 877/877 [00:00<00:00, 6939.27it/s]
```

```

[19]: class_id_to_name_mapping = dict(zip(class_name_to_id_mapping.values(),
↳class_name_to_id_mapping.keys()))

def plot_bounding_box(image, annotation_list):
    annotations = np.array(annotation_list)
    w, h = image.size

    plotted_image = ImageDraw.Draw(image)

    transformed_annotations = np.copy(annotations)
    transformed_annotations[:,[1,3]] = annotations[:,[1,3]] * w
    transformed_annotations[:,[2,4]] = annotations[:,[2,4]] * h

    transformed_annotations[:,1] = transformed_annotations[:,1] -
↳(transformed_annotations[:,3] / 2)
    transformed_annotations[:,2] = transformed_annotations[:,2] -
↳(transformed_annotations[:,4] / 2)
    transformed_annotations[:,3] = transformed_annotations[:,1] +
↳transformed_annotations[:,3]
    transformed_annotations[:,4] = transformed_annotations[:,2] +
↳transformed_annotations[:,4]

    for ann in transformed_annotations:
        obj_cls, x0, y0, x1, y1 = ann
        plotted_image.rectangle(((x0,y0), (x1,y1)))

```

```

        plotted_image.text((x0, y0 - 10),
↪class_id_to_name_mapping[(int(obj_cls)]))

plt.imshow(np.array(image))
plt.show()

# Get any random annotation file
annotation_file = random.choice(annotations)
with open(annotation_file, "r") as file:
    annotation_list = file.read().split("\n")[:-1]
    annotation_list = [x.split(" ") for x in annotation_list]
    annotation_list = [[float(y) for y in x ] for x in annotation_list]

#Get the corresponding image file
image_file = annotation_file.replace("annotations", "images").replace("txt",
↪"png")
assert os.path.exists(image_file)

#Load the image
image = Image.open(image_file)

#Plot the Bounding Box
plot_bounding_box(image, annotation_list)

```



```
[20]: # Read images and annotations
images = [os.path.join('images', x) for x in os.listdir('images')]
annotations = [os.path.join('annotations', x) for x in os.
↳listdir('annotations') if x[-3:] == ".txt"]

images.sort()
annotations.sort()

# Split the dataset into train-valid-test splits
train_images, val_images, train_annotations, val_annotations =
↳train_test_split(images, annotations, test_size = 0.2, random_state = 1)
val_images, test_images, val_annotations, test_annotations =
↳train_test_split(val_images, val_annotations, test_size = 0.5, random_state
↳= 1)
```

```
[21]: !mkdir images/train images/val images/test annotations/train annotations/val
↳annotations/test
```

```
[22]: #Utility function to move images
def move_files_to_folder(list_of_files, destination_folder):
    for f in list_of_files:
        try:
            shutil.move(f, destination_folder)
        except:
            print(f)
            assert False

# Move the splits into their folders
move_files_to_folder(train_images, 'images/train')
move_files_to_folder(val_images, 'images/val/')
move_files_to_folder(test_images, 'images/test/')
move_files_to_folder(train_annotations, 'annotations/train/')
move_files_to_folder(val_annotations, 'annotations/val/')
move_files_to_folder(test_annotations, 'annotations/test/')

```

```
[26]: !mv annotations labels
%cd ../yolov5
```

```
mv: cannot stat 'annotations': No such file or directory
/content/yolov5
```

```
[27]: !pwd
```

```
/content/yolov5
```

```
[31]: !python train.py --img 640 --cfg yolov5s.yaml --hyp hyp.scratch-high.yaml
↳--batch 32 --epochs 100 --data road_sign_data.yaml --weights yolov5s.pt
↳--workers 24 --name yolo_road_det
```

```

train: weights=yolov5s.pt, cfg=yolov5s.yaml,
data=road_sign_data.yaml, hyp=hyp.scratch-high.yaml, epochs=100, batch_size=32,
imgsz=640, rect=False, resume=False, nosave=False, noval=False,
noautoanchor=False, noplots=False, evolve=None, bucket=, cache=None,
image_weights=False, device=, multi_scale=False, single_cls=False,
optimizer=SGD, sync_bn=False, workers=24, project=runs/train,
name=yolo_road_det, 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

```

github: up to date with <https://github.com/ultralytics/yolov5>
YOLOv5 v6.2-186-g7f097dd Python-3.7.14 torch-1.12.1+cu113 CUDA:0 (Tesla V100-SXM2-16GB, 16160MiB)

```

hyperparameters: lr0=0.01, lrf=0.1, momentum=0.937,
weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warmup_bias_lr=0.1,
box=0.05, cls=0.3, cls_pw=1.0, obj=0.7, 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=0.9, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, mosaic=1.0,
mixup=0.1, copy_paste=0.1

```

Weights & Biases: run 'pip install wandb' to automatically track and visualize YOLOv5 runs in Weights & Biases

ClearML: run 'pip install clearml' to automatically track, visualize and remotely train YOLOv5 in ClearML

Comet: run 'pip install comet_ml' to automatically track and visualize YOLOv5 runs in Comet

TensorBoard: Start with 'tensorboard --logdir runs/train', 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, 51.0MB/s]

Downloading

<https://github.com/ultralytics/yolov5/releases/download/v6.2/yolov5s.pt> to yolov5s.pt...

100% 14.1M/14.1M [00:00<00:00, 41.4MB/s]

Overriding model.yaml nc=80 with nc=4

	from	n	params	module	
arguments					
0	-1	1	3520	models.common.Conv	[3,
32, 6, 2, 2]					
1	-1	1	18560	models.common.Conv	[32,
64, 3, 2]					
2	-1	1	18816	models.common.C3	[64,
64, 1]					
3	-1	1	73984	models.common.Conv	[64,
128, 3, 2]					

4	-1 2	115712	models.common.C3	
[128, 128, 2]				
5	-1 1	295424	models.common.Conv	
[128, 256, 3, 2]				
6	-1 3	625152	models.common.C3	
[256, 256, 3]				
7	-1 1	1180672	models.common.Conv	
[256, 512, 3, 2]				
8	-1 1	1182720	models.common.C3	
[512, 512, 1]				
9	-1 1	656896	models.common.SPPF	
[512, 512, 5]				
10	-1 1	131584	models.common.Conv	
[512, 256, 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 1	361984	models.common.C3	
[512, 256, 1, False]				
14	-1 1	33024	models.common.Conv	
[256, 128, 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 1	90880	models.common.C3	
[256, 128, 1, False]				
18	-1 1	147712	models.common.Conv	
[128, 128, 3, 2]				
19	[-1, 14] 1	0	models.common.Concat	[1]
20	-1 1	296448	models.common.C3	
[256, 256, 1, False]				
21	-1 1	590336	models.common.Conv	
[256, 256, 3, 2]				
22	[-1, 10] 1	0	models.common.Concat	[1]
23	-1 1	1182720	models.common.C3	
[512, 512, 1, False]				
24	[17, 20, 23] 1	24273	models.yolo.Detect	[4,
[[10, 13, 16, 30, 33, 23], [30, 61, 62, 45, 59, 119], [116, 90, 156, 198, 373, 326]], [128, 256, 512]]				

YOLOv5s summary: 214 layers, 7030417 parameters, 7030417 gradients, 16.0 GFLOPs

Transferred 342/349 items from yolov5s.pt

AMP: checks passed

optimizer: SGD(lr=0.01) with parameter groups 57 weight(decay=0.0), 60 weight(decay=0.0005), 60 bias

augmentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01), CLAHE(p=0.01, clip_limit=(1, 4.0), tile_grid_size=(8, 8))


```

train: Scanning '/content/RoadSignDetectionDataset/labels/train'
images and labels...701 found, 0 missing, 0 empty, 0 corrupt: 100% 701/701
[00:00<00:00, 5610.25it/s]
train: New cache created:
/content/RoadSignDetectionDataset/labels/train.cache
val: Scanning '/content/RoadSignDetectionDataset/labels/val' images
and labels...88 found, 0 missing, 0 empty, 0 corrupt: 100% 88/88 [00:00<00:00,
909.22it/s]
val: New cache created:
/content/RoadSignDetectionDataset/labels/val.cache

```

```

AutoAnchor: 5.59 anchors/target, 1.000 Best Possible Recall (BPR).
Current anchors are a good fit to dataset
Plotting labels to runs/train/yolo_road_det3/labels.jpg...
Image sizes 640 train, 640 val
Using 8 dataloader workers
Logging results to runs/train/yolo_road_det3
Starting training for 100 epochs...

```

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
0/99	6.46G	0.1083	0.02287	0.02311	87	640:
100% 22/22 [00:08<00:00, 2.70it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:02<00:00, 1.48s/it]				
	all	88	132	0.696	0.205	0.17
0.0441						

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
1/99	8.08G	0.06918	0.02491	0.01784	100	640:
100% 22/22 [00:04<00:00, 4.46it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00, 1.50it/s]				
	all	88	132	0.727	0.182	0.184
0.067						

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
2/99	8.08G	0.05932	0.02193	0.01667	112	640:
100% 22/22 [00:04<00:00, 4.75it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00, 1.46it/s]				
	all	88	132	0.623	0.195	0.125
0.0459						

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
3/99	8.08G	0.05778	0.01939	0.01546	95	640:
100% 22/22 [00:05<00:00, 3.87it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00, 1.70it/s]				

0.106	all	88	132	0.738	0.239	0.197
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Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
4/99	8.08G	0.05523	0.01759	0.01424	72	640:
100% 22/22 [00:05<00:00, 4.17it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.95it/s]						
	all	88	132	0.371	0.429	0.441

0.211	Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
	5/99	8.08G	0.05157	0.01466	0.01197	105	640:
100% 22/22 [00:06<00:00, 3.34it/s]							
	Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:01<00:00, 1.47it/s]							
	all	88	132	0.466	0.647	0.598	

0.275	Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
	6/99	8.08G	0.0483	0.01302	0.0103	93	640:
100% 22/22 [00:04<00:00, 4.85it/s]							
	Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:00<00:00, 2.27it/s]							
	all	88	132	0.832	0.629	0.787	

0.358	Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
	7/99	8.08G	0.04301	0.01145	0.008366	93	640:
100% 22/22 [00:05<00:00, 3.89it/s]							
	Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:00<00:00, 2.22it/s]							
	all	88	132	0.741	0.789	0.826	

0.405	Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
	8/99	8.08G	0.0423	0.01024	0.007336	93	640:
100% 22/22 [00:05<00:00, 4.03it/s]							
	Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:00<00:00, 2.04it/s]							
	all	88	132	0.863	0.802	0.882	

0.446	Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
	9/99	8.08G	0.03994	0.009085	0.006396	107	640:
100% 22/22 [00:05<00:00, 4.12it/s]							
	Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:01<00:00, 1.57it/s]							

	all	88	132	0.811	0.833	0.846
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0.473

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
10/99	8.08G	0.03822	0.00921	0.005511	82	640:
100%	22/22	[00:05<00:00,	4.04it/s]			
	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:00<00:00,	2.30it/s]		
	all	88	132	0.912	0.882	0.925

0.503

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
11/99	8.08G	0.03782	0.009302	0.005117	106	640:
100%	22/22	[00:06<00:00,	3.39it/s]			
	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:01<00:00,	1.99it/s]		
	all	88	132	0.839	0.868	0.856

0.501

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
12/99	8.08G	0.03578	0.008653	0.004564	107	640:
100%	22/22	[00:04<00:00,	4.76it/s]			
	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:00<00:00,	2.33it/s]		
	all	88	132	0.931	0.914	0.931

0.527

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
13/99	8.08G	0.03421	0.008664	0.004032	81	640:
100%	22/22	[00:05<00:00,	3.83it/s]			
	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:01<00:00,	1.81it/s]		
	all	88	132	0.826	0.917	0.909

0.541

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
14/99	8.08G	0.03359	0.008406	0.003831	81	640:
100%	22/22	[00:05<00:00,	3.88it/s]			
	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:00<00:00,	2.15it/s]		
	all	88	132	0.922	0.888	0.94

0.585

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
15/99	8.08G	0.03281	0.008031	0.003723	88	640:
100%	22/22	[00:05<00:00,	3.93it/s]			
	Class	Images	Instances	P	R	mAP50
mAP50-95:	100%	2/2	[00:01<00:00,	1.99it/s]		

	all	88	132	0.965	0.88	0.941
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0.579

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
16/99	8.08G	0.0319	0.008042	0.003496	92	640:
100% 22/22 [00:05<00:00, 3.98it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.02it/s]						
	all	88	132	0.974	0.905	0.967

0.594

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
17/99	8.08G	0.03269	0.007651	0.003462	72	640:
100% 22/22 [00:05<00:00, 4.38it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.55it/s]						
	all	88	132	0.938	0.941	0.962

0.644

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
18/99	8.08G	0.03105	0.008038	0.003225	129	640:
100% 22/22 [00:05<00:00, 3.71it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.14it/s]						
	all	88	132	0.942	0.937	0.963

0.602

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
19/99	8.08G	0.03093	0.007821	0.00322	78	640:
100% 22/22 [00:06<00:00, 3.54it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.82it/s]						
	all	88	132	0.964	0.953	0.975

0.637

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
20/99	8.08G	0.02957	0.007462	0.002836	95	640:
100% 22/22 [00:05<00:00, 4.15it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.04it/s]						
	all	88	132	0.956	0.938	0.962

0.639

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
21/99	8.08G	0.02988	0.007722	0.00294	72	640:
100% 22/22 [00:06<00:00, 3.65it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.50it/s]						

	all	88	132	0.918	0.924	0.953
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0.614

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
22/99	8.08G	0.0289	0.007662	0.002786	100	640:
100% 22/22 [00:05<00:00, 3.77it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.16it/s]						
	all	88	132	0.975	0.924	0.948

0.606

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
23/99	8.08G	0.02918	0.007114	0.002713	90	640:
100% 22/22 [00:06<00:00, 3.56it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.45it/s]						
	all	88	132	0.981	0.921	0.953

0.597

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
24/99	8.08G	0.02908	0.007546	0.002646	93	640:
100% 22/22 [00:05<00:00, 4.13it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.82it/s]						
	all	88	132	0.95	0.949	0.978

0.695

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
25/99	8.08G	0.02719	0.006949	0.002307	91	640:
100% 22/22 [00:05<00:00, 3.96it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.87it/s]						
	all	88	132	0.951	0.944	0.965

0.672

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
26/99	8.08G	0.02712	0.007153	0.002457	95	640:
100% 22/22 [00:05<00:00, 3.89it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.93it/s]						
	all	88	132	0.942	0.928	0.966

0.686

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
27/99	8.08G	0.02743	0.007378	0.00251	98	640:
100% 22/22 [00:05<00:00, 3.86it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.43it/s]						

	all	88	132	0.981	0.943	0.961
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0.717

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
28/99	8.08G	0.0266	0.00686	0.002348	107	640:
100% 22/22	[00:05<00:00,	3.80it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2 [00:00<00:00,	2.33it/s]				
	all	88	132	0.963	0.95	0.974

0.723

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
29/99	8.08G	0.02687	0.007231	0.002493	75	640:
100% 22/22	[00:05<00:00,	3.97it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2 [00:01<00:00,	1.88it/s]				
	all	88	132	0.958	0.981	0.989

0.705

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
30/99	8.08G	0.02619	0.007012	0.00217	75	640:
100% 22/22	[00:06<00:00,	3.64it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2 [00:01<00:00,	1.56it/s]				
	all	88	132	0.954	0.971	0.98

0.694

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
31/99	8.08G	0.02723	0.007169	0.002381	113	640:
100% 22/22	[00:06<00:00,	3.59it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2 [00:00<00:00,	2.47it/s]				
	all	88	132	0.966	0.944	0.977

0.713

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
32/99	8.08G	0.02561	0.007232	0.00223	85	640:
100% 22/22	[00:07<00:00,	3.10it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2 [00:01<00:00,	1.77it/s]				
	all	88	132	0.957	0.965	0.98

0.716

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
33/99	8.08G	0.02568	0.006736	0.002239	93	640:
100% 22/22	[00:05<00:00,	4.34it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2 [00:00<00:00,	2.16it/s]				

	all	88	132	0.971	0.897	0.966
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0.672

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
34/99	8.08G	0.02528	0.006985	0.002148	84	640:
100% 22/22 [00:05<00:00, 3.85it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.51it/s]						
	all	88	132	0.95	0.926	0.97

0.725

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
35/99	8.08G	0.02457	0.006875	0.001967	78	640:
100% 22/22 [00:05<00:00, 4.13it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.27it/s]						
	all	88	132	0.928	0.965	0.976

0.718

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
36/99	8.08G	0.02456	0.00686	0.002048	129	640:
100% 22/22 [00:07<00:00, 3.07it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.03it/s]						
	all	88	132	0.977	0.92	0.981

0.704

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
37/99	8.08G	0.02389	0.006842	0.002111	81	640:
100% 22/22 [00:05<00:00, 3.77it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.74it/s]						
	all	88	132	0.968	0.943	0.962

0.731

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
38/99	8.08G	0.02478	0.006474	0.001945	92	640:
100% 22/22 [00:05<00:00, 4.31it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.72it/s]						
	all	88	132	0.965	0.924	0.974

0.744

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
39/99	8.08G	0.0245	0.006911	0.001883	103	640:
100% 22/22 [00:05<00:00, 4.05it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.64it/s]						

	all	88	132	0.986	0.924	0.978
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0.73

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
40/99	8.08G	0.02318	0.006571	0.001915	87	640:
100% 22/22 [00:06<00:00, 3.34it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.36it/s]						
	all	88	132	0.968	0.948	0.977

0.757

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
41/99	8.08G	0.02357	0.006809	0.001882	120	640:
100% 22/22 [00:05<00:00, 3.76it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.97it/s]						
	all	88	132	0.983	0.941	0.98

0.728

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
42/99	8.08G	0.02328	0.00653	0.001925	78	640:
100% 22/22 [00:05<00:00, 3.97it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.02it/s]						
	all	88	132	0.922	0.979	0.974

0.712

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
43/99	8.08G	0.0228	0.006247	0.001741	80	640:
100% 22/22 [00:05<00:00, 3.93it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.35it/s]						
	all	88	132	0.948	0.962	0.981

0.719

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
44/99	8.08G	0.02229	0.00612	0.001663	79	640:
100% 22/22 [00:06<00:00, 3.43it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.10it/s]						
	all	88	132	0.889	0.974	0.972

0.738

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
45/99	8.08G	0.02211	0.006153	0.00182	90	640:
100% 22/22 [00:06<00:00, 3.50it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.24it/s]						

	all	88	132	0.979	0.933	0.975
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0.735

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
46/99	8.08G	0.02258	0.006025	0.001796	105	640:
100% 22/22 [00:06<00:00, 3.29it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.73it/s]						
	all	88	132	0.981	0.944	0.977

0.743

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
47/99	8.08G	0.02194	0.006173	0.001674	59	640:
100% 22/22 [00:06<00:00, 3.60it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.73it/s]						
	all	88	132	0.956	0.966	0.967

0.741

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
48/99	8.08G	0.0216	0.006345	0.001681	90	640:
100% 22/22 [00:05<00:00, 3.80it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.12it/s]						
	all	88	132	0.979	0.931	0.968

0.746

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
49/99	8.08G	0.02123	0.00614	0.001655	82	640:
100% 22/22 [00:05<00:00, 3.88it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.93it/s]						
	all	88	132	0.974	0.968	0.981

0.764

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
50/99	8.08G	0.02203	0.006111	0.001561	89	640:
100% 22/22 [00:05<00:00, 4.02it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.16it/s]						
	all	88	132	0.98	0.925	0.962

0.736

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
51/99	8.08G	0.02125	0.006039	0.001574	57	640:
100% 22/22 [00:05<00:00, 3.67it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.97it/s]						

0.748	all	88	132	0.979	0.962	0.975
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Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
52/99	8.08G	0.02105	0.006075	0.001573	81	640:
100% 22/22 [00:05<00:00, 4.35it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.45it/s]						
	all	88	132	0.971	0.967	0.972

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
53/99	8.08G	0.02138	0.006079	0.001534	88	640:
100% 22/22 [00:06<00:00, 3.22it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.22it/s]						
	all	88	132	0.928	0.973	0.975

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
54/99	8.08G	0.02074	0.00584	0.001547	86	640:
100% 22/22 [00:06<00:00, 3.40it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.68it/s]						
	all	88	132	0.932	0.974	0.97

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
55/99	8.08G	0.02098	0.005952	0.001354	97	640:
100% 22/22 [00:07<00:00, 2.99it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.97it/s]						
	all	88	132	0.942	0.97	0.983

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
56/99	8.08G	0.02078	0.006223	0.001337	107	640:
100% 22/22 [00:05<00:00, 3.75it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.92it/s]						
	all	88	132	0.936	0.971	0.984

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
57/99	8.08G	0.02053	0.00623	0.00144	57	640:
100% 22/22 [00:06<00:00, 3.38it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.04it/s]						

all 88 132 0.918 0.984 0.984
0.763

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
58/99	8.08G	0.02003	0.005945	0.001456	97	640:
100% 22/22 [00:05<00:00, 3.77it/s]						
Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:01<00:00, 1.74it/s]						
all	88	132	0.944	0.959	0.984	

0.763

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
59/99	8.08G	0.02022	0.005878	0.001516	97	640:
100% 22/22 [00:05<00:00, 3.67it/s]						
Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:00<00:00, 2.31it/s]						
all	88	132	0.954	0.97	0.981	

0.766

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
60/99	8.08G	0.01931	0.005838	0.001416	83	640:
100% 22/22 [00:04<00:00, 4.49it/s]						
Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:01<00:00, 1.87it/s]						
all	88	132	0.984	0.914	0.975	

0.765

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
61/99	8.08G	0.02001	0.005658	0.001352	91	640:
100% 22/22 [00:06<00:00, 3.58it/s]						
Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:01<00:00, 1.92it/s]						
all	88	132	0.951	0.97	0.984	

0.77

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
62/99	8.08G	0.01964	0.005909	0.001306	78	640:
100% 22/22 [00:05<00:00, 4.09it/s]						
Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:00<00:00, 2.03it/s]						
all	88	132	0.978	0.979	0.991	

0.782

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
63/99	8.08G	0.01921	0.005922	0.001344	81	640:
100% 22/22 [00:06<00:00, 3.60it/s]						
Class	Images	Instances	P	R	mAP50	
mAP50-95: 100% 2/2 [00:01<00:00, 1.90it/s]						

	all	88	132	0.924	0.983	0.971
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0.776

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
64/99	8.08G	0.018	0.005566	0.001249	108	640:
100% 22/22 [00:05<00:00, 4.07it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.62it/s]						
	all	88	132	0.965	0.934	0.976

0.755

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
65/99	8.08G	0.01843	0.005869	0.001095	95	640:
100% 22/22 [00:06<00:00, 3.38it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.26it/s]						
	all	88	132	0.937	0.984	0.974

0.775

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
66/99	8.08G	0.01883	0.005993	0.001225	85	640:
100% 22/22 [00:06<00:00, 3.24it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.48it/s]						
	all	88	132	0.959	0.98	0.985

0.767

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
67/99	8.08G	0.01945	0.005669	0.001283	98	640:
100% 22/22 [00:06<00:00, 3.60it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.08it/s]						
	all	88	132	0.966	0.95	0.984

0.78

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
68/99	8.08G	0.01815	0.005539	0.00129	87	640:
100% 22/22 [00:05<00:00, 3.76it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.92it/s]						
	all	88	132	0.962	0.933	0.984

0.779

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
69/99	8.08G	0.01852	0.005758	0.001265	102	640:
100% 22/22 [00:05<00:00, 3.82it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.68it/s]						

	all	88	132	0.94	0.962	0.973
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0.768

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
70/99	8.08G	0.01787	0.005545	0.001143	96	640:
100% 22/22 [00:06<00:00, 3.58it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.44it/s]						
	all	88	132	0.977	0.947	0.973

0.79

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
71/99	8.08G	0.01814	0.005644	0.001157	110	640:
100% 22/22 [00:05<00:00, 4.03it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.18it/s]						
	all	88	132	0.947	0.952	0.974

0.77

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
72/99	8.08G	0.01739	0.005552	0.000976	80	640:
100% 22/22 [00:05<00:00, 3.88it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.88it/s]						
	all	88	132	0.921	0.961	0.981

0.784

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
73/99	8.08G	0.0177	0.005701	0.001083	101	640:
100% 22/22 [00:06<00:00, 3.57it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.24it/s]						
	all	88	132	0.965	0.911	0.979

0.773

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
74/99	8.08G	0.01706	0.005411	0.001092	71	640:
100% 22/22 [00:06<00:00, 3.29it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.75it/s]						
	all	88	132	0.952	0.955	0.985

0.799

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
75/99	8.08G	0.01731	0.005856	0.001112	107	640:
100% 22/22 [00:05<00:00, 3.86it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.63it/s]						

	all	88	132	0.95	0.976	0.988
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0.792

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
76/99	8.08G	0.01718	0.005293	0.001084	88	640:
100% 22/22	[00:06<00:00,	3.60it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.01it/s]			
	all	88	132	0.956	0.944	0.987

0.802

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
77/99	8.08G	0.01741	0.005503	0.001028	88	640:
100% 22/22	[00:04<00:00,	4.50it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.95it/s]			
	all	88	132	0.95	0.982	0.989

0.783

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
78/99	8.08G	0.01702	0.005364	0.001006	81	640:
100% 22/22	[00:06<00:00,	3.28it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.21it/s]			
	all	88	132	0.971	0.985	0.993

0.786

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
79/99	8.08G	0.01664	0.005333	0.0009713	96	640:
100% 22/22	[00:06<00:00,	3.61it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00,	1.77it/s]			
	all	88	132	0.981	0.965	0.989

0.809

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
80/99	8.08G	0.0164	0.005115	0.0009684	96	640:
100% 22/22	[00:04<00:00,	4.84it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00,	1.53it/s]			
	all	88	132	0.966	0.967	0.988

0.796

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
81/99	8.08G	0.01661	0.005311	0.0009634	90	640:
100% 22/22	[00:05<00:00,	3.78it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.11it/s]			

	all	88	132	0.972	0.96	0.988
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0.798

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
82/99	8.08G	0.01619	0.00552	0.0009595	106	640:
100% 22/22	[00:06<00:00,	3.16it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.33it/s]			
	all	88	132	0.959	0.98	0.988

0.802

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
83/99	8.08G	0.01606	0.005174	0.0009515	85	640:
100% 22/22	[00:05<00:00,	3.67it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00,	1.71it/s]			
	all	88	132	0.939	0.97	0.983

0.792

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
84/99	8.08G	0.01631	0.005249	0.0009134	60	640:
100% 22/22	[00:05<00:00,	4.34it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.51it/s]			
	all	88	132	0.943	0.961	0.977

0.796

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
85/99	8.08G	0.01593	0.005192	0.0009041	98	640:
100% 22/22	[00:06<00:00,	3.39it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.18it/s]			
	all	88	132	0.974	0.928	0.976

0.794

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
86/99	8.08G	0.01652	0.005258	0.0008908	69	640:
100% 22/22	[00:05<00:00,	3.72it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.10it/s]			
	all	88	132	0.902	0.992	0.984

0.787

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
87/99	8.08G	0.0157	0.005241	0.0009021	54	640:
100% 22/22	[00:06<00:00,	3.53it/s]				
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:00<00:00,	2.18it/s]			

	all	88	132	0.941	0.986	0.985
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0.785

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
88/99	8.08G	0.01559	0.005297	0.0008223	84	640:
100% 22/22 [00:06<00:00, 3.42it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.22it/s]						
	all	88	132	0.971	0.955	0.985

0.795

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
89/99	8.08G	0.01606	0.005096	0.0008322	100	640:
100% 22/22 [00:05<00:00, 4.06it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.81it/s]						
	all	88	132	0.939	0.972	0.984

0.797

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
90/99	8.08G	0.01604	0.005375	0.0008942	75	640:
100% 22/22 [00:06<00:00, 3.48it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.62it/s]						
	all	88	132	0.972	0.969	0.989

0.794

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
91/99	8.08G	0.01549	0.00493	0.0009987	79	640:
100% 22/22 [00:06<00:00, 3.63it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.87it/s]						
	all	88	132	0.976	0.968	0.989

0.799

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
92/99	8.08G	0.015	0.005198	0.0007106	84	640:
100% 22/22 [00:05<00:00, 3.93it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.12it/s]						
	all	88	132	0.977	0.958	0.988

0.793

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
93/99	8.08G	0.01462	0.004842	0.0008006	89	640:
100% 22/22 [00:06<00:00, 3.52it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.05it/s]						

	all	88	132	0.943	0.974	0.981
--	-----	----	-----	-------	-------	-------

0.805

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
94/99	8.08G	0.01492	0.004959	0.0008217	100	640:
100% 22/22 [00:06<00:00, 3.45it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.84it/s]						
	all	88	132	0.99	0.924	0.972

0.797

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
95/99	8.08G	0.01456	0.005134	0.0008545	89	640:
100% 22/22 [00:06<00:00, 3.29it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.54it/s]						
	all	88	132	0.989	0.925	0.972

0.808

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
96/99	8.08G	0.01425	0.004754	0.0006507	68	640:
100% 22/22 [00:05<00:00, 4.09it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.66it/s]						
	all	88	132	0.992	0.928	0.971

0.802

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
97/99	8.08G	0.01453	0.004586	0.0007498	82	640:
100% 22/22 [00:05<00:00, 4.05it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.01it/s]						
	all	88	132	0.985	0.937	0.974

0.819

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
98/99	8.08G	0.01493	0.005011	0.0006505	85	640:
100% 22/22 [00:05<00:00, 3.81it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:01<00:00, 1.76it/s]						
	all	88	132	0.96	0.97	0.985

0.82

Epoch	GPU_mem	box_loss	obj_loss	cls_loss	Instances	Size
99/99	8.08G	0.01428	0.004918	0.0009268	90	640:
100% 22/22 [00:05<00:00, 4.35it/s]						
	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 2/2 [00:00<00:00, 2.60it/s]						

	all	88	132	0.993	0.922	0.983
--	-----	----	-----	-------	-------	-------

0.812

100 epochs completed in 0.215 hours.

Optimizer stripped from runs/train/yolo_road_det3/weights/last.pt, 14.4MB

Optimizer stripped from runs/train/yolo_road_det3/weights/best.pt, 14.4MB

Validating runs/train/yolo_road_det3/weights/best.pt...

Fusing layers...

YOLOv5s summary: 157 layers, 7020913 parameters, 0 gradients, 15.8 GFLOPs

	Class	Images	Instances	P	R	mAP50
mAP50-95: 100%	2/2	[00:01<00:00,	1.27it/s]			
	all	88	132	0.96	0.97	0.985
0.823	trafficlight	88	19	0.894	0.89	0.956
0.626	stop	88	10	0.972	1	0.995
0.923	speedlimit	88	81	0.972	1	0.995
0.906	crosswalk	88	22	1	0.989	0.995

0.835

Results saved to runs/train/yolo_road_det3

```
[43]: model_name = "/content/yolov5/runs/train/yolo_road_det3/weights/best.pt"
test_model = torch.hub.load("ultralytics/yolov5", 'custom', model_name)
test_model.conf = 0.25 # confidence threshold (0-1)
test_model.iou = 0.45
test_model.eval()

test_path = "/content/RoadSignDetectionDataset/"
test_files = glob.glob(test_path + "/images/test/*")
labels = ["trafficlight", "stop", "speedlimit", "crosswalk"]

for files in test_files:
    test_image = cv2.imread(files)
    file_basename = os.path.basename(files)
    print (file_basename)
    txt_name = file_basename[:file_basename.rfind(".")] + ".txt"
    txt_file = open(test_path + "/labels/test/" + txt_name, "r")
    data = txt_file.read()
    data_into_list = data.split("\n")
    #print(data_into_list)

    results = test_model(test_image, size=640)
    results_df = results.pandas().xyxy
    print (results_df[0].name)
```

```
print("\n")
```

```
Using cache found in /root/.cache/torch/hub/ultralytics_yolov5_master  
YOLOv5 2022-10-6 Python-3.7.14 torch-1.12.1+cu113 CUDA:0 (Tesla  
V100-SXM2-16GB, 16160MiB)
```

```
Fusing layers...
```

```
YOLOv5s summary: 157 layers, 7020913 parameters, 0 gradients, 15.8 GFLOPs
```

```
Adding AutoShape...
```

```
road113.png
```

```
0 speedlimit
```

```
Name: name, dtype: object
```

```
road801.png
```

```
0 speedlimit
```

```
Name: name, dtype: object
```

```
road486.png
```

```
0 speedlimit
```

```
1 trafficlight
```

```
Name: name, dtype: object
```

```
road385.png
```

```
0 speedlimit
```

```
Name: name, dtype: object
```

```
road679.png
```

```
0 speedlimit
```

```
Name: name, dtype: object
```

```
road360.png
```

```
0 speedlimit
```

```
Name: name, dtype: object
```

```
road599.png
```

```
0 speedlimit
```

```
Name: name, dtype: object
```

```
road563.png
```

```
0    speedlimit
1    crosswalk
Name: name, dtype: object
```

```
road731.png
0    speedlimit
1    speedlimit
Name: name, dtype: object
```

```
road418.png
0    speedlimit
Name: name, dtype: object
```

```
road316.png
0    speedlimit
1    speedlimit
2    crosswalk
Name: name, dtype: object
```

```
road709.png
0    speedlimit
1    speedlimit
Name: name, dtype: object
```

```
road80.png
0    stop
Name: name, dtype: object
```

```
road50.png
0    trafficlight
Name: name, dtype: object
```

```
road809.png
0    speedlimit
Name: name, dtype: object
```

```
road403.png
0    speedlimit
Name: name, dtype: object
```

road590.png
0 speedlimit
Name: name, dtype: object

road337.png
0 speedlimit
Name: name, dtype: object

road803.png
0 speedlimit
Name: name, dtype: object

road445.png
0 speedlimit
1 speedlimit
Name: name, dtype: object

road417.png
0 speedlimit
Name: name, dtype: object

road661.png
0 speedlimit
1 stop
Name: name, dtype: object

road600.png
0 speedlimit
1 stop
Name: name, dtype: object

road206.png
0 speedlimit
Name: name, dtype: object

road18.png
0 trafficlight
Name: name, dtype: object

road129.png
0 crosswalk
1 trafficlight
Name: name, dtype: object

road796.png
0 speedlimit
Name: name, dtype: object

road543.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road854.png
0 speedlimit
Name: name, dtype: object

road819.png
0 stop
1 trafficlight
2 trafficlight
Name: name, dtype: object

road321.png
0 speedlimit
1 crosswalk
2 stop
Name: name, dtype: object

road433.png
0 speedlimit
1 stop
Name: name, dtype: object

road367.png
0 speedlimit
Name: name, dtype: object

road67.png
0 stop
Name: name, dtype: object

road37.png
0 trafficlight
Name: name, dtype: object

road174.png
0 speedlimit
Name: name, dtype: object

road356.png
0 stop
Name: name, dtype: object

road199.png
0 speedlimit
Name: name, dtype: object

road494.png
0 speedlimit
Name: name, dtype: object

road408.png
0 speedlimit
Name: name, dtype: object

road315.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road293.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road804.png

0 speedlimit
Name: name, dtype: object

road318.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road764.png
0 speedlimit
Name: name, dtype: object

road91.png
0 stop
1 speedlimit
Name: name, dtype: object

road267.png
0 speedlimit
Name: name, dtype: object

road667.png
0 speedlimit
Name: name, dtype: object

road142.png
0 crosswalk
Name: name, dtype: object

road564.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road160.png
0 stop
1 crosswalk
Name: name, dtype: object


```
road665.png
0    speedlimit
Name: name, dtype: object
```

```
road672.png
0    speedlimit
1          stop
Name: name, dtype: object
```

```
road498.png
0    speedlimit
Name: name, dtype: object
```

```
road183.png
0    crosswalk
1    crosswalk
2    trafficlight
Name: name, dtype: object
```

```
road3.png
0    trafficlight
1    trafficlight
Name: name, dtype: object
```

```
road558.png
0    speedlimit
Name: name, dtype: object
```

```
road643.png
0    speedlimit
Name: name, dtype: object
```

```
road695.png
0    speedlimit
1    speedlimit
2          stop
Name: name, dtype: object
```

```
road261.png
0    speedlimit
```

Name: name, dtype: object

road609.png

0 speedlimit

1 crosswalk

Name: name, dtype: object

road789.png

0 speedlimit

Name: name, dtype: object

road490.png

0 speedlimit

Name: name, dtype: object

road328.png

0 speedlimit

Name: name, dtype: object

road164.png

0 trafficlight

Name: name, dtype: object

road43.png

0 trafficlight

1 trafficlight

2 trafficlight

3 trafficlight

4 trafficlight

5 trafficlight

6 trafficlight

7 trafficlight

8 trafficlight

Name: name, dtype: object

road617.png

0 speedlimit

Name: name, dtype: object

road157.png

0 speedlimit
Name: name, dtype: object

road143.png
0 crosswalk
Name: name, dtype: object

road841.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road194.png
0 crosswalk
1 trafficlight
Name: name, dtype: object

road47.png
0 trafficlight
Name: name, dtype: object

road96.png
0 stop
Name: name, dtype: object

road550.png
0 speedlimit
Name: name, dtype: object

road748.png
0 speedlimit
1 speedlimit
Name: name, dtype: object

road784.png
0 speedlimit
1 crosswalk
Name: name, dtype: object

road640.png
0 speedlimit
1 speedlimit
Name: name, dtype: object

road721.png
0 speedlimit
Name: name, dtype: object

road492.png
0 speedlimit
Name: name, dtype: object

road100.png
0 speedlimit
Name: name, dtype: object

road712.png
0 speedlimit
1 speedlimit
Name: name, dtype: object

road140.png
0 crosswalk
Name: name, dtype: object

road730.png
0 speedlimit
1 speedlimit
Name: name, dtype: object

road431.png
0 speedlimit
Name: name, dtype: object

road547.png
0 speedlimit
1 crosswalk
2 crosswalk
Name: name, dtype: object

```
road33.png
0    trafficlight
Name: name, dtype: object
```

```
road175.png
0    speedlimit
Name: name, dtype: object
```

```
road625.png
0    speedlimit
Name: name, dtype: object
```

```
[42]: !python val.py --weights runs/train/yolo_road_det3/weights/best.pt --data_
      ↪road_sign_data.yaml --task test --name yolo_det
```

```
val: data=/content/yolov5/data/road_sign_data.yaml,
weights=['runs/train/yolo_road_det3/weights/best.pt'], batch_size=32, imgsz=640,
conf_thres=0.001, iou_thres=0.6, max_det=300, task=test, device=, workers=8,
single_cls=False, augment=False, verbose=False, save_txt=False,
save_hybrid=False, save_conf=False, save_json=False, project=runs/val,
name=yolo_det, exist_ok=False, half=False, dnn=False
YOLOv5 v6.2-186-g7f097dd Python-3.7.14 torch-1.12.1+cu113 CUDA:0 (Tesla
V100-SXM2-16GB, 16160MiB)
```

Fusing layers...

YOLOv5s summary: 157 layers, 7020913 parameters, 0 gradients, 15.8 GFLOPs

test: Scanning '/content/RoadSignDetectionDataset/labels/test'

images and labels...88 found, 0 missing, 0 empty, 0 corrupt: 100% 88/88

[00:00<00:00, 2895.35it/s]

test: New cache created:

/content/RoadSignDetectionDataset/labels/test.cache

	Class	Images	Instances	P	R	mAP50
mAP50-95: 100% 3/3						
	all	88	126	0.993	0.901	0.952
0.795						
	trafficlight	88	20	1	0.647	0.828
0.554						
	stop	88	7	0.986	1	0.995
0.889						
	speedlimit	88	76	0.994	1	0.995
0.9						
	crosswalk	88	23	0.992	0.957	0.99

0.837

Speed: 0.3ms pre-process, 2.0ms inference, 0.9ms NMS per image at shape (32, 3, 640, 640)

Results saved to **runs/val/yolo_det2**

[]: