

```
from google.colab import drive
drive.mount('/content/drive')

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

# This Python 3 environment comes with many helpful analytics libraries installed

import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files under the input directory

import os
for dirname, _, filenames in os.walk('/content/drive/MyDrive/ocr/archive.zip (Unzipped Files)'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 20GB to the current directory (/kaggle/working/) that gets preserved as output when you create a version using "Save & I"
# You can also write temporary files to /kaggle/temp/, but they won't be saved outside of the current session

→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars5.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars421.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars426.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars53.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars55.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars417.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars43.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars50.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars58.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars47.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars64.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars44.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars61.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars60.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars419.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars56.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars415.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars425.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars6.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars65.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars45.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars80.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars96.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars97.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars82.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars72.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars66.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars84.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars67.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars81.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars88.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars86.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars98.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars93.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars79.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars83.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars94.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars69.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars76.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars68.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars9.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars92.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars7.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars89.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars8.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars87.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars73.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars70.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars95.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars77.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars91.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars71.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars90.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars75.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars85.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars99.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars74.png
→ /content/drive/MyDrive/ocr/archive.zip (Unzipped Files)/images/Cars78.png
```

```
import os
import cv2
import shutil
import numpy as np
import pandas as pd
from glob import glob
import matplotlib.pyplot as plt
import xml.etree.ElementTree as xet
from sklearn.model_selection import train_test_split
```

```
!pip install ultralytics
```

```
Collecting ultralytics
  Downloading ultralytics-8.3.31-py3-none-any.whl.metadata (35 kB)
Requirement already satisfied: numpy>=1.23.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.26.4)
Requirement already satisfied: matplotlib>=3.3.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (3.8.0)
Requirement already satisfied: opencv-python>=4.6.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.10.0.84)
Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (11.0.0)
Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (6.0.2)
Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.32.3)
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.13.1)
Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.5.0+cu121)
Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.20.0+cu121)
Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.66.6)
Requirement already satisfied: psutil in /usr/local/lib/python3.10/dist-packages (from ultralytics) (5.9.5)
Requirement already satisfied: py-cpuinfo in /usr/local/lib/python3.10/dist-packages (from ultralytics) (9.0.0)
Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.2.2)
Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.13.2)
Collecting ultralytics_thop>=2.0.0 (from ultralytics)
  Downloading ultralytics_thop-2.0.11-py3-none-any.whl.metadata (9.4 kB)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.3.0)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (4.54)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.4.7)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (24.2)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (3.2.0)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (2.
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2024.2)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.10)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2.2.3)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2024.
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.16.1)
Requirement already satisfied: typing-extensions>=4.8.0 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (4.1
Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.4.2)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.1.4)
Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2024.10.0)
Requirement already satisfied: sympy>=1.13.1 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from sympy>=1.13.1->torch>=1.8.0->ultral
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib>=3.3.0->ultral
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from jinja2->torch>=1.8.0->ultralytics) (3.0.
Downloaded ultralytics-8.3.31-py3-none-any.whl (886 kB)
886.3/886.3 kB 24.0 MB/s eta 0:00:00
Downloaded ultralytics_thop-2.0.11-py3-none-any.whl (26 kB)
Installing collected packages: ultralytics-thop, ultralytics
Successfully installed ultralytics-8.3.31 ultralytics-thop-2.0.11
```

```
!pip install -U ipywidgets
```

```
→ Requirement already satisfied: ipywidgets in /usr/local/lib/python3.10/dist-packages (7.7.1)
Collecting ipywidgets
  Downloading ipywidgets-8.1.5-py3-none-any.whl.metadata (2.3 kB)
Collecting comm>=0.1.3 (from ipywidgets)
  Downloading comm-0.2.2-py3-none-any.whl.metadata (3.7 kB)
Requirement already satisfied: ipython>=6.1.0 in /usr/local/lib/python3.10/dist-packages (from ipywidgets) (7.34.0)
Requirement already satisfied: traitlets>=4.3.1 in /usr/local/lib/python3.10/dist-packages (from ipywidgets) (5.7.1)
Collecting widgetsnbextension~=4.0.12 (from ipywidgets)
  Downloading widgetsnbextension-4.0.13-py3-none-any.whl.metadata (1.6 kB)
Requirement already satisfied: jupyterlab-widgets<~3.0.12 in /usr/local/lib/python3.10/dist-packages (from ipywidgets) (3.0.13)
Requirement already satisfied: setuptools>=18.5 in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (75.1.0)
Collecting jedi>=0.16 (from ipython>=6.1.0->ipywidgets)
  Downloading jedi-0.19.2-py2.py3-none-any.whl.metadata (22 kB)
Requirement already satisfied: decorator in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (4.4.2)
Requirement already satisfied: pickleshare in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (0.7.5)
Requirement already satisfied: prompt-toolkit!=3.0.0,!>3.0.1,<3.1.0,>2.0.0 in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (2.18.0)
Requirement already satisfied: pygments in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (0.2.0)
Requirement already satisfied: backcall in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (0.2.0)
Requirement already satisfied: matplotlib-inline in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (0.1.7)
```

```

Requirement already satisfied: pexpect>4.3 in /usr/local/lib/python3.10/dist-packages (from ipython>=6.1.0->ipywidgets) (4.9.0)
Requirement already satisfied: parso<0.9.0,>=0.8.4 in /usr/local/lib/python3.10/dist-packages (from jedi>=0.16->ipython>=6.1.0->ipywidge
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.10/dist-packages (from pexpect>4.3->ipython>=6.1.0->ipywidgets)
Requirement already satisfied: wcwidth in /usr/local/lib/python3.10/dist-packages (from prompt-toolkit!=3.0.0,!<3.0.1,<3.1.0,>=2.0.0->ip
Downloading ipywidgets-8.1.5-py3-none-any.whl (139 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 139.8/139.8 kB 5.6 MB/s eta 0:00:00
Download comm-0.2.2-py3-none-any.whl (7.2 kB)
Download widgetsnbextension-4.0.13-py3-none-any.whl (2.3 MB)
   ━━━━━━━━━━━━━━━━ 2.3/2.3 MB 49.6 MB/s eta 0:00:00
Download jedi-0.19.2-py2.py3-none-any.whl (1.6 MB)
   ━━━━━━━━ 1.6/1.6 MB 75.6 MB/s eta 0:00:00
Installing collected packages: widgetsnbextension, jedi, comm, ipywidgets
Attempting uninstall: widgetsnbextension
  Found existing installation: widgetsnbextension 3.6.10
  Uninstalling widgetsnbextension-3.6.10:
    Successfully uninstalled widgetsnbextension-3.6.10
Attempting uninstall: ipywidgets
  Found existing installation: ipywidgets 7.7.1
  Uninstalling ipywidgets-7.7.1:
    Successfully uninstalled ipywidgets-7.7.1
Successfully installed comm-0.2.2 ipywidgets-8.1.5 jedi-0.19.2 widgetsnbextension-4.0.13

```

```

dataset_path = '/content/drive/MyDrive/ocr/archive.zip (Unzipped Files)'
import re

def the_number_in_the_string(filename):
    match = re.search(r'(\d+)', filename)
    return int(match.group(0)) if match else 0

labels_dict = dict(img_path=[], xmin=[], xmax=[], ymin=[], ymax=[], img_w=[], img_h=[])

xml_files = glob(f'{dataset_path}/annotations/*.xml')
for filename in sorted(xml_files, key=the_number_in_the_string):
    info = xet.parse(filename)
    root = info.getroot()
    member_object = root.find('object')
    labels_info = member_object.find('bndbox')
    xmin = int(labels_info.find('xmin').text)
    xmax = int(labels_info.find('xmax').text)
    ymin = int(labels_info.find('ymin').text)
    ymax = int(labels_info.find('ymax').text)

    img_name = xet.parse(filename).getroot().find('filename').text
    img_path = os.path.join(dataset_path, 'images', img_name)

    labels_dict['img_path'].append(img_path)
    labels_dict['xmin'].append(xmin)
    labels_dict['xmax'].append(xmax)
    labels_dict['ymin'].append(ymin)
    labels_dict['ymax'].append(ymax)

    height, width, _ = cv2.imread(img_path).shape
    labels_dict['img_w'].append(width)
    labels_dict['img_h'].append(height)

alldata = pd.DataFrame(labels_dict)
alldata

```

	img_path	xmin	xmax	ymin	ymax	img_w	img_h	
0	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	226	419	125	173	500	268	☰
1	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	134	262	128	160	400	248	☰
2	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	229	270	176	193	400	400	✎
3	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	142	261	128	157	400	225	
4	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	156	503	82	253	590	350	
...	
428	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	142	258	128	157	400	225	
429	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	86	208	166	195	301	400	
430	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	38	116	159	197	400	225	
431	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	55	343	82	147	400	192	
432	/content/drive/MyDrive/ocr/archive.zip (Unzipp...	95	196	258	284	467	300	

433 rows x 7 columns

Next steps: [Generate code with alldata](#) [View recommended plots](#) [New interactive sheet](#)

```
train, test = train_test_split(alldata, test_size=1/10, random_state=42)
train, val = train_test_split(train, train_size=8/9, random_state=42)

print(f"""
    {len(train)} 
    {len(val)} 
    {len(test)} 
""")

len(train) = 345
len(val) = 44
len(test) = 44

if os.path.exists('datasets'):
    shutil.rmtree('datasets')

def make_split_folder_in_yolo_format(split_name, split_df):
    labels_path = os.path.join('datasets', 'cars_license_plate', split_name, 'labels')
    images_path = os.path.join('datasets', 'cars_license_plate', split_name, 'images')

    os.makedirs(labels_path)
    os.makedirs(images_path)

    for _, row in split_df.iterrows():
        img_name, img_extension = os.path.splitext(os.path.basename(row['img_path']))

        x_center = (row['xmin'] + row['xmax']) / 2 / row['img_w']
        y_center = (row['ymin'] + row['ymax']) / 2 / row['img_h']
        width = (row['xmax'] - row['xmin']) / row['img_w']
        height = (row['ymax'] - row['ymin']) / row['img_h']

        label_path = os.path.join(labels_path, f'{img_name}.txt')
        with open(label_path, 'w') as file:
            file.write(f"0 {x_center:.4f} {y_center:.4f} {width:.4f} {height:.4f}\n")

        shutil.copy(row['img_path'], os.path.join(images_path, img_name + img_extension))

    print(f"created '{images_path}' and '{labels_path}'")

make_split_folder_in_yolo_format("train", train)
make_split_folder_in_yolo_format("val", val)
make_split_folder_in_yolo_format("test", test)
```

→ created 'datasets/cars_license_plate/train/images' and 'datasets/cars_license_plate/train/labels'
 created 'datasets/cars_license_plate/val/images' and 'datasets/cars_license_plate/val/labels'
 created 'datasets/cars_license_plate/test/images' and 'datasets/cars_license_plate/test/labels'

...

Plot the first train image and its bounding box.

```
...
image_dir = 'datasets/cars_license_plate/train/images'
label_dir = 'datasets/cars_license_plate/train/labels'
image_files = sorted(os.listdir(image_dir))
first_image_file = image_files[0]
image_path = os.path.join(image_dir, first_image_file)
label_path = os.path.join(label_dir, os.path.splitext(first_image_file)[0] + '.txt')
image = cv2.imread(image_path)
image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
with open(label_path, 'r') as f:
    lines = f.readlines()
for line in lines:
    class_id, x_center, y_center, width, height = map(float, line.strip().split())
    img_height, img_width, _ = image.shape
    x_center *= img_width
    y_center *= img_height
    width *= img_width
    height *= img_height
    x1 = int(x_center - width / 2)
    y1 = int(y_center - height / 2)
    x2 = int(x_center + width / 2)
    y2 = int(y_center + height / 2)
    cv2.rectangle(image, (x1, y1), (x2, y2), (0, 255, 0), 2)
plt.imshow(image)
plt.axis('off')
plt.show()
```



```
...
Plot the first train image and its bounding box.
...
image_dir = 'datasets/cars_license_plate/train/images'
label_dir = 'datasets/cars_license_plate/train/labels'
image_files = sorted(os.listdir(image_dir))
first_image_file = image_files[20]
image_path = os.path.join(image_dir, first_image_file)
label_path = os.path.join(label_dir, os.path.splitext(first_image_file)[0] + '.txt')
image = cv2.imread(image_path)
image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
with open(label_path, 'r') as f:
    lines = f.readlines()
for line in lines:
    class_id, x_center, y_center, width, height = map(float, line.strip().split())
    img_height, img_width, _ = image.shape
    x_center *= img_width
    y_center *= img_height
    width *= img_width
    height *= img_height
    x1 = int(x_center - width / 2)
    y1 = int(y_center - height / 2)
    x2 = int(x_center + width / 2)
    y2 = int(y_center + height / 2)
    cv2.rectangle(image, (x1, y1), (x2, y2), (0, 255, 0), 2)
plt.imshow(image)
plt.axis('off')
plt.show()
```



```
datasets_yaml = '''
path: cars_license_plate
```

```
train: train/images
val: val/images
test: test/images
```

```
# number of classes
nc: 1
```

```
# class names
names: ['license_plate']
'''
```

```
with open('datasets.yaml', 'w') as file:
    file.write(datasets_yaml)
from ultralytics import YOLO
```

```
model = YOLO('yolov8s.pt')
```

```
→ Creating new Ultralytics Settings v0.0.6 file ✓
View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics.com/gui
Downloading https://github.com/ultralytics/assets/releases/download/v8.3.0/yolov8s.pt to 'yolov8s.pt'...
100% [██████████] 21.5M/21.5M [00:00<00:00, 83.7MB/s]
```

```
model.train(
    data='datasets.yaml',
    epochs=88,
    batch=16,
    device='cuda',
    imgsz=320,
    cache=True,
)
```



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Cars License Plate using YOLOv8 - Colab

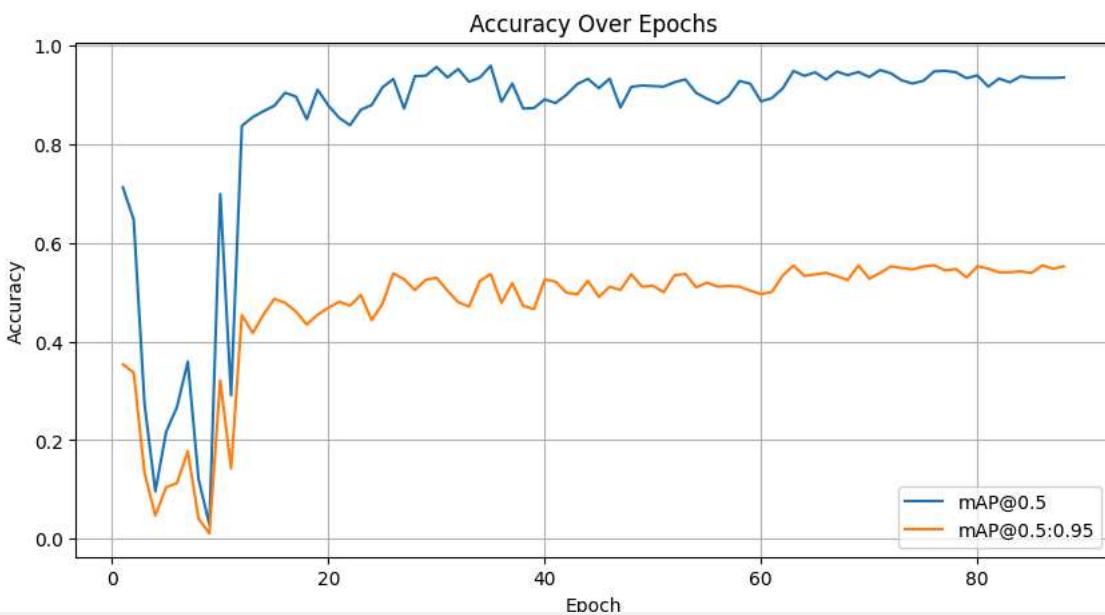
0.34555,	0.34655,	0.34755,	0.34855,	0.34955,	0.35055,	0.35155,	0.35255,	0.35355,	0.35455,
0.35536,	0.35636,	0.35736,	0.35836,	0.35936,	0.36036,	0.36136,	0.36236,	0.36336,	0.36436,
0.36937,	0.37037,	0.37137,	0.37237,	0.37337,	0.37437,	0.37537,	0.37637,	0.37737,	0.37837,
0.37938,	0.38038,	0.38138,	0.38238,	0.38338,	0.38438,	0.38539,	0.38639,	0.38739,	0.38839,
0.39339,	0.39439,	0.3954,	0.3964,	0.3974,	0.3984,	0.3994,	0.4004,	0.4014,	0.4024,
0.4034,	0.4044,	0.40541,	0.40641,	0.40741,	0.40841,	0.40941,	0.41041,	0.41141,	0.41241,
0.41742,	0.41842,	0.41942,	0.42042,	0.42142,	0.42242,	0.42342,	0.42442,	0.42543,	0.42643,
0.42743,	0.42843,	0.42943,	0.43043,	0.43143,	0.43243,	0.43343,	0.43443,	0.43544,	0.43644,
0.44144,	0.44244,	0.44344,	0.44444,	0.44545,	0.44646,	0.44745,	0.44845,	0.44945,	0.45045,
0.45145,	0.45245,	0.45345,	0.45445,	0.45546,	0.45646,	0.45746,	0.45846,	0.45946,	0.46046,
0.46547,	0.46647,	0.46747,	0.46847,	0.46947,	0.47047,	0.47147,	0.47247,	0.47347,	0.47447,
0.47548,	0.47648,	0.47748,	0.47848,	0.47948,	0.48048,	0.48148,	0.48248,	0.48348,	0.48448,
0.48949,	0.49049,	0.49149,	0.49249,	0.49349,	0.49449,	0.49549,	0.49649,	0.49749,	0.49849,
0.4995,	0.5005,	0.5015,	0.5025,	0.5035,	0.5045,	0.50551,	0.50651,	0.50751,	0.50851,
0.51351,	0.51451,	0.51552,	0.51652,	0.51752,	0.52853,	0.52953,	0.53053,	0.53153,	0.53253,
0.52352,	0.52452,	0.52553,	0.52653,	0.52753,	0.52853,	0.52953,	0.53053,	0.53153,	0.53253,
0.53754,	0.53854,	0.53954,	0.54054,	0.54154,	0.54254,	0.54354,	0.54454,	0.54555,	0.54655,
0.54755,	0.54855,	0.54955,	0.55055,	0.55155,					

```
log_dir = max(glob('runs/detect/train*'), key=lambda s: int(s.split('/')[-1].split('_')[1]))
```

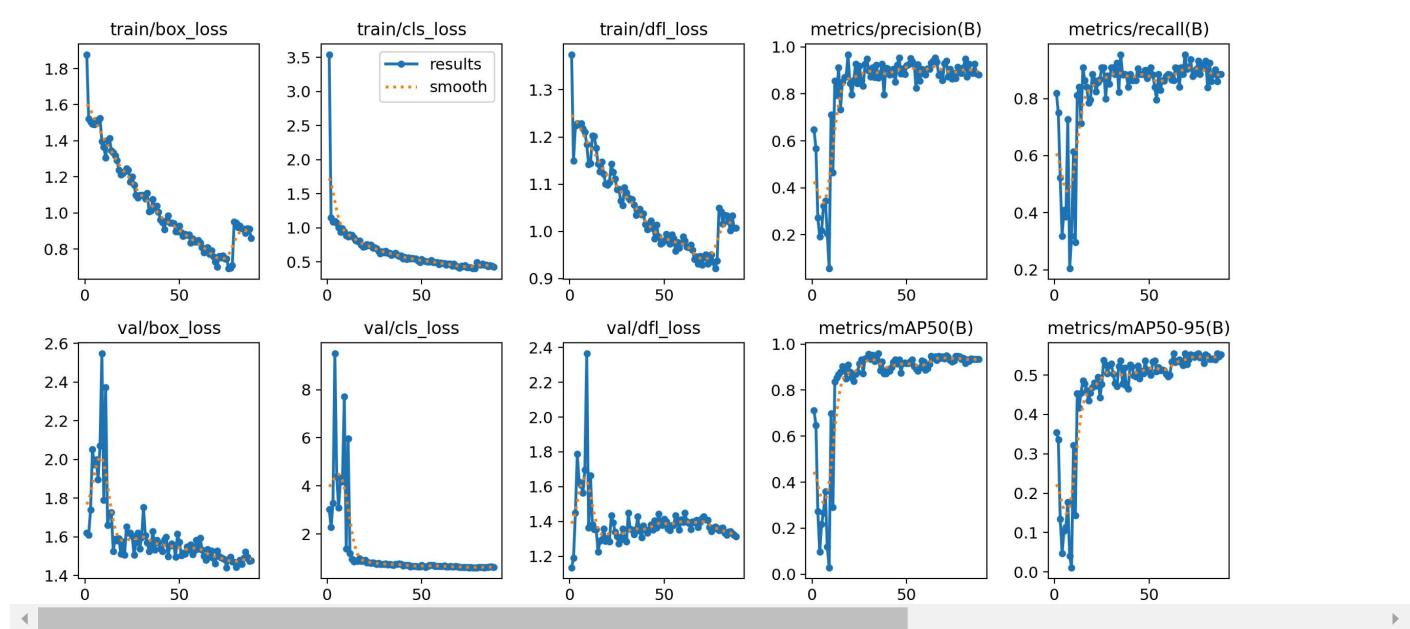
```
results = pd.read_csv(os.path.join(log_dir, 'results.csv'))  
results.columns = results.columns.str.strip()
```

```
epochs = results.index + 1  
mAP_0_5 = results['metrics/mAP50(B)']  
mAP_0_5_0_95 = results['metrics/mAP50-95(B)']
```

```
plt.figure(figsize=(10, 5))  
plt.plot(epochs, mAP_0_5, label='mAP@0.5')  
plt.plot(epochs, mAP_0_5_0_95, label='mAP@0.5:0.95')  
plt.xlabel('Epoch')  
plt.ylabel('Accuracy')  
plt.title('Accuracy Over Epochs')  
plt.legend()  
plt.grid(True)  
plt.show()
```



```
from IPython.display import Image,display  
  
display(Image(filename='/content/runs/detect/train/results.png',width=920))
```



```
metrics=model.val(split='val')
```

```
Ultralytics 8.3.31 Python-3.10.12 torch-2.5.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
Model summary (fused): 168 layers, 11,125,971 parameters, 0 gradients, 28.4 GFLOPs
val: Scanning /content/datasets/cars_license_plate/val/labels.cache... 44 images, 0 backgrounds, 0 corrupt: 100%|██████████| 44/44 [00:00<00:00, 85.33it/s]
WARNING ⚠ cache='ram' may produce non-deterministic training results. Consider cache='disk' as a deterministic alternative if your dis
val: Caching images (0.0GB RAM): 100%|██████████| 44/44 [00:00<00:00, 85.33it/s]
      Class     Images   Instances   Box(P)      R    mAP50    mAP50-95: 100%|██████████| 3/3 [00:00<00:00,  3.74it/s]
          all       44        44     0.866     0.932    0.947    0.555
Speed: 0.2ms preprocess, 9.3ms inference, 0.0ms loss, 1.3ms postprocess per image
Results saved to runs/detect/train2
```

```
print(f"Mean Average Precision @.5:.95 : {metrics.box.map}")
print(f"Mean Average Precision @ .50 : {metrics.box.map50}")
print(f"Mean Average Precision @ .70 : {metrics.box.map75}")
```

```
Mean Average Precision @.5:.95 : 0.5547091837762814
Mean Average Precision @ .50 : 0.9474872105867158
Mean Average Precision @ .70 : 0.5586296446158456
```

```
#visualiser les résultats de prédiction de plusieurs images
image_dir = "/content/drive/MyDrive/ocr/new"
```

```
all_images = os.listdir(image_dir)
selected_images = all_images[:40]

for img_name in selected_images:
    img_path = os.path.join(image_dir, img_name)
    results = model.predict(img_path)
    img = cv2.imread(img_path)
    img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
    for result in results:
        plotted_img = result.plot()
        plt.figure(figsize=(8, 6))
        plt.imshow(plotted_img)
        plt.axis('off')
        plt.show()
```



image 1/1 /content/drive/MyDrive/ocr/new/Samples-of-Characters-for-Recognition-Sample-Indian-Vehicle-Sample-Foreign-Vehicle.png: 256x320
Speed: 1.5ms preprocess, 43.3ms inference, 2.1ms postprocess per image at shape (1, 3, 256, 320)



image 1/1 /content/drive/MyDrive/ocr/new/Different-Colour-Number-Pla_62c949963e4e0.webp: 192x320 1 license_plate, 43.4ms
Speed: 1.1ms preprocess, 43.4ms inference, 1.3ms postprocess per image at shape (1, 3, 192, 320)



image 1/1 /content/drive/MyDrive/ocr/new/d3.jpg: 256x320 1 license_plate, 8.7ms
Speed: 1.1ms preprocess, 8.7ms inference, 1.3ms postprocess per image at shape (1, 3, 256, 320)



image 1/1 /content/drive/MyDrive/ocr/new/IMG_20170505_165100_HDR.jpg: 256x320 1 license_plate, 13.6ms
 Speed: 1.9ms preprocess, 13.6ms inference, 1.8ms postprocess per image at shape (1, 3, 256, 320)



WARNING ⚠ inference results will accumulate in RAM unless `stream=True` is passed, causing potential out-of-memory errors for large sources or long-running streams and videos. See <https://docs.ultralytics.com/modes/predict/> for help.

Example:

```
results = model(source=..., stream=True) # generator of Results objects
for r in results:
    boxes = r.boxes # Boxes object for bbox outputs
    masks = r.masks # Masks object for segment masks outputs
    probs = r.probs # Class probabilities for classification outputs
```

```
video 1/1 (frame 1/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 28.1ms
video 1/1 (frame 2/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 18.2ms
video 1/1 (frame 3/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 17.9ms
video 1/1 (frame 4/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 14.4ms
video 1/1 (frame 5/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 15.7ms
video 1/1 (frame 6/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 14.8ms
video 1/1 (frame 7/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 11.4ms
video 1/1 (frame 8/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 14.5ms
video 1/1 (frame 9/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 20.8ms
video 1/1 (frame 10/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 13.7ms
video 1/1 (frame 11/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 9.3ms
video 1/1 (frame 12/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 14.5ms
video 1/1 (frame 13/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 10.5ms
video 1/1 (frame 14/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 12.8ms
video 1/1 (frame 15/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 13.6ms
video 1/1 (frame 16/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 9.2ms
video 1/1 (frame 17/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 12.9ms
video 1/1 (frame 18/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 10.0ms
video 1/1 (frame 19/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 19.6ms
video 1/1 (frame 20/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 16.5ms
video 1/1 (frame 21/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 19.6ms
video 1/1 (frame 22/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 17.3ms
video 1/1 (frame 23/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 11.5ms
video 1/1 (frame 24/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 17.9ms
video 1/1 (frame 25/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 17.8ms
video 1/1 (frame 26/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 13.3ms
video 1/1 (frame 27/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 16.8ms
video 1/1 (frame 28/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 10.3ms
video 1/1 (frame 29/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 10.9ms
video 1/1 (frame 30/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 9.9ms
video 1/1 (frame 31/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 13.3ms
video 1/1 (frame 32/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 10.0ms
video 1/1 (frame 33/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 12.7ms
video 1/1 (frame 34/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 9.4ms
video 1/1 (frame 35/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 11.6ms
video 1/1 (frame 36/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 16.1ms
video 1/1 (frame 37/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 18.1ms
video 1/1 (frame 38/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 14.9ms
video 1/1 (frame 39/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 11.1ms
video 1/1 (frame 40/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 8.9ms
video 1/1 (frame 41/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 8.6ms
```


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Cars License Plate using YOLOv8 - Colab

```
video 1/1 (frame 1313/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 9.1ms
video 1/1 (frame 1314/1314) /content/drive/MyDrive/ocr/new/demo.mp4: 192x320 (no detections), 8.5ms
Speed: 1.4ms preprocess, 11.1ms inference, 0.9ms postprocess per image at shape (1, 3, 192, 320)
```

```
error                                         Traceback (most recent call last)
<ipython-input-19-d9987108fc01> in <cell line: 7>()
      9     results = model.predict(img_path)
     10     img = cv2.imread(img_path)
--> 11     img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
     12     for result in results:
     13         plotted_img = result.plot()
```

```
error: OpenCV(4.10.0) /io/opencv/modules/imgproc/src/color.cpp:196: error: (-215:Assertion failed) !_src.empty() in function 'cvtColor'
```