

```
!curl -L "https://public.roboflow.com/ds/8FE9kLiSog?key=V6EAXWCSBG" > roboflow.zip; unzip rob
extracting: export/images/armas (1366)_jpg.rf.57196a4e384c1cc4410e56ebc4fe86fd.jpg
extracting: export/images/armas (277)_jpg.rf.5682c898e03c076a352e3e85c780a5ab.jpg
extracting: export/images/armas (231)_jpg.rf.56e2f9c3d0082153e99d032d4854628c.jpg
extracting: export/images/armas (1633)_jpg.rf.5688e2f01da85355fa330dda144f0c5a.jpg
extracting: export/images/armas (1786)_jpg.rf.5667061ff2fb5942ea351b7023874f02.jpg
extracting: export/images/armas (493)_jpg.rf.56e5e3ac99ff6e8080c27c3aa31cdeb7.jpg
extracting: export/images/armas (2841)_jpg.rf.56c2de0d11c050b2cfc7d0154a332e45.jpg
extracting: export/images/armas (331)_jpg.rf.57419d06b391446a15ddd24d8172c834.jpg
extracting: export/images/armas (610)_jpg.rf.57798628867be64aed4bd3022bcbf5ab.jpg
extracting: export/images/armas (530)_jpg.rf.56f1570b5fbdc3f7e70076c3bcce8368.jpg
extracting: export/images/armas (1264)_jpg.rf.57371e4f7504ad8eaa3875f144d697db.jpg
extracting: export/images/armas (1818)_jpg.rf.5788288ab450c6ee1dc2c4e8bbd87cf9.jpg
extracting: export/images/armas (1115)_jpg.rf.576136cf41a50007cd05bc7b8feeb87a.jpg
extracting: export/images/armas (1710)_jpg.rf.5723e981d7bec304fa743c087ed40a5c.jpg
extracting: export/images/armas (476)_jpg.rf.5792df2b884008319d41bdbad7f71e20.jpg
extracting: export/images/armas (2433)_jpg.rf.577f0027adbf860c04089fc37c748a1c.jpg
extracting: export/images/armas (37)_jpg.rf.5791743db2288c79bfc4e236c0b72336.jpg
extracting: export/images/armas (2072)_jpg.rf.585b769113c80ac6dca4179eab5a9b39.jpg
extracting: export/images/armas (1890)_jpg.rf.573f2dd421cc5b5abecfcbf6a5ae4377.jpg
extracting: export/images/armas (934)_jpg.rf.587b353fb956cf1bb12adf226b588139.jpg
extracting: export/images/armas (2979)_jpg.rf.57fa6e874984470606d20c170645d024.jpg
extracting: export/images/armas (2167)_jpg.rf.57ce923dbf9ac47c11ee9ba0a88bc372.jpg
extracting: export/images/armas (2298)_jpg.rf.581124a9c7af90354b5fdd7b1bc5bc84.jpg
extracting: export/images/armas (1083)_jpg.rf.57f216f3c242d254eebd5421dfd7bf4c.jpg
extracting: export/images/armas (1530)_jpg.rf.57a3f017d6749e202e405eb7382a16ed.jpg
extracting: export/images/armas (1032)_jpg.rf.58d71d0765096e9d85c9bb0051195e83.jpg
extracting: export/images/armas (2666)_jpg.rf.58f5dd9ddaef26b942ebfacbc634c454.jpg
extracting: export/images/armas (2873)_jpg.rf.58cfaaa18241800e4fc703fa96195317.jpg
extracting: export/images/armas (1715)_jpg.rf.593da0323a80164aad0fdf449b9a51a2.jpg
extracting: export/images/armas (2594)_jpg.rf.580772d0de5f23cb938ecc8b76e50d9c.jpg
extracting: export/images/armas (2675)_jpg.rf.58abb2e68889708323dad70c3102b88.jpg
extracting: export/images/armas (2821)_jpg.rf.59830bbf5fb8d4e80745177aea243cd2.jpg
extracting: export/images/armas (2585)_jpg.rf.594c7312b4bfbe5482e45d51f32e1b43.jpg
extracting: export/images/armas (1259)_jpg.rf.59661b85b4083c94636efed624d2761e.jpg
extracting: export/images/armas (509)_jpg.rf.5906d007369a404ad0f52da3bc47d07d.jpg
extracting: export/images/armas (169)_jpg.rf.58f07ca65e49251270d9598702dd6dcf.jpg
extracting: export/images/armas (1480)_jpg.rf.598710bfe2d1803ec7b1511e0c4fd6af.jpg
extracting: export/images/armas (964)_jpg.rf.59a231c7f797206c24f84dfefb08d6e.jpg
extracting: export/images/armas (1091)_jpg.rf.59d75e4b0a88457400e29ab4dbd5ae62.jpg
extracting: export/images/armas (1766)_jpg.rf.598e0e8efd670b4b6189c49c2f419d20.jpg
extracting: export/images/armas (1377)_jpg.rf.59b86d258f37ccc85a6ba30e344f0c17.jpg
extracting: export/images/armas (1742)_jpg.rf.59a97cbbe1fb9faeb45b4bdc5883d3c1.jpg
extracting: export/images/armas (2973)_jpg.rf.59c1d6a10920d70523418fd8321a9ff3.jpg
extracting: export/images/armas (2849)_jpg.rf.59fa9b34784e9f6b015be204a6a589ba.jpg
extracting: export/images/armas (1443)_jpg.rf.59e5087638228a7d3dcf9f04f9366e86.jpg
extracting: export/images/armas (2171)_jpg.rf.5a6c23c910a96fecf7acf98143d0043c.jpg
extracting: export/images/armas (977)_jpg.rf.59ae9eafdea8744debdd76f223be8189.jpg
extracting: export/images/armas (2275)_jpg.rf.59c33f295664a0c399a5742480255bc8.jpg
extracting: export/images/armas (365)_jpg.rf.5a81d811c4e3037e1f35f903a43fdd2a.jpg
extracting: export/images/armas (1778)_jpg.rf.59e116d6a7127558dd3f24593c8c8ac4.jpg
extracting: export/images/armas (1451)_jpg.rf.5a5d6470b62a0fbfaa0e1b5eabbc9498.jpg
extracting: export/images/armas (1168)_jpg.rf.5a267ddcebd843b662c31bfce579c779.jpg
extracting: export/images/armas (1492)_jpg.rf.5a8ed8090975af31a98b3c78328be3f8.jpg
```

```

extracting: export/images/armas (607)_jpg.rf.59bc8b9dfe6ae969450b55290de115ce.jpg
extracting: export/images/armas (489)_jpg.rf.5b4c256d7125b692c59de74df109fb81.jpg
extracting: export/images/armas (1281)_jpg.rf.5afee623e4ac5274e5c80c9f9e511f69.jpg
extracting: export/images/armas (2814)_jpg.rf.5b9946cfe9dd87f6e13684f1b22ded4d.jpg
extracting: export/images/armas (723)_jpg.rf.5b8f292cc76ea86c45b46a896fce3b1e.jpg
extracting: export/images/armas (371)_jpg.rf.59e78df0dae63e2cb7ce95fe99a25c45.jpg

```

```
%cd /content
```

```
!git clone https://github.com/ultralytics/yolov5.git
```

```
/content
```

```
Cloning into 'yolov5'...
```

```
remote: Enumerating objects: 21, done.
```

```
remote: Counting objects: 100% (21/21), done.
```

```
remote: Compressing objects: 100% (15/15), done.
```

```
remote: Total 4340 (delta 9), reused 15 (delta 6), pack-reused 4319
```

```
Receiving objects: 100% (4340/4340), 7.35 MiB | 7.58 MiB/s, done.
```

```
Resolving deltas: 100% (2940/2940), done.
```

```
%cd /content/yolov5/
```

```
!pip install -r requirements.txt
```

```
/content/yolov5
```

```
Requirement already satisfied: Cython in /usr/local/lib/python3.6/dist-packages (from -r
```

```
Requirement already satisfied: matplotlib>=3.2.2 in /usr/local/lib/python3.6/dist-packag
```

```
Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.6/dist-packages (
```

```
Requirement already satisfied: opencv-python>=4.1.2 in /usr/local/lib/python3.6/dist-pac
```

```
Requirement already satisfied: Pillow in /usr/local/lib/python3.6/dist-packages (from -r
```

```
Collecting PyYAML>=5.3
```

```
  Downloading https://files.pythonhosted.org/packages/7a/5b/bc0b5ab38247bba158504a410117
```

```
  |██████████████████████████████████████████████████████████████████████████████| 645kB 11.6MB/s
```

```
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.6/dist-packages (f
```

```
Requirement already satisfied: tensorboard>=2.2 in /usr/local/lib/python3.6/dist-packag
```

```
Requirement already satisfied: torch>=1.7.0 in /usr/local/lib/python3.6/dist-packages (f
```

```
Requirement already satisfied: torchvision>=0.8.1 in /usr/local/lib/python3.6/dist-packa
```

```
Requirement already satisfied: tqdm>=4.41.0 in /usr/local/lib/python3.6/dist-packages (f
```

```
Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.6/dist-packages
```

```
Requirement already satisfied: pandas in /usr/local/lib/python3.6/dist-packages (from -r
```

```
Collecting thop
```

```
  Downloading https://files.pythonhosted.org/packages/6c/8b/22ce44e1c71558161a8bd5447117
```

```
Requirement already satisfied: pycocotools>=2.0 in /usr/local/lib/python3.6/dist-packag
```

```
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.6/dist-packag
```

```
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/li
```

```
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.6/dist-pac
```

```
Requirement already satisfied: cyclical>=0.10 in /usr/local/lib/python3.6/dist-packages (f
```

```
Requirement already satisfied: grpcio>=1.24.3 in /usr/local/lib/python3.6/dist-packages
```

```
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.6/dist-packages
```

```
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/lib/python3.6.0
```

```
Requirement already satisfied: wheel>=0.26; python_version >= "3" in /usr/local/lib/pyth
```

```
Requirement already satisfied: setuptools>=41.0.0 in /usr/local/lib/python3.6/dist-packa
```

```
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.6/dist-pack
```

```
Requirement already satisfied: six>=1.10.0 in /usr/local/lib/python3.6/dist-packages (fr
```

```
Requirement already satisfied: protobuf>=3.6.0 in /usr/local/lib/python3.6/dist-packages
```

```
Requirement already satisfied: werkzeug>=0.11.15 in /usr/local/lib/python3.6/dist-packag
```

```
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /usr/local/lib/pythor
```

```

Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.6/dist-packages (1
Requirement already satisfied: google-auth<2,>=1.6.3 in /usr/local/lib/python3.6/dist-pa
Requirement already satisfied: dataclasses in /usr/local/lib/python3.6/dist-packages (fr
Requirement already satisfied: future in /usr/local/lib/python3.6/dist-packages (from to
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.6/dist-packag
Requirement already satisfied: pytz>=2017.2 in /usr/local/lib/python3.6/dist-packages (f
Requirement already satisfied: importlib-metadata; python_version < "3.8" in /usr/local/
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.6/dist-packag
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.6/dist-packa
Requirement already satisfied: urllib3!=1.25.0,!1.25.1,<1.26,>=1.21.1 in /usr/local/lib
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.6/dist-packages (f
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.6/dist
Requirement already satisfied: rsa<5,>=3.1.4; python_version >= "3" in /usr/local/lib/py
Requirement already satisfied: cachetools<5.0,>=2.0.0 in /usr/local/lib/python3.6/dist-p
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.6/dist-pa
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.6/dist-packages (from
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.6/dist-packages
Requirement already satisfied: pyasn1>=0.1.3 in /usr/local/lib/python3.6/dist-packages (
Installing collected packages: PyYAML, thop
  Found existing installation: PyYAML 3.13
  Uninstalling PyYAML-3.13:
    Successfully uninstalled PyYAML-3.13
Successfully installed PyYAML-5.4.1 thop-0.0.31.post2005241907

```

```
%cat /content/dataset/data.yaml
```

```

train: ../train/images
val: ../valid/images

nc: 1
names: ['pistol']

```

```
%cd /
```

```
from glob import glob
```

```
img_list = glob('/content/dataset/export/images/*.jpg')
```

```
print(len(img_list))
```

```

/
2971

```

```
from sklearn.model_selection import train_test_split
```

```
train_img_list, val_img_list = train_test_split(img_list, test_size=0.2, random_state=2000)
```

```
print(len(train_img_list), len(val_img_list))
```

```
2376 595
```

```
with open('/content/dataset/train.txt', 'w') as f:
```

```
f.write('\n'.join(train_img_list) + '\n')

with open('/content/dataset/val.txt', 'w') as f:
    f.write('\n'.join(val_img_list) + '\n')

import yaml

with open('/content/dataset/data.yaml', 'r') as f:
    data = yaml.load(f)

print(data)

data['train'] = '/content/dataset/train.txt'
data['val'] = '/content/dataset/val.txt'

with open('/content/dataset/data.yaml', 'w') as f:
    yaml.dump(data, f)

print(data)

{'train': '../train/images', 'val': '../valid/images', 'nc': 1, 'names': ['pistol']}
{'train': '/content/dataset/train.txt', 'val': '/content/dataset/val.txt', 'nc': 1, 'names': ['pistol']}
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:4: YAMLLoadWarning: calling yaml.load() without Loader=... is deprecated, as the default loader is unsafe; recommend calling yaml.load(..., Loader=yaml.FullLoader)
after removing the cwd from sys.path.
```

```
%cd /content/yolov5/
```

```
!python train.py --img 416 --batch 16 --epochs 10 --data /content/dataset/data.yaml --cfg ./models/yolov5s.yaml
```

```
Image sizes 416 train, 416 test
Using 2 dataloader workers
Logging results to runs/train/gun_yolov5s_results
Starting training for 10 epochs...
```

Epoch	gpu_mem	box	obj	cls	total	targets	img_size
0/9	1.15G	0.08877	0.01996	0	0.1087	22	416: 100%
	Class	Images	Targets		P	R	mAP@.5
	all	595	683		0.265	0.461	0.302

Epoch	gpu_mem	box	obj	cls	total	targets	img_size
1/9	1.34G	0.05853	0.02024	0	0.07877	23	416: 100%
	Class	Images	Targets		P	R	mAP@.5
	all	595	683		0.424	0.786	0.706

Epoch	gpu_mem	box	obj	cls	total	targets	img_size
2/9	1.34G	0.04833	0.0174	0	0.06573	15	416: 100%
	Class	Images	Targets		P	R	mAP@.5
	all	595	683		0.458	0.87	0.803

Epoch	gpu_mem	box	obj	cls	total	targets	img_size
3/9	1.34G	0.04554	0.01571	0	0.06124	23	416: 100%
	Class	Images	Targets		P	R	mAP@.5

	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted
	all	595	683	0.42	0.893	0.806	

Epoch	gpu_mem	box	obj	cls	total	targets	img_size	
4/9	1.34G	0.04198	0.01483	0	0.05681	16	416:	100%
	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted	
	all	595	683	0.474	0.862	0.813		

Epoch	gpu_mem	box	obj	cls	total	targets	img_size	
5/9	1.34G	0.04045	0.01456	0	0.055	18	416:	100%
	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted	
	all	595	683	0.425	0.878	0.802		

Epoch	gpu_mem	box	obj	cls	total	targets	img_size	
6/9	1.34G	0.03933	0.01429	0	0.05362	16	416:	100%
	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted	
	all	595	683	0.426	0.896	0.832		

Epoch	gpu_mem	box	obj	cls	total	targets	img_size	
7/9	1.34G	0.03751	0.01384	0	0.05135	14	416:	100%
	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted	
	all	595	683	0.493	0.886	0.848		

Epoch	gpu_mem	box	obj	cls	total	targets	img_size	
8/9	1.34G	0.03495	0.01341	0	0.04836	20	416:	100%
	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted	
	all	595	683	0.594	0.887	0.868		

Epoch	gpu_mem	box	obj	cls	total	targets	img_size	
9/9	1.34G	0.03291	0.01312	0	0.04603	16	416:	100%
	Class	Images	Targets	P	R	mAP@.5	mAP@.5 weighted	
	all	595	683	0.608	0.908	0.879		

Optimizer stripped from runs/train/gun_yolov5s_results/weights/last.pt, 14.4MB
Optimizer stripped from runs/train/gun_yolov5s_results/weights/best.pt, 14.4MB
10 epochs completed in 0.116 hours.

```
%load_ext tensorboard
%tensorboard --logdir /content/yolov5/runs/
```

TensorBoard

SCALARS

DISTRIBUTIONS

INACTIVE

☐ Show data download links☐ Ignore outliers in chart scalingTooltip sorting
method: default

Smoothing

0.6

Horizontal Axis

STEP

RELATIVE

WALL

Runs

Write a regex to filter runs

☐ ☒ train/gun_yolov5s_results

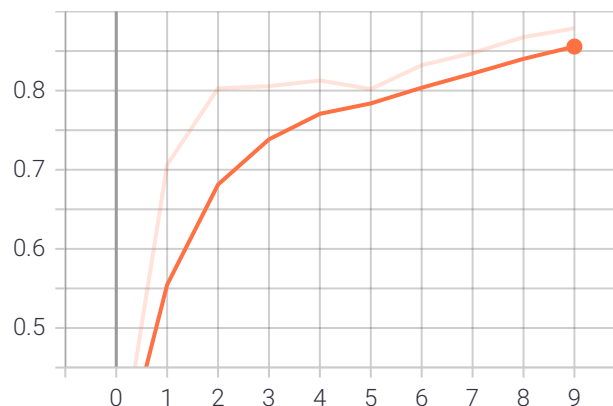
Filter tags (regular expressions supported)

metrics

4 ^

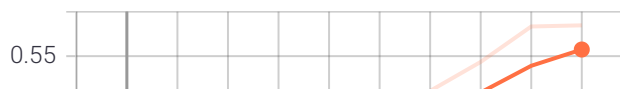
mAP_0.5

tag: metrics/mAP_0.5



mAP_0.5:0.95

tag: metrics/mAP_0.5:0.95



```
from IPython.display import Image
import os
```

```
val_img_path = val_img_list[4]
```

```
!python detect.py --weights /content/yolov5/runs/train/gun_yolov5s_results/weights/best.pt --
```

```
Image(os.path.join('/content/yolov5/inference/output', os.path.basename(val_img_path)))
```

```
Namespace(agnostic_nms=False, augment=False, classes=None, conf_thres=0.5, device='', e
YOLOv5 v4.0-11-gdd03b20 torch 1.7.0+cu101 CUDA:0 (Tesla T4, 15079.75MB)
```

```
Fusing layers...
```

```
Model Summary: 224 layers, 7053910 parameters, 0 gradients, 16.3 GFLOPS
```

```
image 1/1 /content/dataset/export/images/armas (2046)_jpg.rf.391116c55962bd802dc23ae5556
```

```
Results saved to runs/detect/exp5
```

```
Done. (0.043s)
```



