

Kirby Detection using YOLOv5 (AI Camp Crash Course Project)

This project is designed to use bounding box to detect Kirby in images. Kirby is an adorable action-platform video game character developed by HAL Laboratory and published by Nintendo.

Note:

This notebook could run in Google Colab directly. If you want to reproduce the training process in other environment, please change the relative paths accordingly.

```
In [1]: from google.colab import drive  
drive.mount('/content/drive')  
  
Mounted at /content/drive
```

Dataset Download

The data I use here is collected in Google Image Search and is labeled using Roboflow.

```
In [ ]: !pip install roboflow  
  
In [3]: from roboflow import Roboflow  
  
rf = Roboflow(api_key="vBpZoEq9j50qc2xeJ8xZ")  
project = rf.workspace("jinxuan-tang").project("kirby-detection---ai-camp-crash-course")  
dataset = project.version(2).download("yolov5")  
  
loading Roboflow workspace...  
loading Roboflow project...  
Downloading Dataset Version Zip in Kirby-Detection---AI-Camp-Crash-Course-2 to yolov5pytorch: 100% [3683272 / 3683272]  
bytes  
Extracting Dataset Version Zip to Kirby-Detection---AI-Camp-Crash-Course-2 in yolov5pytorch:: 100%|██████████| 270/270  
[00:00<00:00, 1210.55it/s]
```

Model Training & Process

Load wandb

```
In [4]: ! pip install wandb -qqq
```

```
|██████████| 1.8 MB 5.5 MB/s
|██████████| 181 kB 28.7 MB/s
|██████████| 144 kB 34.4 MB/s
|██████████| 63 kB 1.5 MB/s
Building wheel for pathutils (setup.py) ... done
```

```
In [5]: import wandb
wandb.login()
```

```
wandb: You can find your API key in your browser here: https://wandb.ai/authorize
wandb: Paste an API key from your profile and hit enter, or press ctrl+c to quit: .....
wandb: Appending key for api.wandb.ai to your netrc file: /root/.netrc
```

```
Out[5]: True
```

Load YOLOv5

```
In [6]: import os
os.chdir('/content')
```

```
In [7]: !git clone https://github.com/ultralytics/yolov5 # clone
%cd yolov5
%pip install -qr requirements.txt # install

import torch
from yolov5 import utils
display = utils.notebook_init() # checks
```

```
YOLOv5 🚀 v6.1-143-g6ea81bb torch 1.10.0+cu111 CUDA:0 (Tesla K80, 11441MiB)
Setup complete ✅ (2 CPUs, 12.7 GB RAM, 40.0/78.2 GB disk)
```

```
In [9]: yolo_loc = os.getcwd()
print(os.getcwd())
data_loc = '/content/Kirby-Detection---AI-Camp-Crash-Course-2'
```

```
/content/yolov5
```

Model Training

```
In [10]: import shutil  
shutil.copytree(data_loc, yolo_loc + '/Kirby-Detection---AI-Camp-Crash-Course-2')  
  
Out[10]: '/content/yolov5/Kirby-Detection---AI-Camp-Crash-Course-2'  
  
In [11]: !python train.py --img 416 --batch 8 --epochs 200 --data {data_loc}/data.yaml --weights yolov5s.pt --cache
```

```

Downloading https://ultralytics.com/assets/Arial.ttf to /root/.config/Ultralytics/Arial.ttf...
wandb: Currently logged in as: erisedtang (use `wandb login --relogin` to force relogin)
train: weights=yolov5s.pt, cfg=, data=/content/Kirby-Detection---AI-Camp-Crash-Course-2/data.yaml, hyp=data/hyps/hyp.scratch-low.yaml, epochs=200, batch_size=8, imgsz=416, rect=False, resume=False, nosave=False, noval=False, noautoanchor=False, evolve=None, bucket=, cache=ram, image_weights=False, device=, multi_scale=False, single_cls=False, optimizer=SGD, sync_bn=False, workers=8, project=runs/train, name=exp, exist_ok=False, quad=False, cos_lr=False, label_smoothing=0.0, patience=100, freeze=[0], save_period=-1, 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 🚀 v6.1-143-g6ea81bb torch 1.10.0+cu111 CUDA:0 (Tesla K80, 11441MiB)

hyperparameters: lr0=0.01, lrf=0.01, momentum=0.937, weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warmup_bias_lr=0.1, box=0.05, cls=0.5, cls_pw=1.0, obj=1.0, obj_pw=1.0, iou_t=0.2, anchor_t=4.0, fl_gamma=0.0, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, mosaic=1.0, mixup=0.0, copy_paste=0.0
TensorBoard: Start with 'tensorboard --logdir runs/train', view at http://localhost:6006/
wandb: Tracking run with wandb version 0.12.15
wandb: Run data is saved locally in /content/yolov5/wandb/run-20220421_212135-28uwu0bh
wandb: Run `wandb offline` to turn off syncing.
wandb: Syncing run azure-pyramid-6
wandb: ★ View project at https://wandb.ai/erisedtang/YOLOv5
wandb: 🚀 View run at https://wandb.ai/erisedtang/YOLOv5/runs/28uwu0bh
YOLOv5 temporarily requires wandb version 0.12.10 or below. Some features may not work as expected.
Downloading https://github.com/ultralytics/yolov5/releases/download/v6.1/yolov5s.pt to yolov5s.pt...
100% 14.1M/14.1M [00:00<00:00, 113MB/s]

```

Overriding model.yaml nc=80 with nc=1

	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   16182 models.yolo.Detect [1, [[10, 13, 16, 30, 33, 23], [30, 61, 62,
45, 59, 119], [116, 90, 156, 198, 373, 326]], [128, 256, 512]]
Model summary: 270 layers, 7022326 parameters, 7022326 gradients, 15.8 GFLOPs

```

Transferred 343/349 items from yolov5s.pt

Scaled weight_decay = 0.0005

optimizer: SGD with parameter groups 57 weight (no decay), 60 weight, 60 bias

albumentations: version 1.0.3 required by YOLOv5, but version 0.1.12 is currently installed

train: Scanning '/content/yolov5/Kirby-Detection---AI-Camp-Crash-Course-2/train/labels' images and labels...108 found, 0 missing, 0 empty, 0 corrupt: 100% 108/108 [00:00<00:00, 1033.76it/s]

train: New cache created: /content/yolov5/Kirby-Detection---AI-Camp-Crash-Course-2/train/labels.cache

train: Caching images (0.1GB ram): 100% 108/108 [00:00<00:00, 335.42it/s]

val: Scanning '/content/yolov5/Kirby-Detection---AI-Camp-Crash-Course-2/valid/labels' images and labels...10 found, 0 missing, 0 empty, 0 corrupt: 100% 10/10 [00:00<00:00, 192.01it/s]

val: New cache created: /content/yolov5/Kirby-Detection---AI-Camp-Crash-Course-2/valid/labels.cache

val: Caching images (0.0GB ram): 100% 10/10 [00:00<00:00, 258.63it/s]

Plotting labels to runs/train/exp/labels.jpg...

AutoAnchor: 5.40 anchors/target, 1.000 Best Possible Recall (BPR). Current anchors are a good fit to dataset ✓

Image sizes 416 train, 416 val

Using 2 dataloader workers

Logging results to runs/train/exp

Starting training for 200 epochs...

Epoch	gpu_mem	box	obj	cls	labels	img_size
0/199	0.753G	0.1203	0.01915	0	8	416: 100% 14/14 [00:07<00:00, 1.81it/s]
s]		Class	Images	Labels	P	mAP@.5:.95: 100% 1/1 [00:00<00:00, 3.98it/
		all	10	11	0.01	0.273 0.00489 0.00101
Epoch	gpu_mem	box	obj	cls	labels	img_size
1/199	0.82G	0.1059	0.02398	0	9	416: 100% 14/14 [00:05<00:00, 2.61it/s]
s]		Class	Images	Labels	P	mAP@.5:.95: 100% 1/1 [00:00<00:00, 4.54it/
		all	10	11	0.0186	0.182 0.0116 0.00244
Epoch	gpu_mem	box	obj	cls	labels	img_size

	2/199	0.82G	0.09396	0.02159	0	P	5	R	416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 5.09it/
s]		Class	Images	Labels					
		all	10	11	0.117	0.182	0.047	0.0115	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
3/199	0.82G	0.08424	0.02854	0	8	416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 5.64it/			
s]	Class	Images	Labels		P	R			
		all	10	11	0.139	0.545	0.118	0.0234	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
4/199	0.82G	0.07777	0.02512	0	7	416: 100% 14/14 [00:04<00:00, 2.85it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 5.88it/			
s]	Class	Images	Labels		P	R			
		all	10	11	0.171	0.451	0.117	0.026	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
5/199	0.82G	0.07936	0.02568	0	9	416: 100% 14/14 [00:05<00:00, 2.78it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.30it/			
s]	Class	Images	Labels		P	R			
		all	10	11	0.24	0.636	0.179	0.0624	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
6/199	0.82G	0.0753	0.02195	0	4	416: 100% 14/14 [00:04<00:00, 2.84it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.44it/			
s]	Class	Images	Labels		P	R			
		all	10	11	0.199	0.273	0.0815	0.0236	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
7/199	0.82G	0.07502	0.02095	0	8	416: 100% 14/14 [00:04<00:00, 2.83it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.39it/			
s]	Class	Images	Labels		P	R			
		all	10	11	0.0288	0.636	0.0275	0.00644	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
8/199	0.82G	0.06972	0.02352	0	8	416: 100% 14/14 [00:04<00:00, 2.83it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.72it/			
s]	Class	Images	Labels		P	R			
		all	10	11	0.356	0.455	0.262	0.0312	
	Epoch	gpu_mem	box	obj	cls	labels	img_size		
9/199	0.82G	0.06666	0.02082	0	7	416: 100% 14/14 [00:04<00:00, 2.84it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.01it/			
s]	Class	Images	Labels		P	R			

		all	10	11	0.219	0.358	0.135	0.029
Epoch 10/199	gpu_mem 0.82G Class	box 0.06272 Images	obj 0.0208 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.61it/s]		
s]		all	10	11	0.202	0.455	0.174	0.0377
Epoch 11/199	gpu_mem 0.82G Class	box 0.06748 Images	obj 0.02029 Labels	cls 0 P	labels 6 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.67it/s]		
s]		all	10	11	0.171	0.545	0.145	0.0284
Epoch 12/199	gpu_mem 0.82G Class	box 0.0608 Images	obj 0.02319 Labels	cls 0 P	labels 10 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.61it/s]		
s]		all	10	11	0.226	0.455	0.172	0.0483
Epoch 13/199	gpu_mem 0.82G Class	box 0.05458 Images	obj 0.02398 Labels	cls 0 P	labels 11 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.73it/s]		
s]		all	10	11	0.213	0.455	0.181	0.0326
Epoch 14/199	gpu_mem 0.82G Class	box 0.05721 Images	obj 0.02159 Labels	cls 0 P	labels 13 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.01it/s]		
s]		all	10	11	0.543	0.545	0.418	0.128
Epoch 15/199	gpu_mem 0.82G Class	box 0.05951 Images	obj 0.02048 Labels	cls 0 P	labels 5 R	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.04it/s]		
s]		all	10	11	0.249	0.545	0.227	0.0437
Epoch 16/199	gpu_mem 0.82G Class	box 0.06499 Images	obj 0.01906 Labels	cls 0 P	labels 10 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.82it/s]		
s]		all	10	11	0.499	0.362	0.374	0.0717
Epoch	gpu_mem	box	obj	cls	labels	img_size		

17/199	0.822G	0.04918	0.02143	0	11	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.05it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.533	0.636	0.62	0.226	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
18/199	0.822G	0.04839	0.02073	0	7	416: 100% 14/14 [00:04<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.03it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.499	0.545	0.558	0.196	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
19/199	0.822G	0.05315	0.01881	0	10	416: 100% 14/14 [00:05<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.19it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.454	0.455	0.498	0.128	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
20/199	0.822G	0.05079	0.01796	0	9	416: 100% 14/14 [00:05<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.84it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.774	0.636	0.672	0.242	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
21/199	0.822G	0.04872	0.01719	0	10	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.43it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.663	0.545	0.595	0.182	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
22/199	0.822G	0.04927	0.01793	0	8	416: 100% 14/14 [00:04<00:00, 2.82it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.01it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.775	0.636	0.707	0.3	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
23/199	0.822G	0.04799	0.01946	0	11	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.86it/	s]
	Class	Images	Labels	P	R			
	all	10	11	0.6	0.545	0.492	0.15	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
24/199	0.822G	0.04661	0.01609	0	5	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.11it/	s]
	Class	Images	Labels	P	R			

		all	10	11	0.529	0.818	0.563	0.272
Epoch 25/199	gpu_mem 0.822G Class	box 0.04246 Images	obj 0.01572 Labels	cls 0 P	labels 6 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.90it/s]		
s]		all	10	11	0.411	0.636	0.523	0.154
Epoch 26/199	gpu_mem 0.822G Class	box 0.04445 Images	obj 0.01546 Labels	cls 0 P	labels 10 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.91it/s]		
s]		all	10	11	0.454	0.909	0.583	0.319
Epoch 27/199	gpu_mem 0.822G Class	box 0.04349 Images	obj 0.019 Labels	cls 0 P	labels 13 R	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.39it/s]		
s]		all	10	11	0.359	0.818	0.352	0.109
Epoch 28/199	gpu_mem 0.822G Class	box 0.04383 Images	obj 0.01311 Labels	cls 0 P	labels 4 R	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.11it/s]		
s]		all	10	11	0.434	0.909	0.502	0.213
Epoch 29/199	gpu_mem 0.822G Class	box 0.04274 Images	obj 0.01577 Labels	cls 0 P	labels 5 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.25it/s]		
s]		all	10	11	0.624	0.455	0.44	0.171
Epoch 30/199	gpu_mem 0.822G Class	box 0.04204 Images	obj 0.01376 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.56it/s]		
s]		all	10	11	0.776	0.636	0.663	0.245
Epoch 31/199	gpu_mem 0.822G Class	box 0.04388 Images	obj 0.01509 Labels	cls 0 P	labels 10 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.14it/s]		
s]		all	10	11	0.571	0.726	0.569	0.235
Epoch	gpu_mem	box	obj	cls	labels	img_size		

	32/199	0.822G	0.04273	0.01429	0	6	416: 100% 14/14 [00:05<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.02it/
		all	10	11	0.6	0.818	0.675 0.318
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	33/199	0.822G	0.03597	0.01613	0	6	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.80it/
		all	10	11	0.666	0.727	0.674 0.357
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	34/199	0.822G	0.03877	0.016	0	10	416: 100% 14/14 [00:05<00:00, 2.79it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.57it/
		all	10	11	0.5	0.726	0.587 0.179
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	35/199	0.822G	0.04127	0.01508	0	10	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.27it/
		all	10	11	0.667	0.727	0.675 0.275
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	36/199	0.822G	0.04329	0.016	0	16	416: 100% 14/14 [00:05<00:00, 2.77it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.04it/
		all	10	11	0.666	0.727	0.694 0.264
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	37/199	0.822G	0.03905	0.01556	0	6	416: 100% 14/14 [00:05<00:00, 2.79it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.11it/
		all	10	11	0.666	0.724	0.691 0.293
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	38/199	0.822G	0.03688	0.0138	0	4	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.18it/
		all	10	11	0.692	0.817	0.735 0.351
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	39/199	0.822G	0.03868	0.01247	0	7	416: 100% 14/14 [00:04<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.35it/

		all	10	11	0.526	0.908	0.702	0.318
Epoch 40/199	gpu_mem 0.822G Class	box 0.0377 Images	obj 0.01265 Labels	cls 0 P	labels 9 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.81it/s]		
s]		all	10	11	0.624	0.909	0.73	0.214
Epoch 41/199	gpu_mem 0.822G Class	box 0.03652 Images	obj 0.01333 Labels	cls 0 P	labels 8 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.18it/s]		
s]		all	10	11	0.666	0.727	0.746	0.329
Epoch 42/199	gpu_mem 0.822G Class	box 0.03421 Images	obj 0.01288 Labels	cls 0 P	labels 13 R	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.94it/s]		
s]		all	10	11	1	0.545	0.771	0.315
Epoch 43/199	gpu_mem 0.822G Class	box 0.03518 Images	obj 0.01202 Labels	cls 0 P	labels 3 R	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.44it/s]		
s]		all	10	11	0.6	0.818	0.738	0.275
Epoch 44/199	gpu_mem 0.822G Class	box 0.03834 Images	obj 0.01251 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.11it/s]		
s]		all	10	11	0.713	0.455	0.613	0.263
Epoch 45/199	gpu_mem 0.822G Class	box 0.03457 Images	obj 0.01422 Labels	cls 0 P	labels 22 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.23it/s]		
s]		all	10	11	0.777	0.636	0.724	0.349
Epoch 46/199	gpu_mem 0.822G Class	box 0.03247 Images	obj 0.01151 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.82it/s]		
s]		all	10	11	0.6	0.817	0.728	0.372
Epoch	gpu_mem	box	obj	cls	labels	img_size		

	47/199	0.822G	0.03681	0.01445	0	11	416: 100% 14/14 [00:05<00:00, 2.79it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.93it/
		all	10	11	0.529	0.818	0.648 0.288
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	48/199	0.822G	0.03867	0.01415	0	9	416: 100% 14/14 [00:05<00:00, 2.79it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.44it/
		all	10	11	0.571	0.727	0.705 0.333
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	49/199	0.822G	0.03676	0.01432	0	8	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.96it/
		all	10	11	0.818	0.818	0.828 0.415
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	50/199	0.822G	0.03557	0.01266	0	10	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.98it/
		all	10	11	0.75	0.818	0.793 0.386
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	51/199	0.822G	0.03657	0.01305	0	7	416: 100% 14/14 [00:04<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.39it/
		all	10	11	0.727	0.727	0.667 0.35
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	52/199	0.822G	0.03691	0.01077	0	7	416: 100% 14/14 [00:04<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.26it/
		all	10	11	0.625	0.909	0.79 0.292
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	53/199	0.822G	0.03498	0.01203	0	8	416: 100% 14/14 [00:04<00:00, 2.82it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.28it/
		all	10	11	0.786	1	0.92 0.407
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	54/199	0.822G	0.03183	0.01575	0	28	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.00it/

		all	10	11	0.786	1	0.93	0.366
Epoch 55/199	gpu_mem 0.822G Class	box 0.03497 Images	obj 0.01089 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.95it/		
s]		all	10	11	0.786	1	0.934	0.375
Epoch 56/199	gpu_mem 0.822G Class	box 0.03396 Images	obj 0.01439 Labels	cls 0 P	labels 15	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.50it/		
s]		all	10	11	0.714	0.909	0.736	0.282
Epoch 57/199	gpu_mem 0.822G Class	box 0.03271 Images	obj 0.01546 Labels	cls 0 P	labels 30	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.04it/		
s]		all	10	11	0.786	1	0.808	0.377
Epoch 58/199	gpu_mem 0.822G Class	box 0.03278 Images	obj 0.01164 Labels	cls 0 P	labels 8	img_size 416: 100% 14/14 [00:04<00:00, 2.83it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.41it/		
s]		all	10	11	0.692	0.818	0.645	0.339
Epoch 59/199	gpu_mem 0.822G Class	box 0.02726 Images	obj 0.01307 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.41it/		
s]		all	10	11	0.785	1	0.825	0.347
Epoch 60/199	gpu_mem 0.822G Class	box 0.02824 Images	obj 0.01199 Labels	cls 0 P	labels 13	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.71it/		
s]		all	10	11	0.733	1	0.767	0.293
Epoch 61/199	gpu_mem 0.822G Class	box 0.02973 Images	obj 0.01186 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.27it/		
s]		all	10	11	0.714	0.909	0.752	0.375
Epoch	gpu_mem	box	obj	cls	labels	img_size		

	62/199	0.822G	0.03106	0.01322	0	11	416: 100% 14/14 [00:04<00:00, 2.83it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.40it/
		all	10	11	0.833	0.907	0.827 0.436
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	63/199	0.822G	0.03121	0.01345	0	10	416: 100% 14/14 [00:05<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.86it/
		all	10	11	0.769	0.909	0.828 0.361
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	64/199	0.822G	0.03021	0.01297	0	7	416: 100% 14/14 [00:05<00:00, 2.79it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.14it/
		all	10	11	0.833	0.909	0.835 0.447
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	65/199	0.822G	0.02849	0.01122	0	9	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.15it/
		all	10	11	0.833	0.909	0.816 0.394
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	66/199	0.822G	0.03387	0.01085	0	4	416: 100% 14/14 [00:04<00:00, 2.82it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.26it/
		all	10	11	0.833	0.909	0.87 0.454
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	67/199	0.822G	0.0389	0.01118	0	6	416: 100% 14/14 [00:05<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.05it/
		all	10	11	0.909	0.909	0.927 0.38
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	68/199	0.822G	0.03335	0.01163	0	9	416: 100% 14/14 [00:05<00:00, 2.78it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.21it/
		all	10	11	0.846	1	0.932 0.51
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	69/199	0.822G	0.03051	0.01016	0	6	416: 100% 14/14 [00:04<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.06it/

		all	10	11	0.846	1	0.922	0.411
Epoch 70/199	gpu_mem 0.822G Class	box 0.02968 Images	obj 0.01141 Labels	cls 0 P	labels 5	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.54it/s]		
s]		all	10	11	0.785	1	0.916	0.471
Epoch 71/199	gpu_mem 0.822G Class	box 0.02817 Images	obj 0.01108 Labels	cls 0 P	labels 12	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.43it/s]		
s]		all	10	11	0.786	0.999	0.911	0.43
Epoch 72/199	gpu_mem 0.822G Class	box 0.029 Images	obj 0.01107 Labels	cls 0 P	labels 11	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.97it/s]		
s]		all	10	11	0.733	0.999	0.845	0.389
Epoch 73/199	gpu_mem 0.822G Class	box 0.02818 Images	obj 0.01101 Labels	cls 0 P	labels 14	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.39it/s]		
s]		all	10	11	0.733	1	0.874	0.439
Epoch 74/199	gpu_mem 0.822G Class	box 0.03066 Images	obj 0.01026 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.21it/s]		
s]		all	10	11	0.714	0.909	0.806	0.355
Epoch 75/199	gpu_mem 0.822G Class	box 0.03604 Images	obj 0.01174 Labels	cls 0 P	labels 10	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.23it/s]		
s]		all	10	11	0.799	0.727	0.765	0.386
Epoch 76/199	gpu_mem 0.822G Class	box 0.03262 Images	obj 0.01008 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.18it/s]		
s]		all	10	11	0.9	0.818	0.844	0.391
Epoch	gpu_mem	box	obj	cls	labels	img_size		

	77/199	0.822G Class	0.02902 Images	0.01237 Labels	0 P	15 R	416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.96it/
s]		all	10	11	0.916	1	0.935 0.433
	Epoch 78/199	gpu_mem 0.822G Class	box 0.03087 Images	obj 0.01112 Labels	cls 0 P	labels 5 R	img_size 416: 100% 14/14 [00:04<00:00, 2.83it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.86it/
s]		all	10	11	0.846	1	0.913 0.407
	Epoch 79/199	gpu_mem 0.822G Class	box 0.03427 Images	obj 0.01231 Labels	cls 0 P	labels 9 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.53it/
s]		all	10	11	0.769	0.909	0.794 0.373
	Epoch 80/199	gpu_mem 0.822G Class	box 0.03162 Images	obj 0.01098 Labels	cls 0 P	labels 6 R	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.23it/
s]		all	10	11	0.846	0.998	0.884 0.394
	Epoch 81/199	gpu_mem 0.822G Class	box 0.02917 Images	obj 0.01105 Labels	cls 0 P	labels 11 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.83it/
s]		all	10	11	0.786	1	0.847 0.421
	Epoch 82/199	gpu_mem 0.822G Class	box 0.0261 Images	obj 0.01096 Labels	cls 0 P	labels 4 R	img_size 416: 100% 14/14 [00:05<00:00, 2.73it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.57it/
s]		all	10	11	0.786	1	0.858 0.42
	Epoch 83/199	gpu_mem 0.822G Class	box 0.0299 Images	obj 0.01115 Labels	cls 0 P	labels 14 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.69it/
s]		all	10	11	0.786	1	0.829 0.389
	Epoch 84/199	gpu_mem 0.822G Class	box 0.02688 Images	obj 0.01081 Labels	cls 0 P	labels 8 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.88it/
s]							

		all	10	11	0.786	1	0.811	0.381
Epoch 85/199	gpu_mem 0.822G Class	box 0.02534 Images	obj 0.0119 Labels	cls 0 P	labels 12 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.28it/s]		
s]		all	10	11	0.714	0.909	0.729	0.382
Epoch 86/199	gpu_mem 0.822G Class	box 0.02516 Images	obj 0.008884 Labels	cls 0 P	labels 9 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.37it/s]		
s]		all	10	11	0.667	0.909	0.722	0.369
Epoch 87/199	gpu_mem 0.822G Class	box 0.02752 Images	obj 0.01039 Labels	cls 0 P	labels 8 R	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.79it/s]		
s]		all	10	11	0.769	0.909	0.829	0.412
Epoch 88/199	gpu_mem 0.822G Class	box 0.02566 Images	obj 0.009429 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.24it/s]		
s]		all	10	11	0.714	0.909	0.811	0.391
Epoch 89/199	gpu_mem 0.822G Class	box 0.02784 Images	obj 0.01105 Labels	cls 0 P	labels 6 R	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.86it/s]		
s]		all	10	11	0.666	0.908	0.76	0.367
Epoch 90/199	gpu_mem 0.822G Class	box 0.02948 Images	obj 0.008732 Labels	cls 0 P	labels 10 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.98it/s]		
s]		all	10	11	0.692	0.818	0.731	0.388
Epoch 91/199	gpu_mem 0.822G Class	box 0.03213 Images	obj 0.01136 Labels	cls 0 P	labels 24 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.17it/s]		
s]		all	10	11	0.769	0.909	0.832	0.362
Epoch	gpu_mem	box	obj	cls	labels	img_size		

	92/199	0.822G	0.02619	0.009774	0	6	416: 100% 14/14 [00:04<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.49it/
		all	10	11	0.692	0.818	0.754 0.428
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	93/199	0.822G	0.02569	0.01029	0	15	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.37it/
		all	10	11	0.733	1	0.863 0.42
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	94/199	0.822G	0.02552	0.01096	0	13	416: 100% 14/14 [00:04<00:00, 2.80it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.11it/
		all	10	11	0.786	0.999	0.856 0.405
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	95/199	0.822G	0.02726	0.01084	0	9	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.97it/
		all	10	11	0.714	0.909	0.825 0.445
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	96/199	0.822G	0.02745	0.011	0	6	416: 100% 14/14 [00:05<00:00, 2.79it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.19it/
		all	10	11	0.786	1	0.897 0.408
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	97/199	0.822G	0.02439	0.01001	0	8	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.91it/
		all	10	11	0.786	1	0.896 0.394
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	98/199	0.822G	0.02528	0.01005	0	13	416: 100% 14/14 [00:04<00:00, 2.82it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.53it/
		all	10	11	0.786	1	0.877 0.416
	Epoch	gpu_mem	box	obj	cls	labels	img_size
	99/199	0.822G	0.02776	0.01017	0	14	416: 100% 14/14 [00:04<00:00, 2.81it/s]
s]		Class	Images	Labels	P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.49it/

		all	10	11	0.786	1	0.861	0.353
Epoch 100/199	gpu_mem 0.822G Class	box 0.02825 Images	obj 0.009549 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.83it/s]		
s]		all	10	11	0.786	1	0.876	0.463
Epoch 101/199	gpu_mem 0.822G Class	box 0.02613 Images	obj 0.009365 Labels	cls 0 P	labels 12	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.22it/s]		
s]		all	10	11	0.833	0.909	0.877	0.442
Epoch 102/199	gpu_mem 0.822G Class	box 0.02418 Images	obj 0.01113 Labels	cls 0 P	labels 16	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.20it/s]		
s]		all	10	11	0.785	1	0.876	0.449
Epoch 103/199	gpu_mem 0.822G Class	box 0.02473 Images	obj 0.0102 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.40it/s]		
s]		all	10	11	0.786	1	0.858	0.431
Epoch 104/199	gpu_mem 0.822G Class	box 0.02242 Images	obj 0.01029 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.25it/s]		
s]		all	10	11	0.786	1	0.842	0.404
Epoch 105/199	gpu_mem 0.822G Class	box 0.02315 Images	obj 0.01047 Labels	cls 0 P	labels 8	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.25it/s]		
s]		all	10	11	0.786	1	0.842	0.388
Epoch 106/199	gpu_mem 0.822G Class	box 0.02183 Images	obj 0.008959 Labels	cls 0 P	labels 4	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.16it/s]		
s]		all	10	11	0.786	1	0.886	0.385
Epoch	gpu_mem	box	obj	cls	labels	img_size		

107/199 s]	0.822G Class	0.025 Images	0.009213 Labels	0 P	8 R	416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.22it/			
	all	10	11	0.786	1	0.886	0.45		
Epoch 108/199 s]	gpu_mem 0.822G Class	box 0.02376 Images	obj 0.01074 Labels	cls 0 P	labels 25 R	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.93it/			
	all	10	11	0.786	1	0.908	0.397		
Epoch 109/199 s]	gpu_mem 0.822G Class	box 0.02488 Images	obj 0.008811 Labels	cls 0 P	labels 8 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.04it/			
	all	10	11	0.786	1	0.908	0.419		
Epoch 110/199 s]	gpu_mem 0.822G Class	box 0.02213 Images	obj 0.008907 Labels	cls 0 P	labels 5 R	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.37it/			
	all	10	11	0.786	1	0.908	0.422		
Epoch 111/199 s]	gpu_mem 0.822G Class	box 0.02431 Images	obj 0.008437 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.45it/			
	all	10	11	0.786	1	0.931	0.415		
Epoch 112/199 s]	gpu_mem 0.822G Class	box 0.02426 Images	obj 0.01078 Labels	cls 0 P	labels 28 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.27it/			
	all	10	11	0.832	0.909	0.926	0.454		
Epoch 113/199 s]	gpu_mem 0.822G Class	box 0.02485 Images	obj 0.009038 Labels	cls 0 P	labels 11 R	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.65it/			
	all	10	11	0.833	0.909	0.926	0.453		
Epoch 114/199 s]	gpu_mem 0.822G Class	box 0.02249 Images	obj 0.00981 Labels	cls 0 P	labels 10 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.25it/			

		all	10	11	0.833	0.909	0.931	0.448
Epoch 115/199	gpu_mem 0.822G Class	box 0.02242 Images	obj 0.01088 Labels	cls 0 P	labels 5 R	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.28it/s]		
s]		all	10	11	0.833	0.909	0.926	0.453
Epoch 116/199	gpu_mem 0.822G Class	box 0.02384 Images	obj 0.01007 Labels	cls 0 P	labels 9 R	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.53it/s]		
s]		all	10	11	0.833	0.909	0.896	0.426
Epoch 117/199	gpu_mem 0.822G Class	box 0.02344 Images	obj 0.01247 Labels	cls 0 P	labels 23 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.14it/s]		
s]		all	10	11	0.833	0.908	0.881	0.441
Epoch 118/199	gpu_mem 0.822G Class	box 0.0234 Images	obj 0.009161 Labels	cls 0 P	labels 12 R	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.24it/s]		
s]		all	10	11	0.833	0.909	0.881	0.445
Epoch 119/199	gpu_mem 0.822G Class	box 0.02179 Images	obj 0.009343 Labels	cls 0 P	labels 4 R	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.50it/s]		
s]		all	10	11	0.832	0.909	0.877	0.403
Epoch 120/199	gpu_mem 0.822G Class	box 0.02448 Images	obj 0.01022 Labels	cls 0 P	labels 7 R	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.29it/s]		
s]		all	10	11	0.769	0.908	0.876	0.432
Epoch 121/199	gpu_mem 0.822G Class	box 0.02356 Images	obj 0.01096 Labels	cls 0 P	labels 14 R	img_size 416: 100% 14/14 [00:05<00:00, 2.80it/s] mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.44it/s]		
s]		all	10	11	0.769	0.909	0.91	0.409
Epoch	gpu_mem	box	obj	cls	labels	img_size		

122/199	0.822G	0.02278	0.009105	0	P	6	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.30it/
s]	Class	Images	Labels			R		
	all	10	11	0.9	0.818	0.919	0.419	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
123/199	0.822G	0.02312	0.009763	0	10	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.98it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.833	0.908	0.916	0.417	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
124/199	0.822G	0.02436	0.01034	0	6	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.97it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.833	0.909	0.916	0.424	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
125/199	0.822G	0.02172	0.009491	0	8	416: 100% 14/14 [00:05<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.58it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.786	1	0.89	0.415	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
126/199	0.822G	0.022	0.008942	0	8	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.47it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.786	0.999	0.876	0.437	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
127/199	0.822G	0.02107	0.007758	0	7	416: 100% 14/14 [00:05<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.22it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.733	1	0.867	0.384	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
128/199	0.822G	0.02233	0.008778	0	11	416: 100% 14/14 [00:05<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.38it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.733	1	0.892	0.442	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
129/199	0.822G	0.02132	0.009564	0	6	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.30it/	
s]	Class	Images	Labels		P	R		

		all	10	11	0.785	1	0.912	0.455
Epoch 130/199	gpu_mem 0.822G Class	box 0.02145 Images	obj 0.008285 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.09it/s]		
s]		all	10	11	0.786	1	0.93	0.434
Epoch 131/199	gpu_mem 0.822G Class	box 0.02294 Images	obj 0.009388 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.80it/s]		
s]		all	10	11	0.786	1	0.946	0.445
Epoch 132/199	gpu_mem 0.822G Class	box 0.02392 Images	obj 0.00817 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.11it/s]		
s]		all	10	11	0.786	1	0.946	0.423
Epoch 133/199	gpu_mem 0.822G Class	box 0.02013 Images	obj 0.008891 Labels	cls 0 P	labels 8	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.73it/s]		
s]		all	10	11	0.786	1	0.926	0.423
Epoch 134/199	gpu_mem 0.822G Class	box 0.0214 Images	obj 0.008646 Labels	cls 0 P	labels 11	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.34it/s]		
s]		all	10	11	0.846	1	0.923	0.461
Epoch 135/199	gpu_mem 0.822G Class	box 0.02189 Images	obj 0.009001 Labels	cls 0 P	labels 13	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.18it/s]		
s]		all	10	11	0.846	1	0.931	0.404
Epoch 136/199	gpu_mem 0.822G Class	box 0.02244 Images	obj 0.009601 Labels	cls 0 P	labels 8	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.34it/s]		
s]		all	10	11	0.846	1	0.931	0.452
Epoch	gpu_mem	box	obj	cls	labels	img_size		

137/199	0.822G	0.02212	0.008869	0	P	7	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.93it/
s]	Class	Images	Labels			R		
	all	10	11	0.846		1	0.923	0.443
Epoch	gpu_mem	box	obj	cls	labels	img_size		
138/199	0.822G	0.02036	0.009176	0	12	416: 100% 14/14 [00:04<00:00, 2.82it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.07it/	
	all	10	11	0.846		1	0.912	0.447
Epoch	gpu_mem	box	obj	cls	labels	img_size		
139/199	0.822G	0.02198	0.008812	0	12	416: 100% 14/14 [00:05<00:00, 2.80it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.47it/	
	all	10	11	0.846		1	0.912	0.426
Epoch	gpu_mem	box	obj	cls	labels	img_size		
140/199	0.822G	0.02082	0.009619	0	6	416: 100% 14/14 [00:05<00:00, 2.79it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.34it/	
	all	10	11	0.846		1	0.898	0.448
Epoch	gpu_mem	box	obj	cls	labels	img_size		
141/199	0.822G	0.02093	0.01003	0	6	416: 100% 14/14 [00:04<00:00, 2.81it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.41it/	
	all	10	11	0.846		1	0.898	0.44
Epoch	gpu_mem	box	obj	cls	labels	img_size		
142/199	0.822G	0.02036	0.007502	0	6	416: 100% 14/14 [00:04<00:00, 2.82it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.44it/	
	all	10	11	0.846		1	0.898	0.451
Epoch	gpu_mem	box	obj	cls	labels	img_size		
143/199	0.822G	0.02051	0.009504	0	6	416: 100% 14/14 [00:04<00:00, 2.81it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.32it/	
	all	10	11	0.846		1	0.898	0.418
Epoch	gpu_mem	box	obj	cls	labels	img_size		
144/199	0.822G	0.01818	0.007686	0	7	416: 100% 14/14 [00:05<00:00, 2.78it/s]		
s]	Class	Images	Labels		P	R	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.18it/	

		all	10	11	0.846	1	0.917	0.467
Epoch 145/199	gpu_mem 0.822G Class	box 0.01971 Images	obj 0.008465 Labels	cls 0 P	labels 11	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.95it/		
s]		all	10	11	0.846	1	0.943	0.466
Epoch 146/199	gpu_mem 0.822G Class	box 0.01943 Images	obj 0.008438 Labels	cls 0 P	labels 5	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.30it/		
s]		all	10	11	0.846	1	0.94	0.454
Epoch 147/199	gpu_mem 0.822G Class	box 0.02023 Images	obj 0.007714 Labels	cls 0 P	labels 8	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.26it/		
s]		all	10	11	0.846	1	0.958	0.497
Epoch 148/199	gpu_mem 0.822G Class	box 0.02137 Images	obj 0.009793 Labels	cls 0 P	labels 19	img_size 416: 100% 14/14 [00:05<00:00, 2.77it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.28it/		
s]		all	10	11	0.846	1	0.949	0.464
Epoch 149/199	gpu_mem 0.822G Class	box 0.02028 Images	obj 0.008116 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.48it/		
s]		all	10	11	0.846	1	0.958	0.48
Epoch 150/199	gpu_mem 0.822G Class	box 0.02028 Images	obj 0.01006 Labels	cls 0 P	labels 3	img_size 416: 100% 14/14 [00:04<00:00, 2.81it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.41it/		
s]		all	10	11	0.846	1	0.94	0.483
Epoch 151/199	gpu_mem 0.822G Class	box 0.02103 Images	obj 0.008994 Labels	cls 0 P	labels 6	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.04it/		
s]		all	10	11	0.846	1	0.928	0.463
Epoch	gpu_mem	box	obj	cls	labels	img_size		

152/199	0.822G	0.01911	0.008581	0	P	6	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.02it/
s]	Class	Images	Labels			R		
	all	10	11	0.846		1	0.928	0.467
Epoch	gpu_mem	box	obj	cls	labels	img_size		
153/199	0.822G	0.01864	0.008711	0	5	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.99it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.846		1	0.94	0.472
Epoch	gpu_mem	box	obj	cls	labels	img_size		
154/199	0.822G	0.02038	0.00811	0	5	416: 100% 14/14 [00:04<00:00, 2.81it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.29it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.786		1	0.931	0.471
Epoch	gpu_mem	box	obj	cls	labels	img_size		
155/199	0.822G	0.02122	0.008923	0	10	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.27it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.786		1	0.931	0.462
Epoch	gpu_mem	box	obj	cls	labels	img_size		
156/199	0.822G	0.01959	0.007912	0	12	416: 100% 14/14 [00:04<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.20it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.833	0.908	0.926	0.434	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
157/199	0.822G	0.01901	0.008731	0	8	416: 100% 14/14 [00:05<00:00, 2.79it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.49it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.831	0.909	0.931	0.45	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
158/199	0.822G	0.0184	0.009372	0	23	416: 100% 14/14 [00:04<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.17it/	
s]	Class	Images	Labels		P	R		
	all	10	11	0.833	0.909	0.931	0.438	
Epoch	gpu_mem	box	obj	cls	labels	img_size		
159/199	0.822G	0.01845	0.008763	0	7	416: 100% 14/14 [00:04<00:00, 2.80it/s]	mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 1.53it/	
s]	Class	Images	Labels		P	R		

		all	10	11	0.733	1	0.929	0.449
Epoch 160/199	gpu_mem 0.822G Class	box 0.01873 Images	obj 0.01 Labels	cls 0 P	labels 11	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.18it/s]		
s]		all	10	11	0.733	1	0.911	0.434
Epoch 161/199	gpu_mem 0.822G Class	box 0.01811 Images	obj 0.008323 Labels	cls 0 P	labels 11	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.10it/s]		
s]		all	10	11	0.786	1	0.908	0.421
Epoch 162/199	gpu_mem 0.822G Class	box 0.01631 Images	obj 0.00697 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:04<00:00, 2.82it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.14it/s]		
s]		all	10	11	0.786	1	0.901	0.427
Epoch 163/199	gpu_mem 0.822G Class	box 0.01932 Images	obj 0.008177 Labels	cls 0 P	labels 12	img_size 416: 100% 14/14 [00:05<00:00, 2.78it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 6.88it/s]		
s]		all	10	11	0.785	1	0.861	0.419
Epoch 164/199	gpu_mem 0.822G Class	box 0.01919 Images	obj 0.008603 Labels	cls 0 P	labels 9	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.30it/s]		
s]		all	10	11	0.786	1	0.886	0.397
Epoch 165/199	gpu_mem 0.822G Class	box 0.01794 Images	obj 0.007734 Labels	cls 0 P	labels 7	img_size 416: 100% 14/14 [00:05<00:00, 2.79it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.26it/s]		
s]		all	10	11	0.846	1	0.912	0.403
Epoch 166/199	gpu_mem 0.822G Class	box 0.01871 Images	obj 0.009017 Labels	cls 0 P	labels 11	img_size 416: 100% 14/14 [00:04<00:00, 2.80it/s] R mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.12it/s]		
s]		all	10	11	0.786	1	0.868	0.401
Epoch	gpu_mem	box	obj	cls	labels	img_size		

```
167/199 0.822G 0.01877 0.007675      0     8     416: 100% 14/14 [00:05<00:00, 2.79it/s]
          Class    Images    Labels      P     R   mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.14it/
s]           all       10       11     0.786      1     0.868     0.388
```

```
Epoch  gpu_mem    box    obj    cls  labels img_size
168/199 0.822G 0.01901 0.009682      0     9     416: 100% 14/14 [00:04<00:00, 2.82it/s]
          Class    Images    Labels      P     R   mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 7.39it/
s]           all       10       11     0.786      1     0.89     0.384
```

Stopping training early as no improvement observed in last 100 epochs. Best results observed at epoch 68, best model saved as `best.pt`.

To update `EarlyStopping(patience=100)` pass a new patience value, i.e. `python train.py --patience 300` or use `--patience 0` to disable `EarlyStopping`.

169 epochs completed in 0.267 hours.

Optimizer stripped from runs/train/exp/weights/last.pt, 14.3MB

Optimizer stripped from runs/train/exp/weights/best.pt, 14.3MB

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

Fusing layers...

Model summary: 213 layers, 7012822 parameters, 0 gradients, 15.8 GFLOPs

```
          Class    Images    Labels      P     R   mAP@.5 mAP@.5:.95: 100% 1/1 [00:00<00:00, 4.55it/
s]           all       10       11     0.846      1     0.932     0.51
```

wandb: Waiting for W&B process to finish... (success).

wandb:

wandb:

wandb: Run history:



wandb:

wandb: Run summary:

wandb: best/epoch 68

```
wandb:      best/mAP_0.5 0.93206
wandb:      best/mAP_0.5:0.95 0.50971
wandb:      best/precision 0.84613
wandb:      best/recall 0.9998
wandb:      metrics/mAP_0.5 0.93206
wandb: metrics/mAP_0.5:0.95 0.50971
wandb:      metrics/precision 0.84613
wandb:      metrics/recall 0.9998
wandb:      train/box_loss 0.01901
wandb:      train/cls_loss 0.0
wandb:      train/obj_loss 0.00968
wandb:      val/box_loss 0.03579
wandb:      val/cls_loss 0.0
wandb:      val/obj_loss 0.00673
wandb:          x/lr0 0.00173
wandb:          x/lr1 0.00173
wandb:          x/lr2 0.00173
wandb:
wandb: Synced azure-pyramid-6: https://wandb.ai/erisedtang/YOLOv5/runs/28uwu0bh
wandb: Synced 5 W&B file(s), 173 media file(s), 1 artifact file(s) and 0 other file(s)
wandb: Find logs at: ./wandb/run-20220421_212135-28uwu0bh/logs
Results saved to runs/train/exp
```

```
In [12]: output_train_dir = 'runs/train/exp'
!ls {output_train_dir}
```

```
confusion_matrix.png           R_curve.png
events.out.tfevents.1650576095.1772e2aff100.448.0 results.csv
F1_curve.png                  results.png
hyp.yaml                      train_batch0.jpg
labels_correlogram.jpg        train_batch1.jpg
labels.jpg                     train_batch2.jpg
opt.yaml                      val_batch0_labels.jpg
P_curve.png                   val_batch0_pred.jpg
PR_curve.png                  weights
```

```
In [13]: # Save model and result to Google Drive
save_path = '/content/drive/MyDrive/AI Camp/Crash Course'
shutil.copytree(output_train_dir, save_path + '/train')
```

```
Out[13]: '/content/drive/MyDrive/AI Camp/Crash Course/train'
```

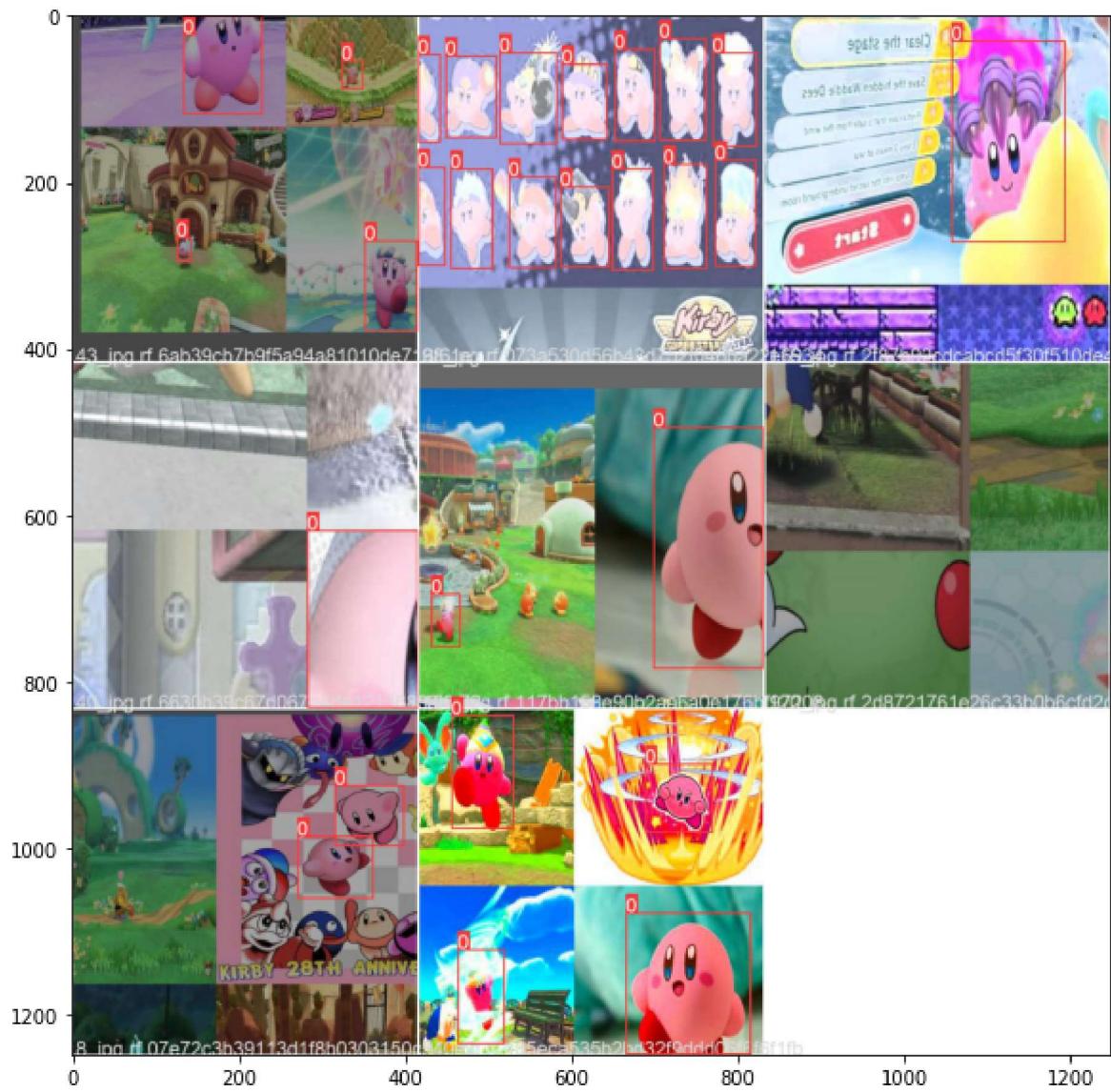
Result Visualization

Batch Process

```
In [14]: import matplotlib.pyplot as plt  
  
plt.figure(figsize = (10, 10))  
plt.imshow(plt.imread(f'{output_train_dir}/train_batch0.jpg'))  
  
plt.figure(figsize = (10, 10))  
plt.imshow(plt.imread(f'{output_train_dir}/train_batch1.jpg'))  
  
plt.figure(figsize = (10, 10))  
plt.imshow(plt.imread(f'{output_train_dir}/train_batch2.jpg'))
```

```
Out[14]: <matplotlib.image.AxesImage at 0x7f87d8cc14d0>
```







Ground True V.S. Predict

```
In [19]: fig, ax = plt.subplots(1, 2, figsize = (2*9,3*5), constrained_layout = True)

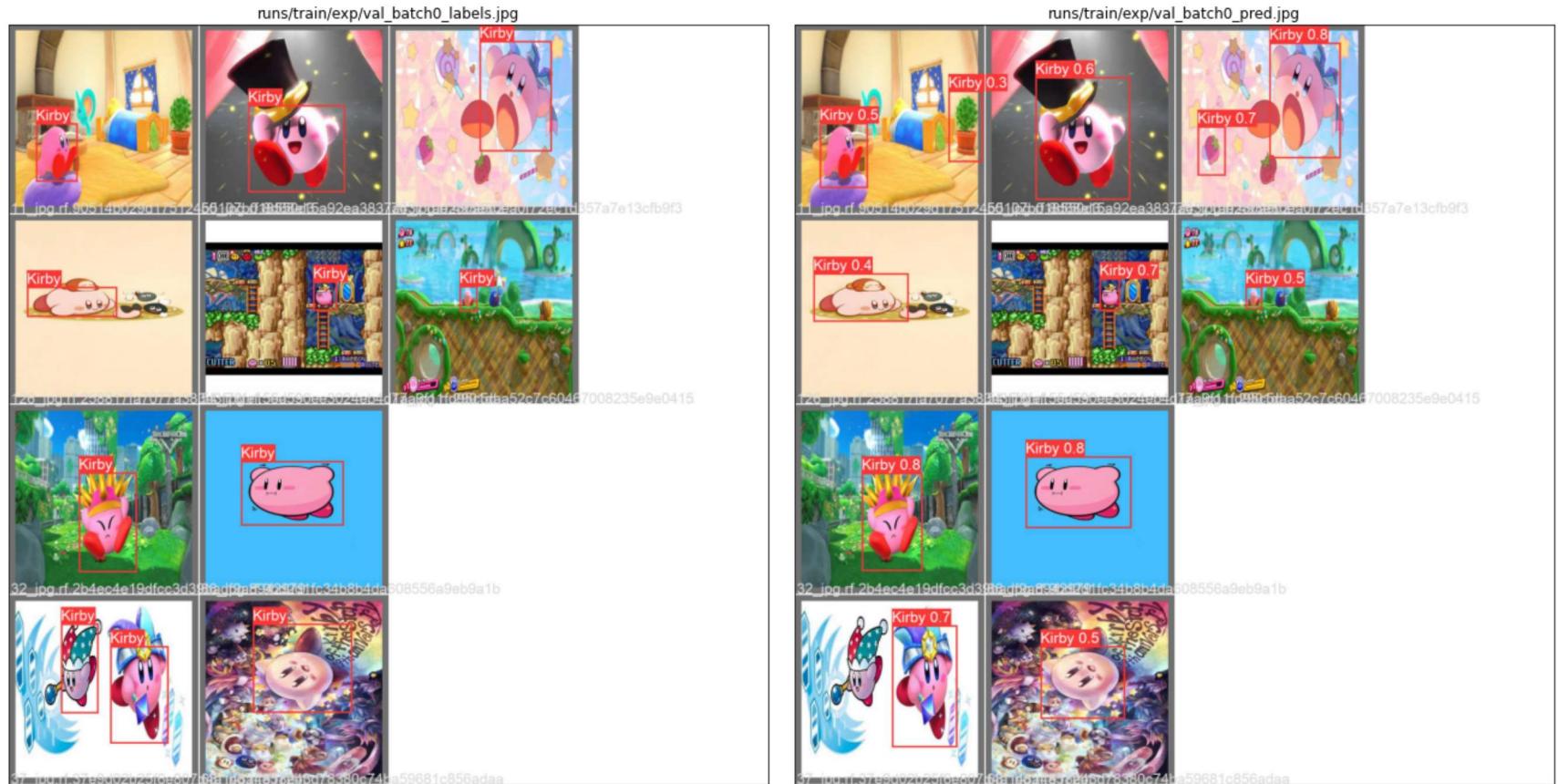
ax[0].imshow(plt.imread(f'{output_train_dir}/val_batch0_labels.jpg'))
ax[0].set_xticks([])
ax[0].set_yticks([])
```

```

ax[0].set_title(f'{output_train_dir}/val_batch0_labels.jpg', fontsize = 12)

ax[1].imshow(plt.imread(f'{output_train_dir}/val_batch0_pred.jpg'))
ax[1].set_xticks([])
ax[1].set_yticks([])
ax[1].set_title(f'{output_train_dir}/val_batch0_pred.jpg', fontsize = 12)
plt.show()

```

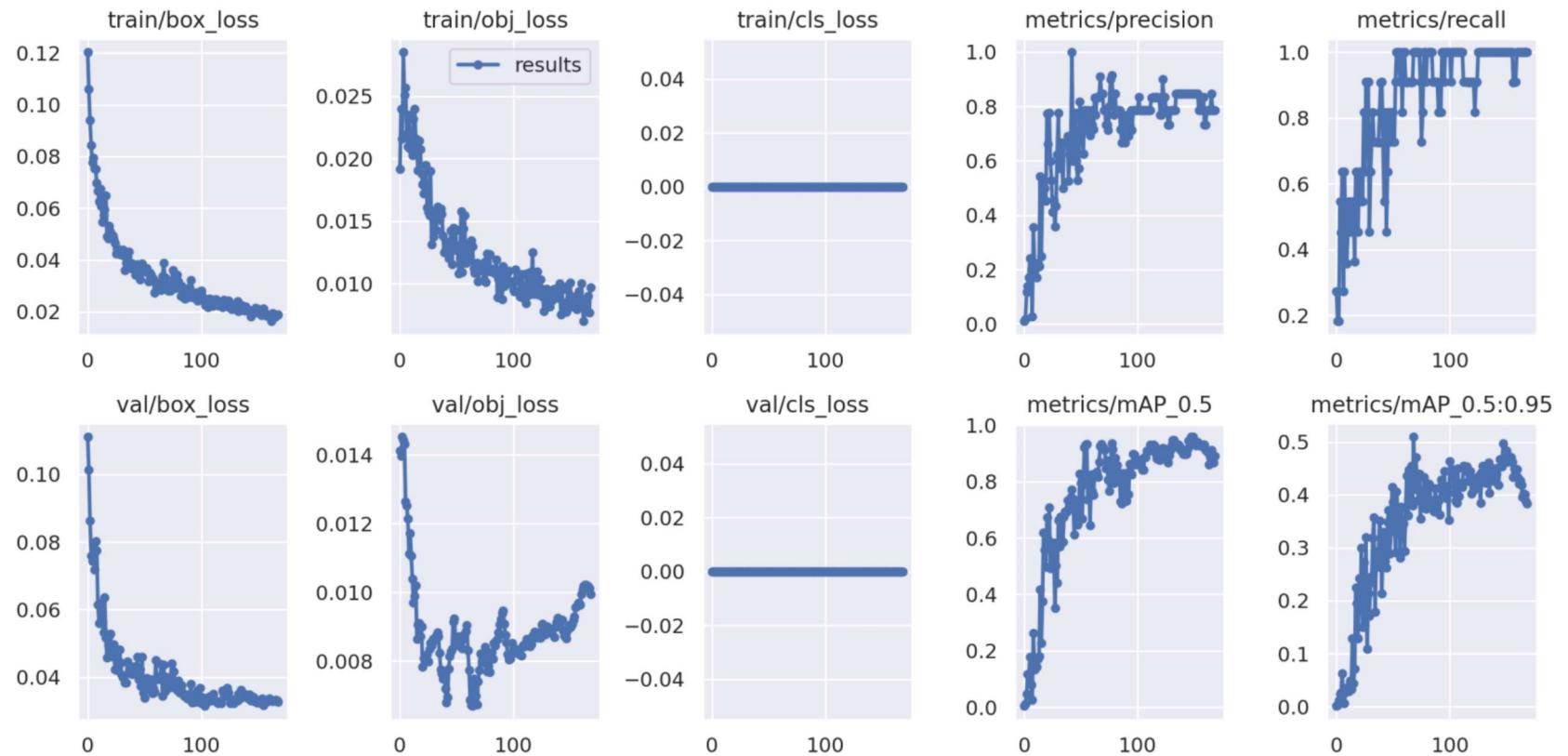


Score V.S. Epoch

```

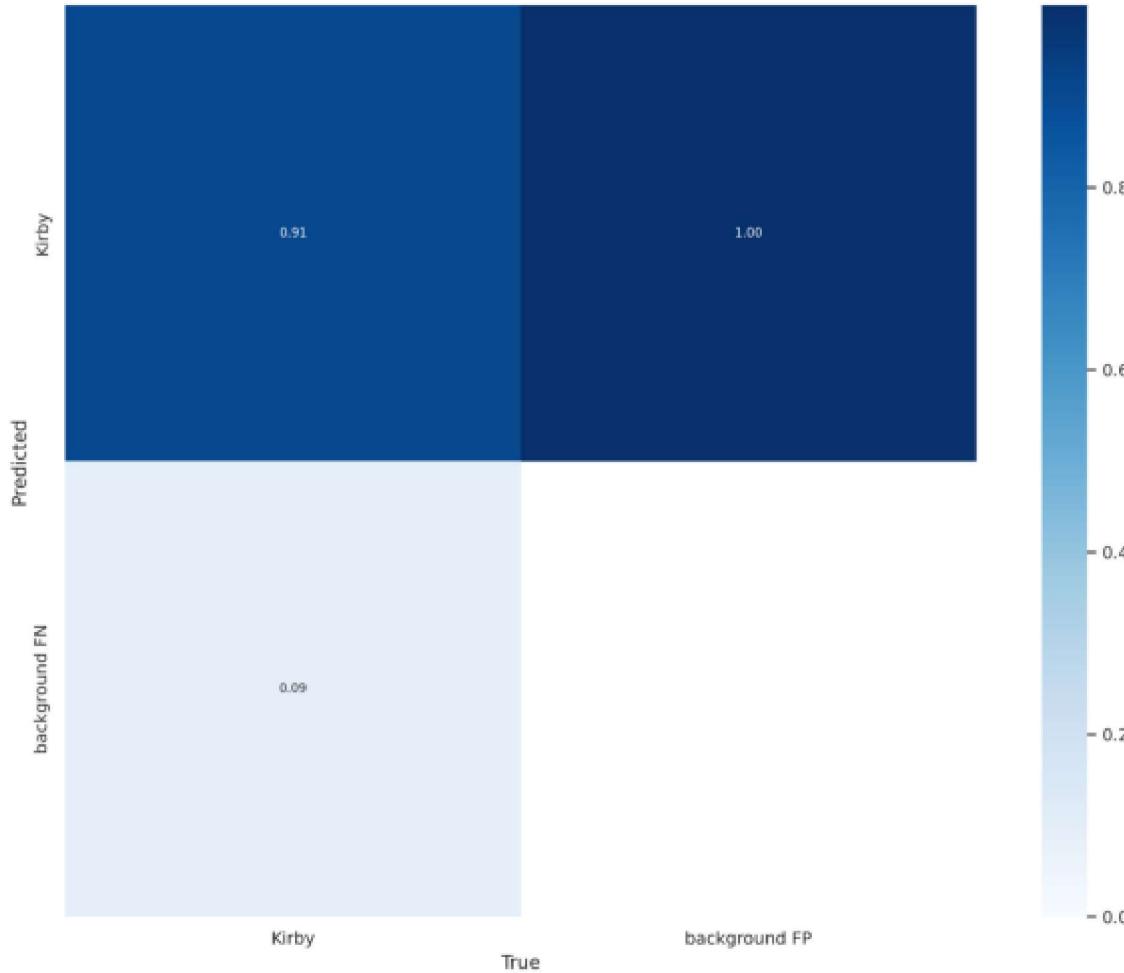
In [22]: plt.figure(figsize=(30,15))
plt.axis('off')
plt.imshow(plt.imread(f'{output_train_dir}/results.png'));

```



Confusion Matrix

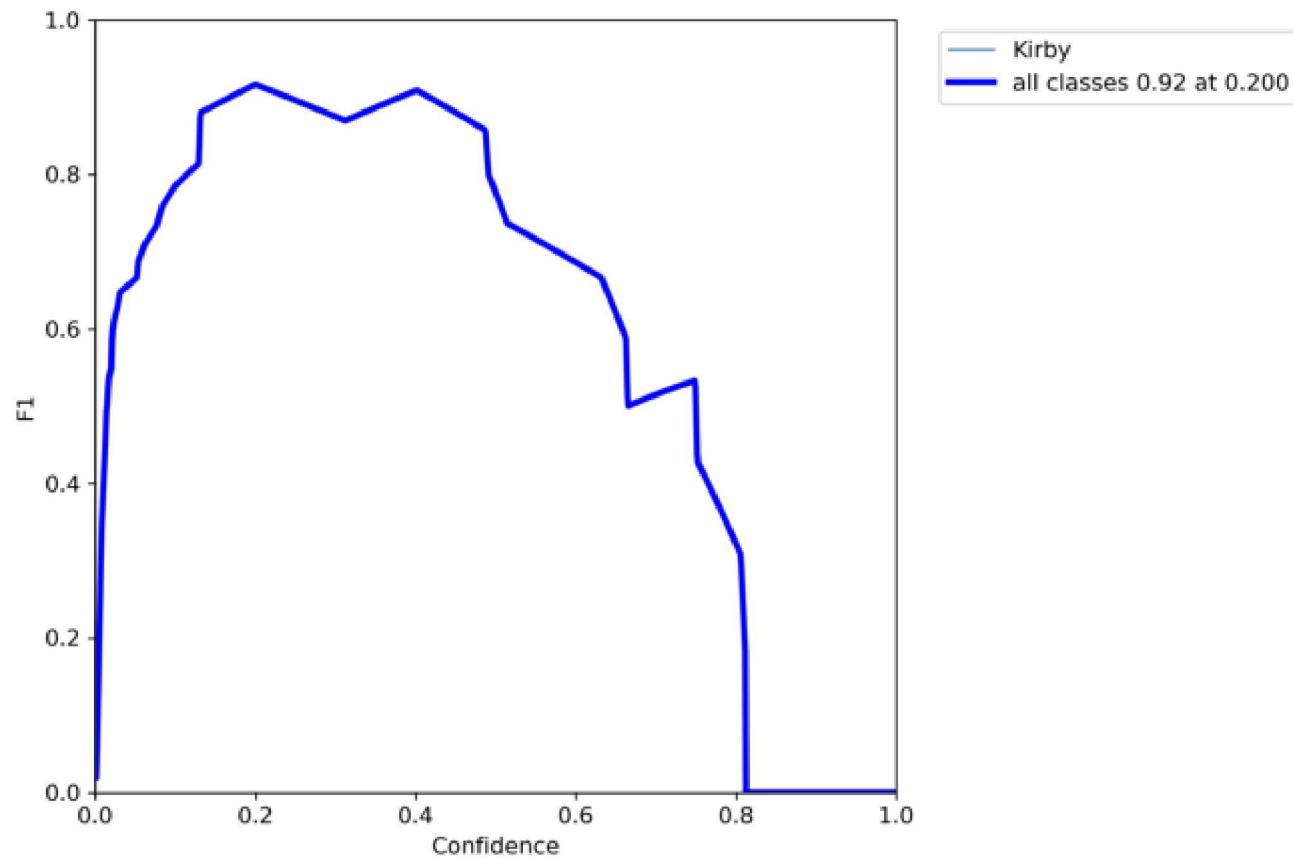
```
In [23]: plt.figure(figsize=(12,10))
plt.axis('off')
plt.imshow(plt.imread(f'{output_train_dir}/confusion_matrix.png'));
```

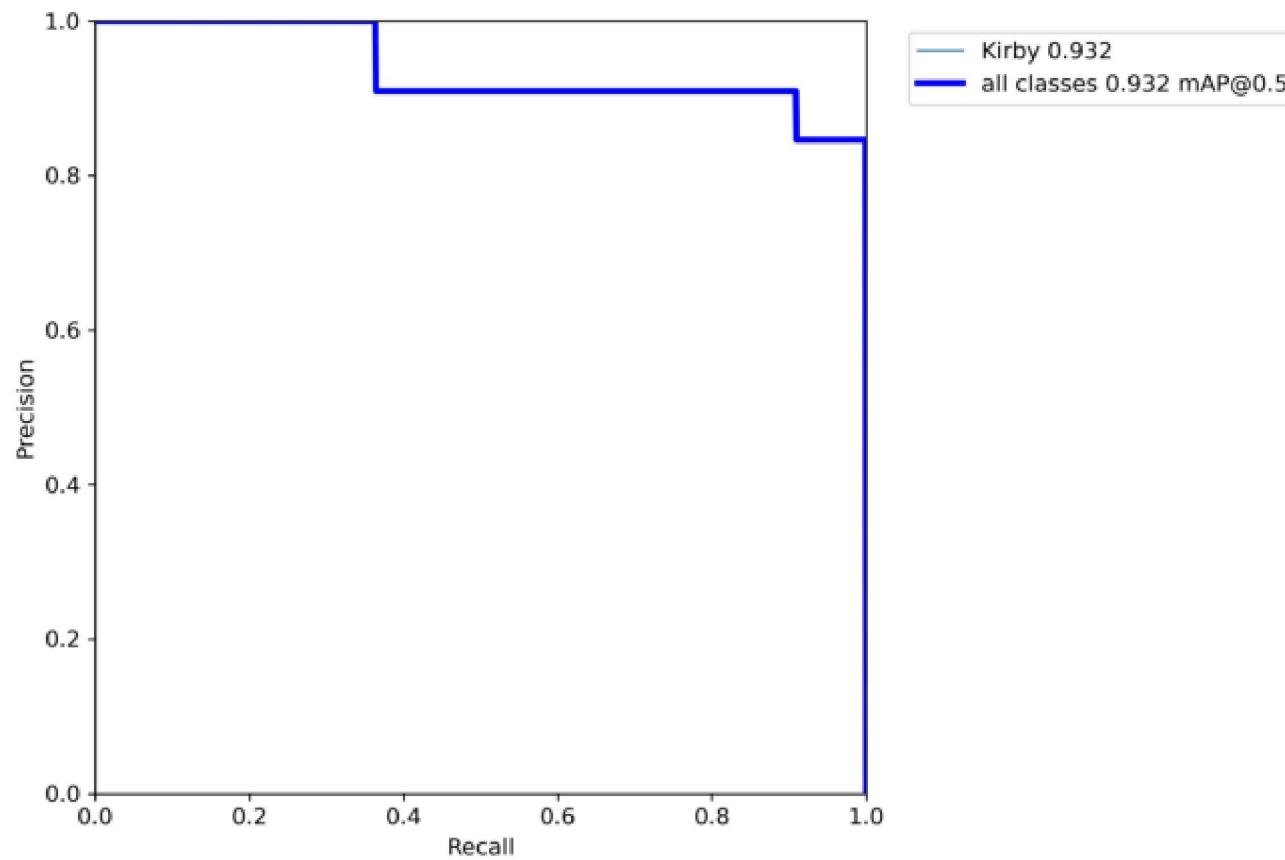


Metrics

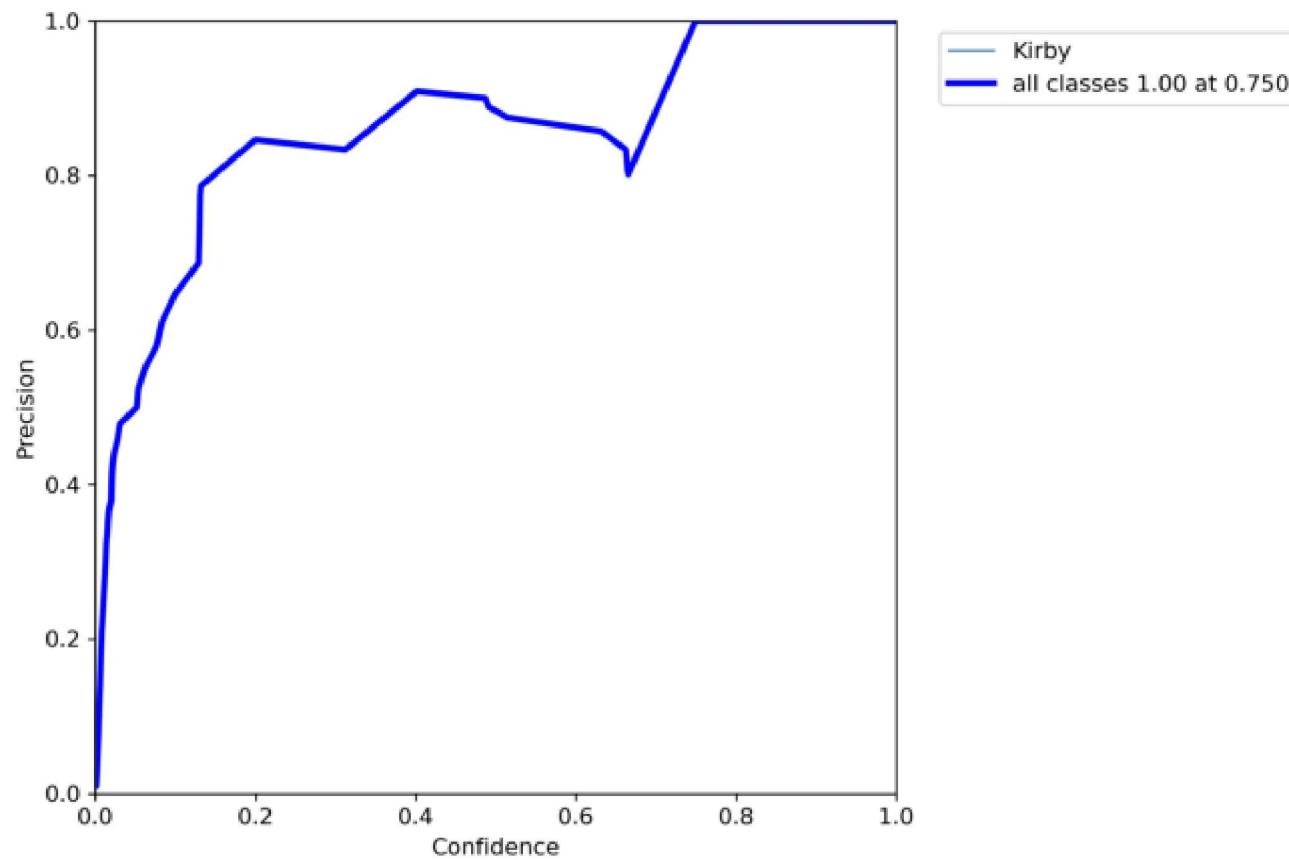
```
In [24]: for metric in ['F1', 'PR', 'P', 'R']:
    print(f'Metric: {metric}')
    plt.figure(figsize=(12,10))
    plt.axis('off')
    plt.imshow(plt.imread(f'{output_train_dir}/{metric}_curve.png'));
    plt.show()
```

Metric: F1

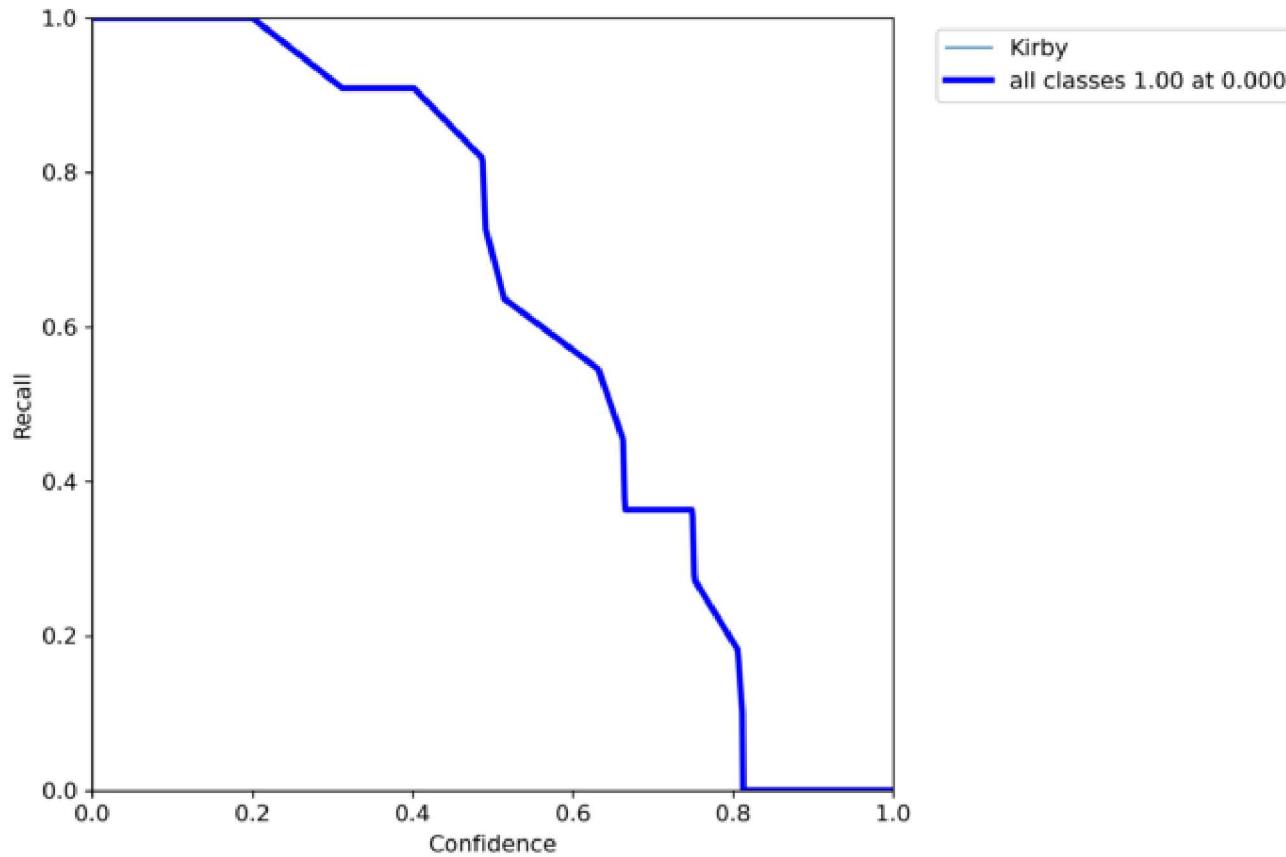




Metric: P



Metric: R



Model Testing

```
In [25]: !python detect.py --weights {output_train_dir}/weights/best.pt --img 416 --conf 0.1 --source {data_loc}/test/images
```

```
detect: weights=['runs/train/exp/weights/best.pt'], source=/content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images, data=data/coco128.yaml, imgsz=[416, 416], conf_thres=0.1, iou_thres=0.45, max_det=1000, device=, view_img=False, save_txt=False, save_conf=False, save_crop=False, nosave=False, classes=None, agnostic_nms=False, augment=False, visualize=False, update=False, project=runs/detect, name=exp, exist_ok=False, line_thickness=3, hide_labels=False, hide_conf=False, half=False, dnn=False
YOLOv5 🚀 v6.1-143-g6ea81bb torch 1.10.0+cu111 CUDA:0 (Tesla K80, 11441MiB)
```

Fusing layers...

```
Model summary: 213 layers, 7012822 parameters, 0 gradients, 15.8 GFLOPs
image 1/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/104.jpg.rf.00af1d06471c42baab7f3a50eec774f6.jpg: 416x416 1 Kirby, Done. (0.028s)
image 2/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/114.jpg.rf.1e3834e663c719e7163af952704d557e.jpg: 416x416 1 Kirby, Done. (0.028s)
image 3/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/121.jpg.rf.9ccc51d4cc438643b9b59a3aecf4db18.jpg: 416x416 2 Kirbys, Done. (0.028s)
image 4/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/122.jpg.rf.f6df0188a95c8967c44e8f42f63cc8fd.jpg: 416x416 1 Kirby, Done. (0.027s)
image 5/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/124.png.rf.0eb5e89910fe223144aa570283619cf6.jpg: 416x416 1 Kirby, Done. (0.028s)
image 6/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/125.jpg.rf.d468dfca6522d47cb0c4e3220b5ad11a.jpg: 416x416 1 Kirby, Done. (0.028s)
image 7/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/127.png.rf.fcc7ac352d4b189324ef9599f0b4bacd.jpg: 416x416 1 Kirby, Done. (0.028s)
image 8/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/128.jpg.rf.e36b36fb24d9070c6838822421eeb07c.jpg: 416x416 2 Kirbys, Done. (0.028s)
image 9/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/14.jpg.rf.fdf328db1d150df2af3d054527a91fab.jpg: 416x416 1 Kirby, Done. (0.028s)
image 10/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/1.jpg.rf.172dc1f29849825018d66df6c6ccfbf.jpg: 416x416 1 Kirby, Done. (0.028s)
image 11/11 /content/Kirby-Detection---AI-Camp-Crash-Course-2/test/images/99.jpg.rf.48af50bddc83f25bbe0c59cd388b8e3d.jpg: 416x416 2 Kirbys, Done. (0.028s)
Speed: 0.4ms pre-process, 27.9ms inference, 1.4ms NMS per image at shape (1, 3, 416, 416)
Results saved to runs/detect/exp
```

```
In [27]: # Save test result to Google Drive
shutil.copytree('runs/detect/exp', save_path + '/infer')
```

```
Out[27]: '/content/drive/MyDrive/AI Camp/Crash Course/infer'
```

```
In [26]: import cv2
from google.colab.patches import cv2_imshow

base_dir = 'runs/detect/exp/'
```

```
for image in os.listdir(base_dir):  
    detect_result = cv2.imread(base_dir+image)  
    cv2.imshow(detect_result)
```







Kirby 0.85









Kirby 0.20

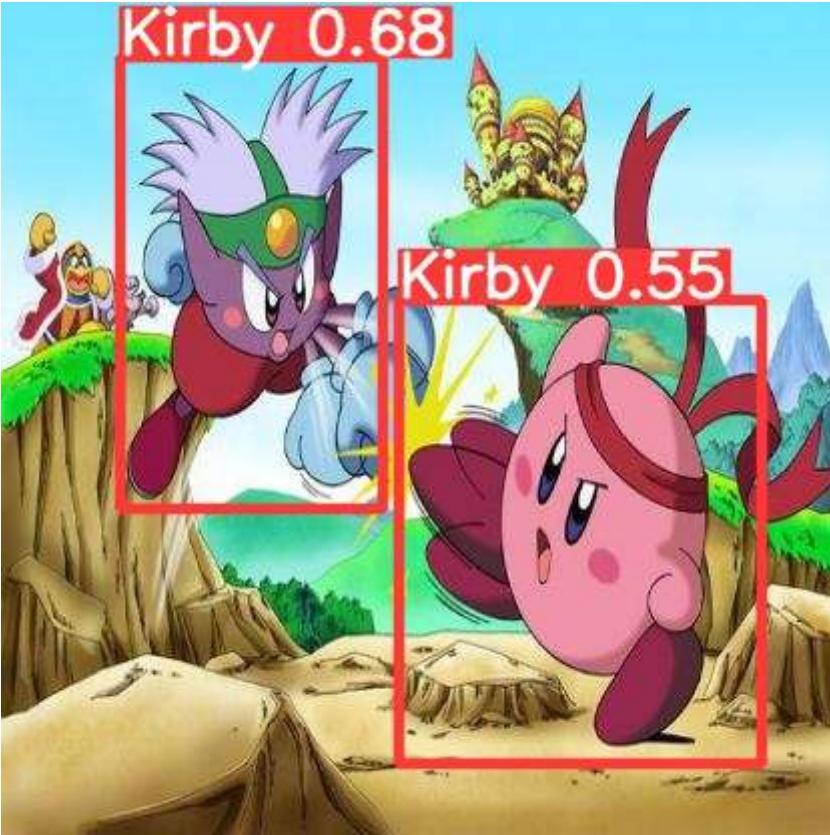


Kirby 0.87





Kirby 0.68



Kirby 0.55