AI Object Detection

10070901 计科导第13组

从零开始的四天AI生活

- 成果：
- mAP：0%->5%->10%->20%->40%->80%
- 全员红绿条PTSD

小组成员

- 陈泓仰　高曾谊　程森　杨可盈　彭斐然　贾仁军　周珂帆
- 分工将在后续介绍中完整标注

周四

见龙在田

Hello, bugs

- We only support 'data()' in static graph mode, please call 'paddle.enable_static()' to enter static graph mode.
- Image size exceeds limit of 89478485 pixels, could be decompression bomb DOS attack.
  添加Image.MAX_IMAGE_PIXELS = None
- Invoke operator load error
  重新新建一个项目；图片压缩；删除一些特定的过大的图片
- TypeError: dict expected at most 1 arguments, got 3
  在python 3.X中已经默认继承object类。删去全部object
- predict模块出错-->input中无内容
  找到txt写入路径，[24:-4]修改为[15:-4]
- ipykernel_launcher.py报错
  parser.parse_args()改为parser.parse_known_args()[0]
- .__file__未命名
  os.path.dirname(os.path.abspath(__file__))-->os.getcwd()

Contributor：贾仁军 程森 高曾谊

Hello, world?

```
freeze end
label_dict:{0: 'Person', 1: 'Car', 2: 'Bicycle'} class dim:3
predict cost time:0.05 sec
predict cost time:0.04 sec
predict cost time:0.04 sec
predict cost time:0.04 sec
predict cost time:0.04 sec
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predict cost time:0.04 sec
predict cost time:0.04 sec
predict cost time:0.04 sec
predict cost time:0.04 sec
0.00% = 0.0 AP
0.00% = 1.0 AP
0.00% = 2.0 AP
```
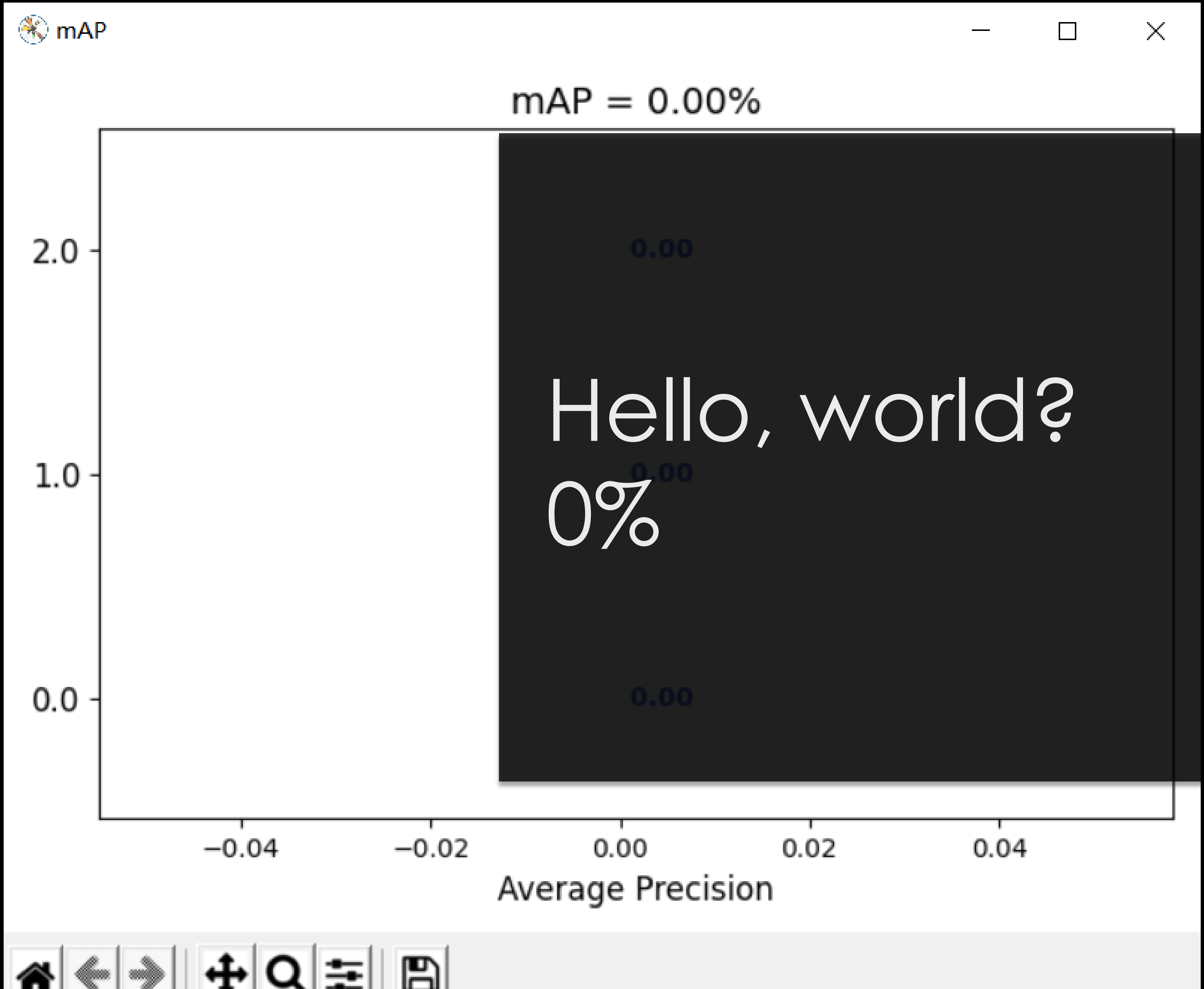
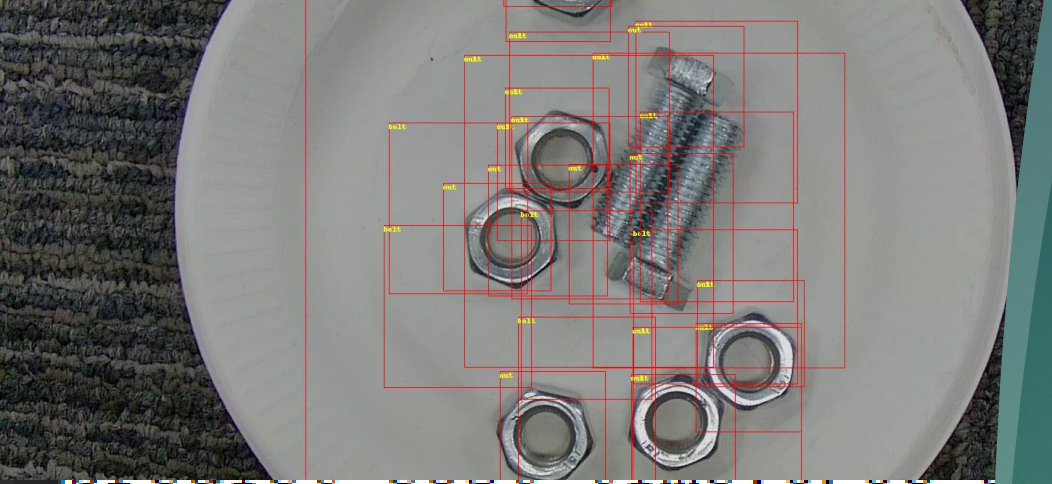
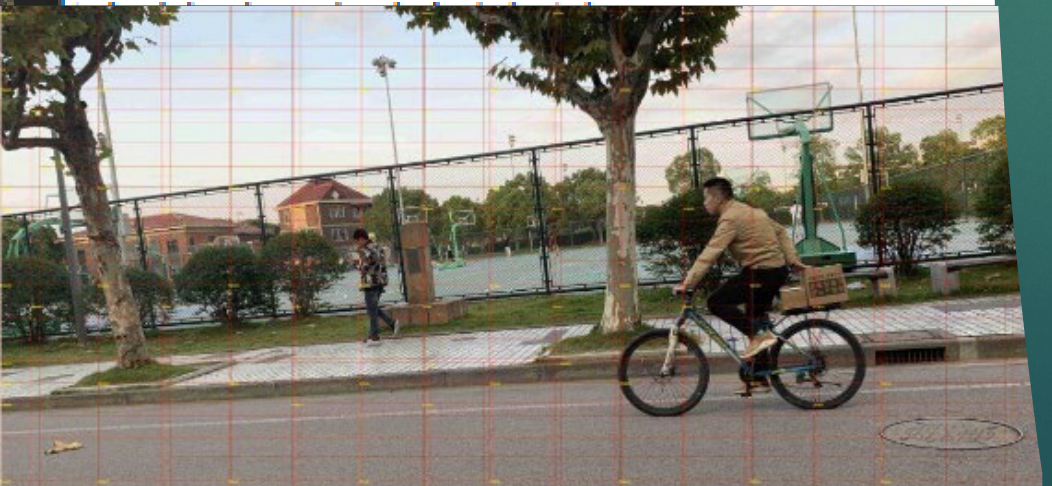





```
predict cost time:0.06 s
1.72% = 0.0 AP
3.01% = 1.0 AP
11.11% = 2.0 AP
mAP = 5.28%
```



对比

- str(j)->str(float(j))
- 别人的四十轮 vs 我们的四十轮
- ~~下宽油！~~上宽图！

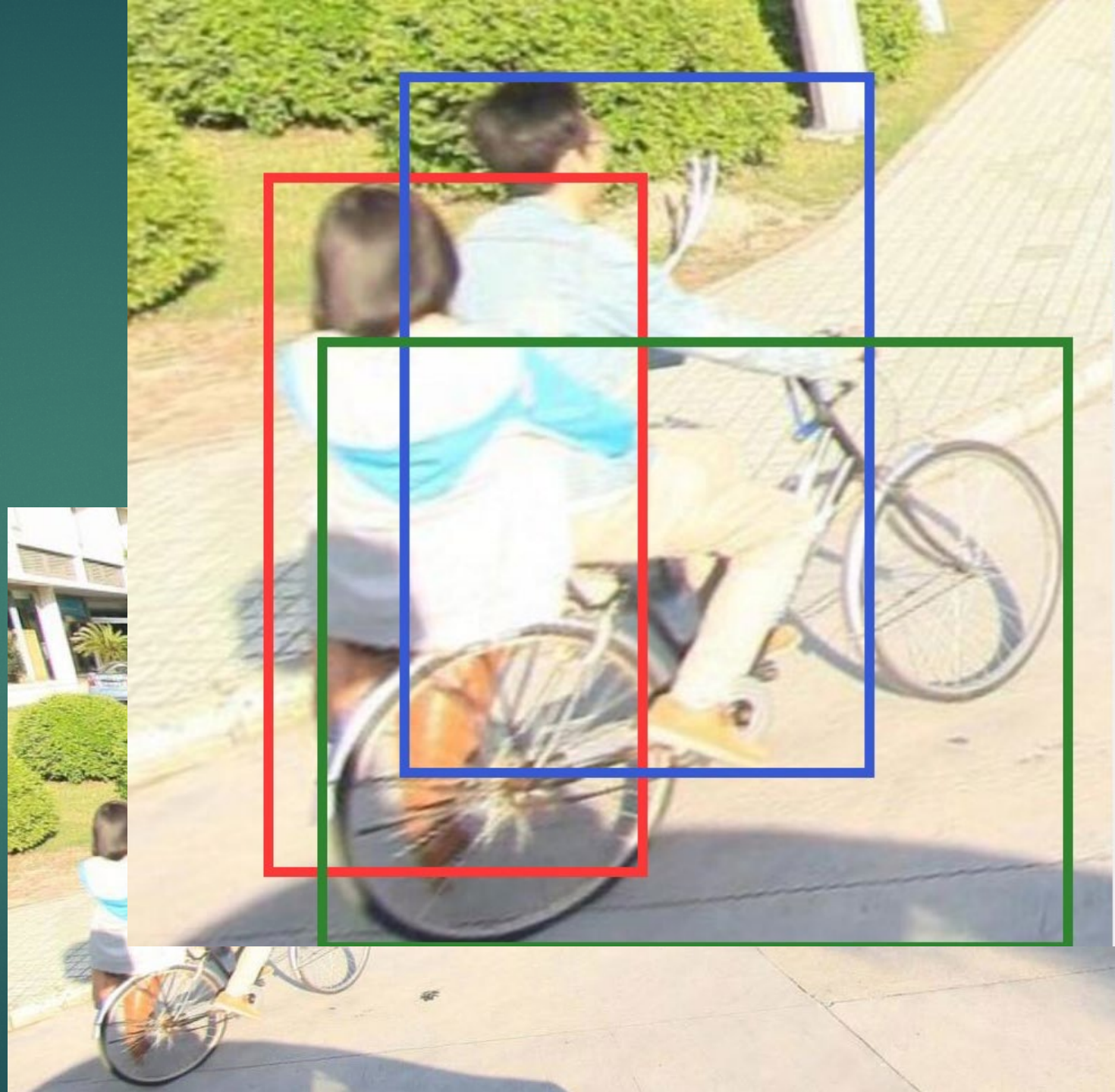
校园抓拍

- 妹什么好说的

Contributor：高曾谊 程森 彭斐然

校园抓拍

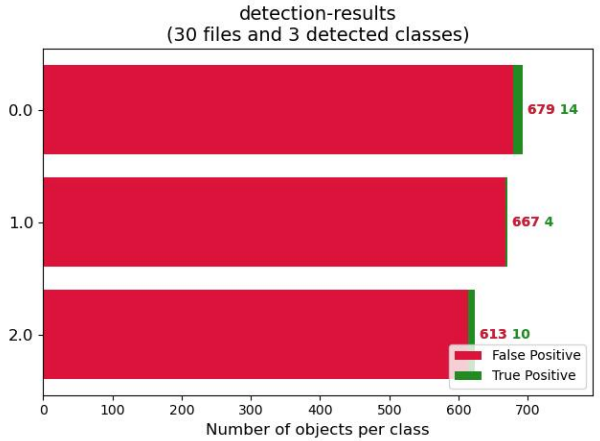
- 妹什么好说的
- 确实妹什么好说的

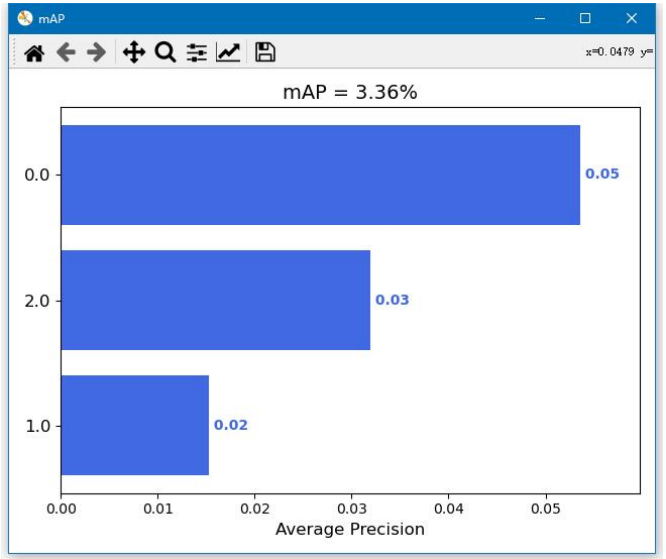



Google Earth
科学采集，手工标注，随机旅游，加强训练。
纯原味五百张套图
新泽西 阿姆斯特丹 东京塔 巴黎圣母院
Sky Stone
Real Stone
Xia Liang
Contributor：周珂帆 杨可盈 彭斐然

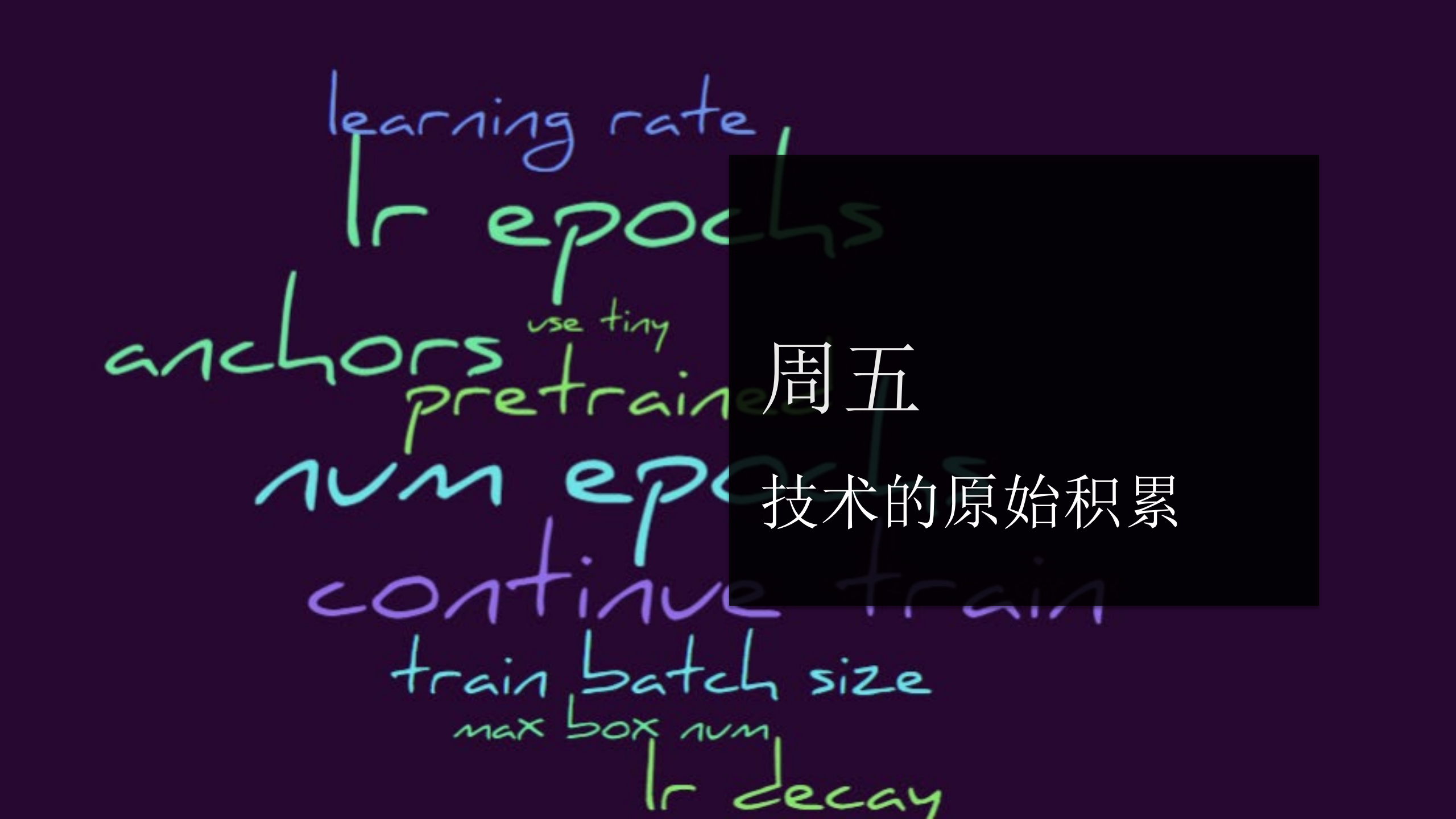
一看AP三点五

一通操作猛如虎





Contributor：贾仁军 高曾谊 陈泓仰


learning rate
lr epochs
use tiny
anchors
pretrained
num epochs
continue train
train batch size
max box num
lr decay

周五

技术的原始积累

《纵向对比》

- 改置信区间（好孩子不能作弊）：mAP高了，但是无效
- 别人搭了模板，我们也搭一个试试。

%ly

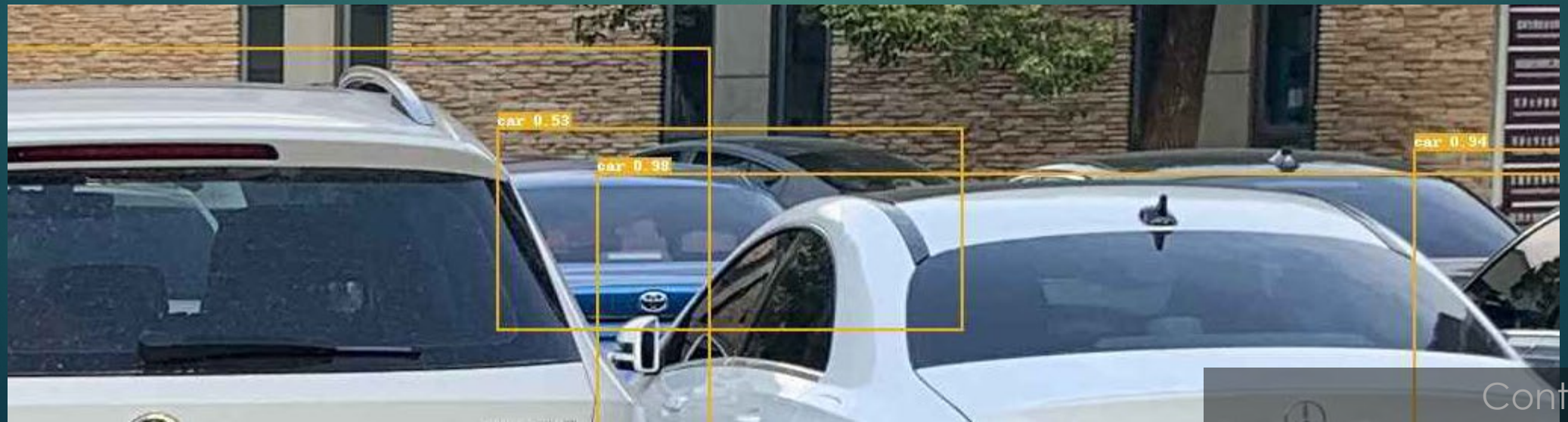
Contributor：陈泓仰

~~YoloV3 on Paddlepaddle on 8265U~~

Python
-u tools/infer.py

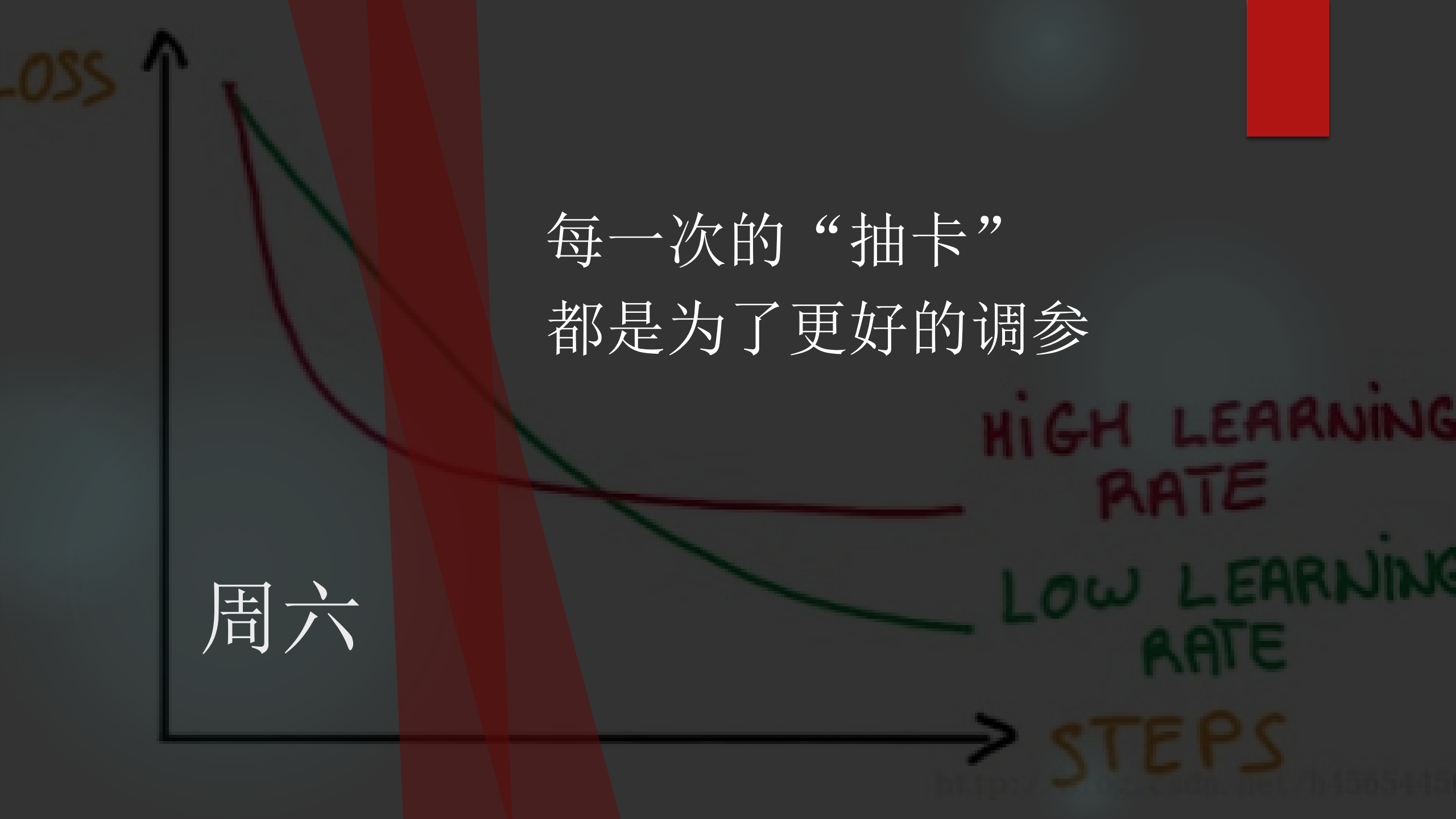
- -c contrib/VehicleDetectionehicle_yolov3_darknet.yml

-o weights=vehicle_yolov3_darknet
--infer_dir contrib/VehicleDetection/demo
--draw_threshold 0.2
--output_dir contrib/VehicleDetection/demo/output



Contributor：陈泓仰

picture	epoch	mAP	env	model	batch_size	alid_thres	ms_thres	nms_pos_k	learning_rate	lr_epochs
71	133	0.73	web	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	113	2.33	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	200	3.51	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	200	3.36	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	232	2.54	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	25	0.04	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	50	1.72	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	225	1.73	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	226	3.01	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	227	3.94	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	228	1.01	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	229	3.8	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	230	4.48	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	231	3.73	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	232	2.83	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	233	3.64	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	234	1.72	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	85	1.82	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	252	5.6	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	300	0.25	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	301	5.36	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	302	6.51	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	303	4.28	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]
311	304	4.95	local	tiny	50	0.01	0.45	300	0.002	[30, 50, 65]

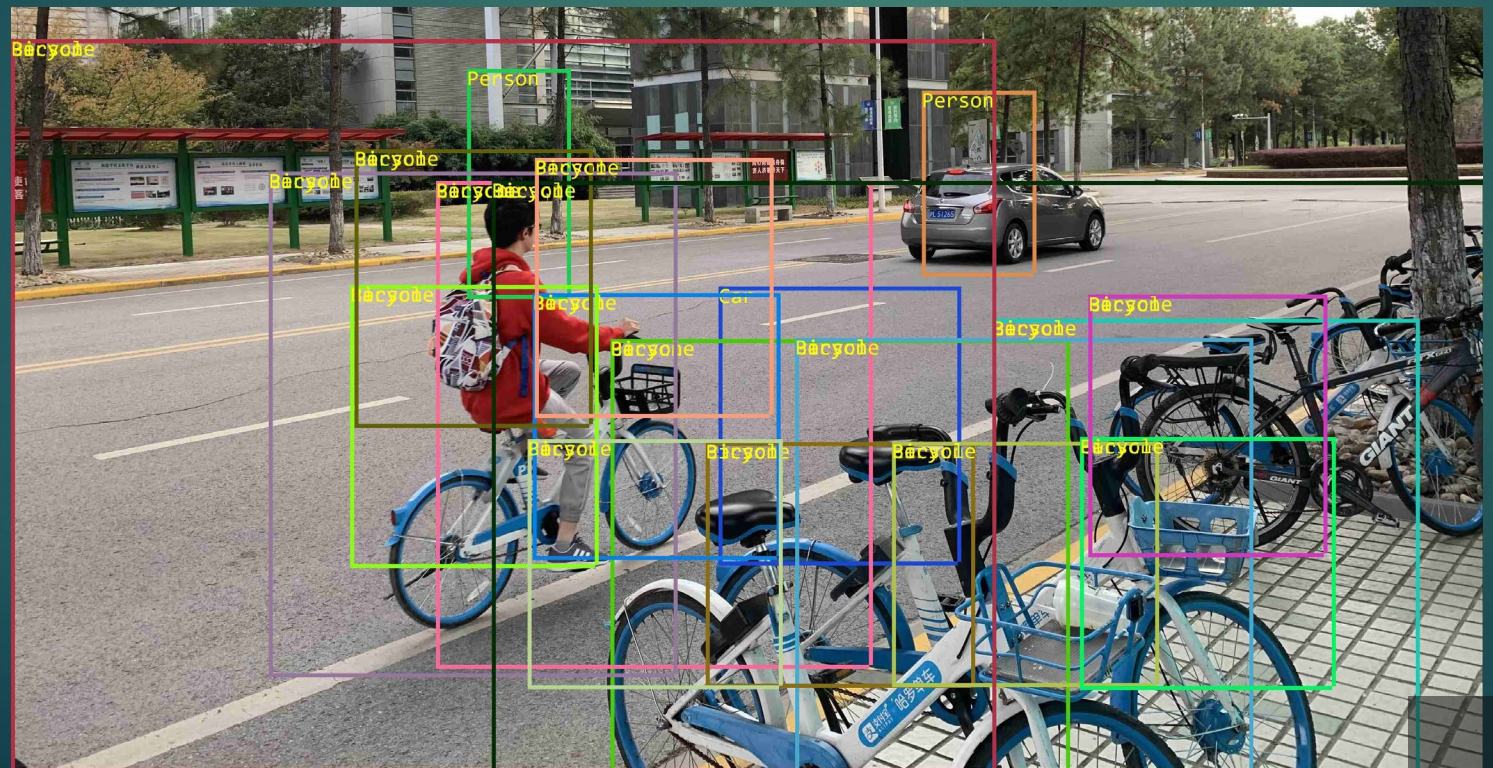


每一次的“抽卡”
都是为了更好的调参

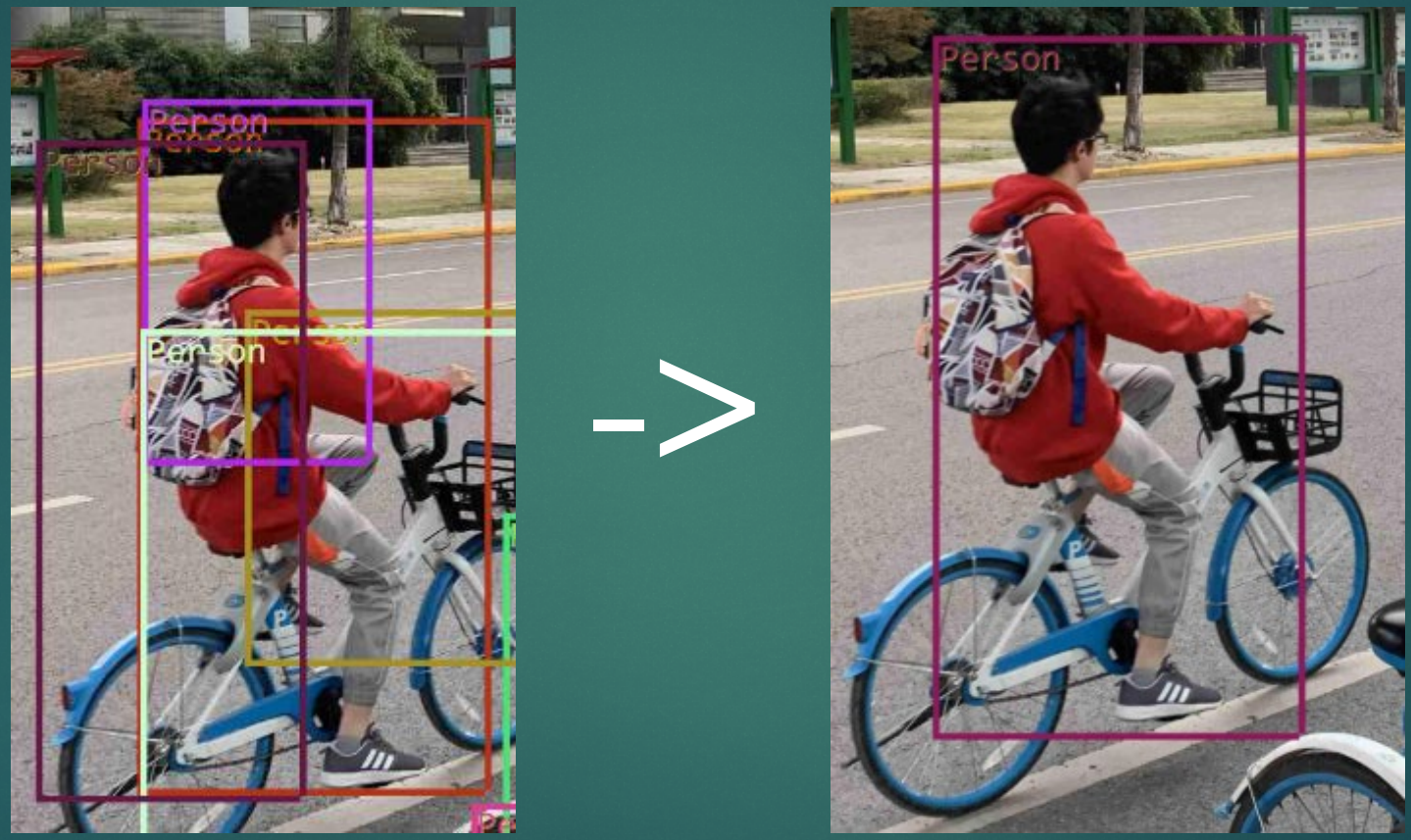
周六

训练集

- 张数：80张->500张->5000张
- 筛选：



重写Non-maximum Suppression



重要参数：Anchor

改Anchor！改Anchor！改Anchor！（说三遍）

- Anchor是什么？
  帮助初期训练的参数
  根据训练图特征计算

```
压缩为448
10, 394],  # 锚点??
```

- 学算法->编程序->算Anchor->测试

Person
1.47 : [7, 21, 10, 39, 16, 52, 21, 89, 30, 77, 32, 121, 50, 120, 79, 160, 141, 209]
4.61 : [7, 21, 9, 34, 11, 47, 16, 43, 16, 69, 24, 49, 26, 92, 50, 136, 113, 195]
9.65 : [5, 15, 7, 27, 11, 41, 15, 64, 20, 45, 23, 87, 33, 113, 63, 144, 124, 201]
2500张
11.92 :[8, 21, 16, 43, 28, 77, 38, 133, 63, 95, 68, 166, 101, 193, 145, 208, 219, 237]
13.50 10轮:[6, 15, 10, 30, 18, 47, 29, 82, 41, 142, 64, 98, 78, 175, 120, 205, 205, 232]
Bicycle
700条数据 10轮
3.70 :[14, 20, 27, 37, 32, 77, 54, 54, 62, 100, 94, 69, 108, 122, 173, 148, 232, 228]
0.83 :[15, 20, 24, 43, 43, 44, 52, 81, 80, 141, 83, 61, 107, 101, 165, 134, 230, 225]
4.20 :[14, 20, 27, 39, 44, 79, 76, 64, 93, 115, 160, 127, 179, 216, 232, 203, 252, 253]
3.81 :[14, 20, 21, 42, 38, 83, 42, 39, 68, 65, 91, 110, 153, 168, 165, 119, 233, 225]
0.99 :[15, 20, 27, 40, 53, 66, 68, 110, 95, 74, 111, 129, 173, 117, 176, 179, 238, 231]
1.49 :[14, 20, 28, 39, 41, 80, 67, 61, 86, 116, 137, 89, 166, 151, 184, 237, 240, 222]
1.41 :[14, 20, 27, 39, 38, 80, 58, 57, 72, 107, 99, 70, 120, 124, 187, 161, 233, 233]
1.69 :[15, 21, 31, 42, 51, 79, 83, 61, 91, 113, 159, 128, 179, 216, 232, 203, 252, 253]
5.25 :[9, 14, 15, 37, 21, 21, 36, 42, 52, 79, 85, 65, 95, 115, 164, 133, 229, 225]
1.57 :[10, 16, 20, 28, 38, 45, 52, 80, 89, 103, 90, 61, 103, 165, 166, 128, 230, 225]
2.83 :[8, 14, 18, 24, 31, 45, 57, 65, 69, 110, 102, 91, 152, 169, 166, 120, 233, 225]
7.40 :[9, 14, 15, 37, 21, 21, 36, 42, 52, 79, 85, 65, 95, 115, 164, 133, 229, 225]
50轮
23.35 :[14, 20, 27, 39, 44, 79, 76, 64, 93, 115, 160, 127, 179, 216, 232, 203, 252, 253]
30.26 :[9, 14, 15, 37, 21, 21, 36, 42, 52, 79, 85, 65, 95, 115, 164, 133, 229, 225]
+infer后12.60
bicycle 448
10轮
16.33 :[25, 33, 38, 78, 73, 69, 91, 138, 150, 200, 161, 110, 267, 200, 276, 292, 410, 394]
12, 24, 30, 44, 57, 134, 67, 67, 105, 112, 143, 192, 235, 175, 301, 281, 407, 403
12, 24, 30, 43, 58, 137, 65, 68, 100, 116, 148, 194, 181, 116, 281, 237, 404, 394
13, 24, 28, 67, 35, 36, 60, 138, 68, 68, 107, 110, 149, 186, 268, 223, 400, 388
25, 33, 38, 78, 73, 69, 91, 138, 150, 200, 161, 110, 267, 200, 276, 292, 410, 394
13, 24, 31, 44, 49, 127, 73, 70, 96, 141, 159, 196, 161, 107, 284, 235, 404, 394
26, 34, 60, 79, 89, 141, 142, 107, 149, 203, 244, 171, 276, 277, 405, 359, 423, 443
23, 32, 43, 70, 60, 138, 65, 38, 100, 100, 133, 202, 187, 138, 267, 237, 404, 390
Person 448
9, 23, 16, 43, 20, 82, 34, 65, 36, 129, 57, 224, 79, 143, 120, 291, 231, 381
9, 22, 15, 42, 19, 76, 29, 124, 33, 60, 48, 101, 57, 196, 111, 270, 214, 368
9, 25, 17, 71, 18, 42, 26, 104, 40, 65, 43, 150, 73, 218, 128, 293, 232, 382
10, 25, 17, 50, 24, 100, 36, 64, 43, 138, 63, 229, 110, 214, 132, 333, 251, 384
10, 21, 10, 40, 19, 50, 24, 90, 38, 137, 40, 67, 66, 203, 124, 288, 231, 381
10, 27, 17, 67, 21, 38, 28, 79, 33, 143, 51, 98, 64, 205, 123, 286, 231, 382
5轮28: [10, 24, 17, 48, 22, 89, 36, 65, 41, 132, 63, 218, [illegible], 229, [illegible]]

Contributor：贾仁军

重要参数：Anchor

- Bicycle：
  [25, 33, 38, 78, 73, 69, 91, 138, 150, 200, 161, 110, 267, 200, 276, 292, 410, 394]
- Car：
  [7, 10, 12, 22, 24, 17, 22, 45, 46, 33, 43, 88, 85, 66, 115, 146, 275, 240]
- Person：
  [9, 25, 14, 53, 22, 36, 22, 86, 37, 136, 40, 68, 65, 201, 123, 286, 231, 382]

Contributor：贾仁军

周日

工业革命

训练速度

- 初始：500pics ≈ 300s/epoch；40epochs ≈ 4h

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- Step1：优化源码　结果：65s/epoch
- Step2：尝试使用多进程　结果：failed

训练速度

- 初始：500pics ≈ 300s/epoch；40epochs ≈ 4h
- Step1：优化源码　结果：65s/epoch
- Step2：尝试使用多进程　结果：failed
- Step3：在MX250上搭建CUDA10.1　结果：30s/epoch

USE_GPU

Contributor：陈泓仰

训练速度

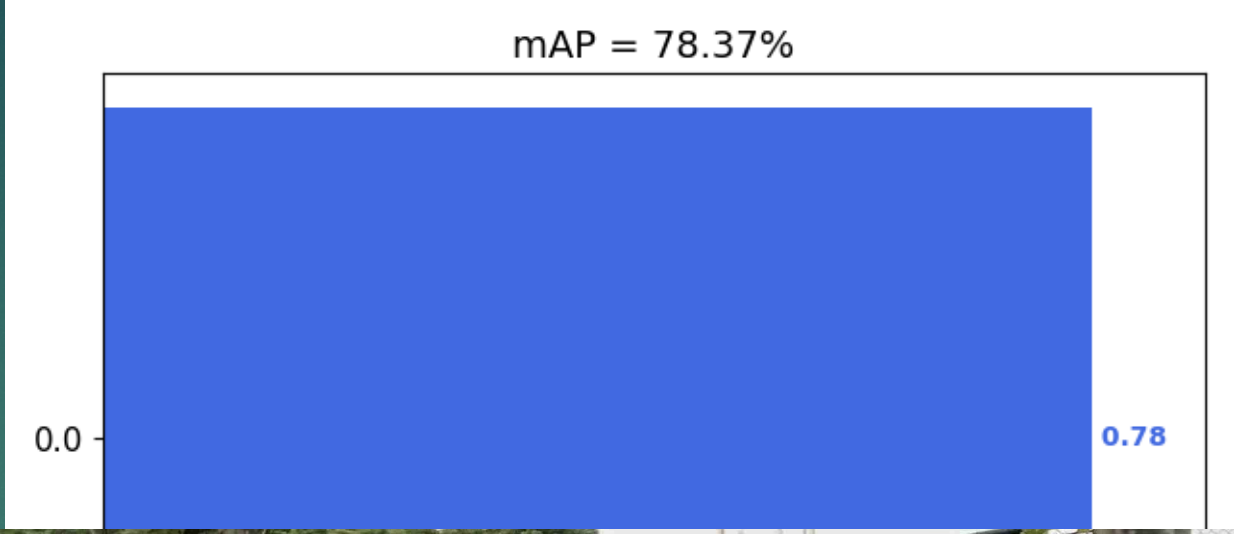
- 初始：500pics ≈ 300s/epoch；40epochs ≈ 4h
- Step1：优化源码　结果：65s/epoch
- Step2：尝试使用多进程　结果：failed
- Step3：在MX250上搭建CUDA10.1　结果：30s/epoch
- Step4：在室友的GTX1650上搭建CUDA11.1
  结果：10s/epoch
- Step5：找到一张RTX2070并搭建CUDA11.2
  结果：5s/epoch

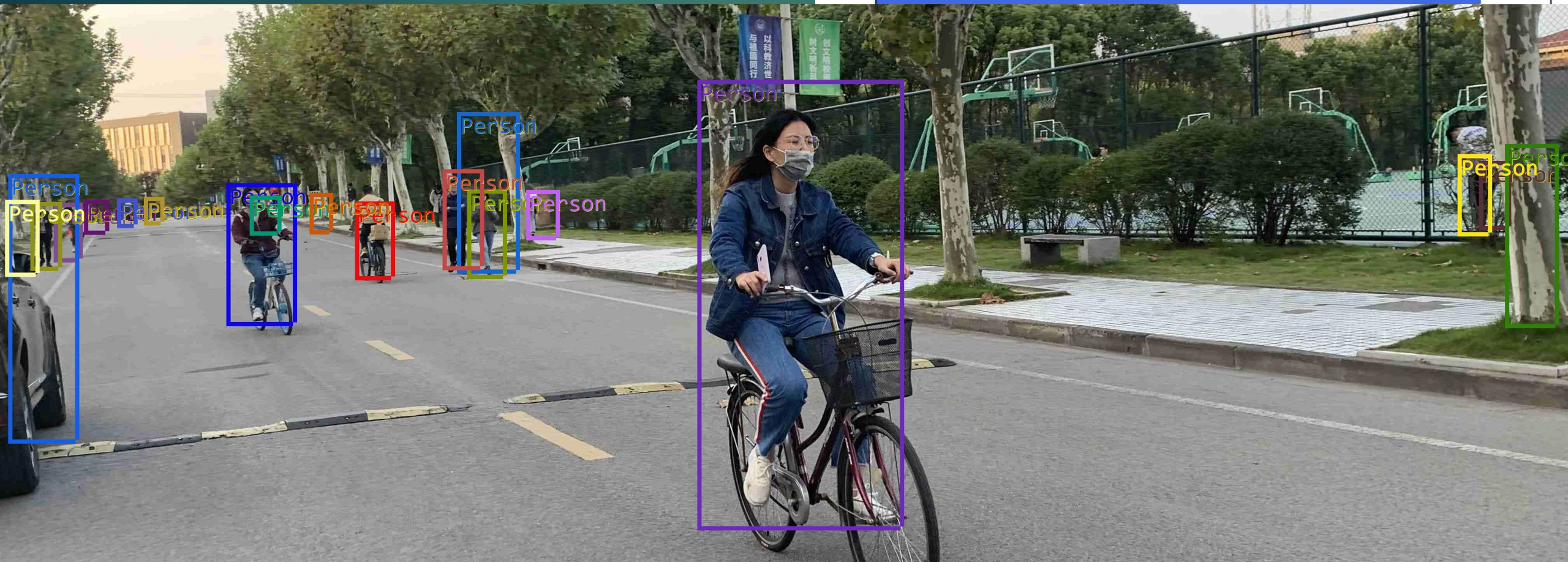
NVIDIA CUDA

Contributor：陈泓仰

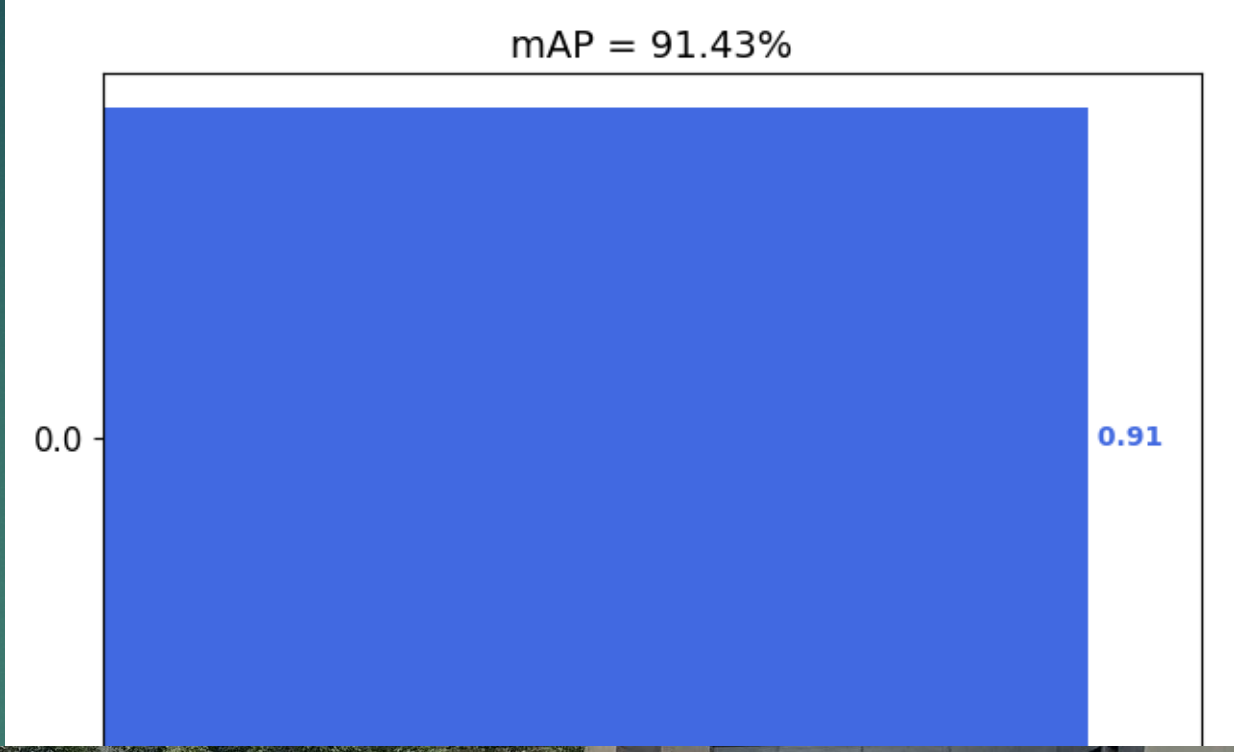
Person：AP=78.37%

- 5000pics 448×448 20-40epochs

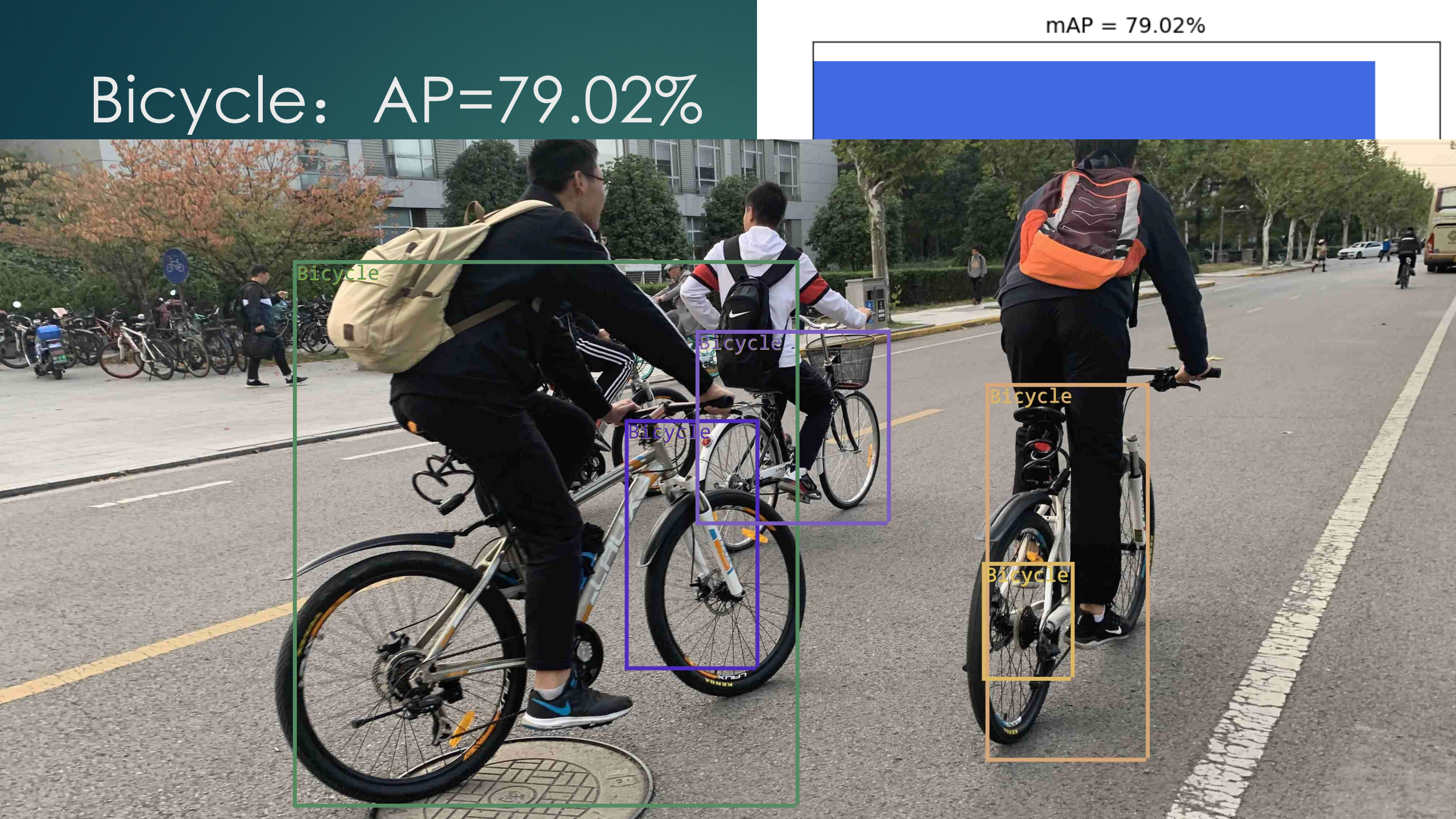




Car：AP=91.43%



Bicycle：AP=79.02%



三合一

- Methods A：合并模型
  当前mAP=71%
- Methods B：依次预测
  将带着预测框的结果投入下一个模型中，叠加到当前图片中
  mAP=78%

谢谢！