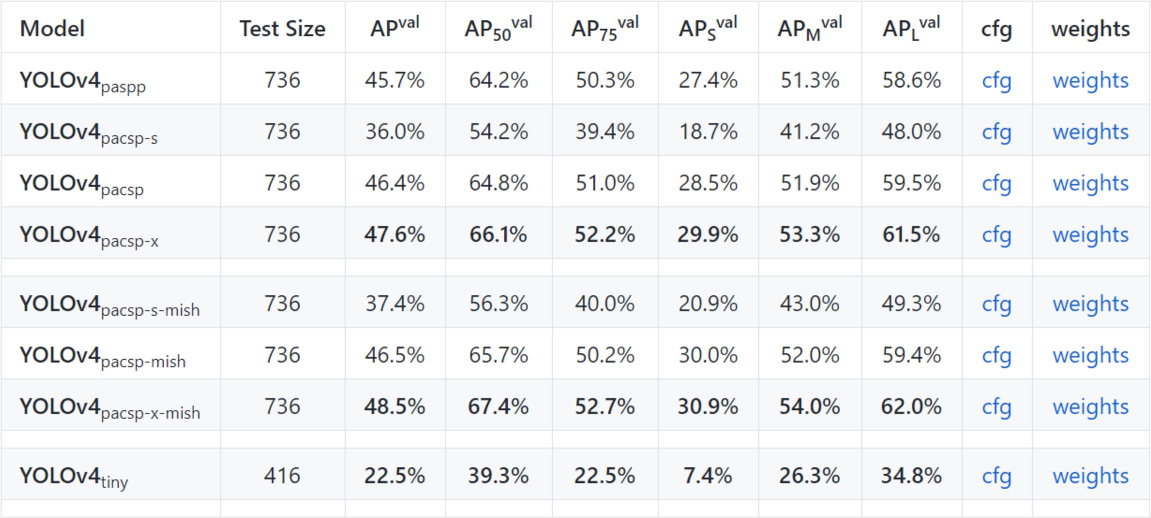
Pytorch-YOLO v4训练自己的数据集

该版本的复现者是YOLOv4的二作：**Chien-Yao Wang**，他也是CSPNet的一作。再值得说的是YOLOv4 和YOLOv5都用到了CSPNet。 这个PyTorch版本的YOLOv4是基于 ultralytic的YOLOv3基础上实现的。ultralytic 复现的YOLOv3 应该最强的YOLOv3 PyTorch复现：https://github.com/ultralytics/yolov3。我们将使用该本本的YOLO v4训练自己的数据集，并提供详细的代码修改和训练，测试的整个过程。



Model	Test Size	AP^{val}	AP_{50}^{val}	AP_{75}^{val}	AP_{S}^{val}	AP_{M}^{val}	AP_{L}^{val}	cfg	weights
YOLOv4$_{paspp}$	736	45.7%	64.2%	50.3%	27.4%	51.3%	58.6%	cfg	weights
YOLOv4$_{pacsp-s}$	736	36.0%	54.2%	39.4%	18.7%	41.2%	48.0%	cfg	weights
YOLOv4$_{pacsp}$	736	46.4%	64.8%	51.0%	28.5%	51.9%	59.5%	cfg	weights
YOLOv4$_{pacsp-x}$	736	**47.6%**	**66.1%**	**52.2%**	**29.9%**	**53.3%**	**61.5%**	cfg	weights
YOLOv4$_{pacsp-s-mish}$	736	37.4%	56.3%	40.0%	20.9%	43.0%	49.3%	cfg	weights
YOLOv4$_{pacsp-mish}$	736	46.5%	65.7%	50.2%	30.0%	52.0%	59.4%	cfg	weights
YOLOv4$_{pacsp-x-mish}$	736	**48.5%**	**67.4%**	**52.7%**	**30.9%**	**54.0%**	**62.0%**	cfg	weights
YOLOv4$_{tiny}$	416	**22.5%**	**39.3%**	**22.5%**	**7.4%**	**26.3%**	**34.8%**	cfg	weights

1.数据准备

数据集的构建参考https://github.com/ultralytics/yolov3/wiki/Train-Custom-Data

1. 将数据转化为darknet fromat.

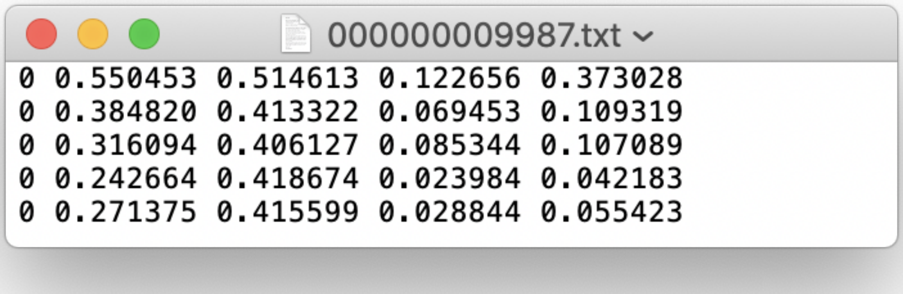
使用LabelImg或Labelbox标注后的数据后，需要将数据转化为darknet format. 其中images和labels需要放在同级的两个文件夹下，每一个image对应一个label标注文件（如果该图像没有标注，则没有标注文件对应），标注文件满足：

- 一个标注box对应一行
- 每行内容： class, x_center,y_center, width,height
- Box的坐标时标准化后的（0-1）
- class的index从0开始

每一个image和label文件的存放满足如下的关系

```
../coco/images/train2017/000000109622.jpg  # image
../coco/labels/train2017/000000109622.txt  # label
```

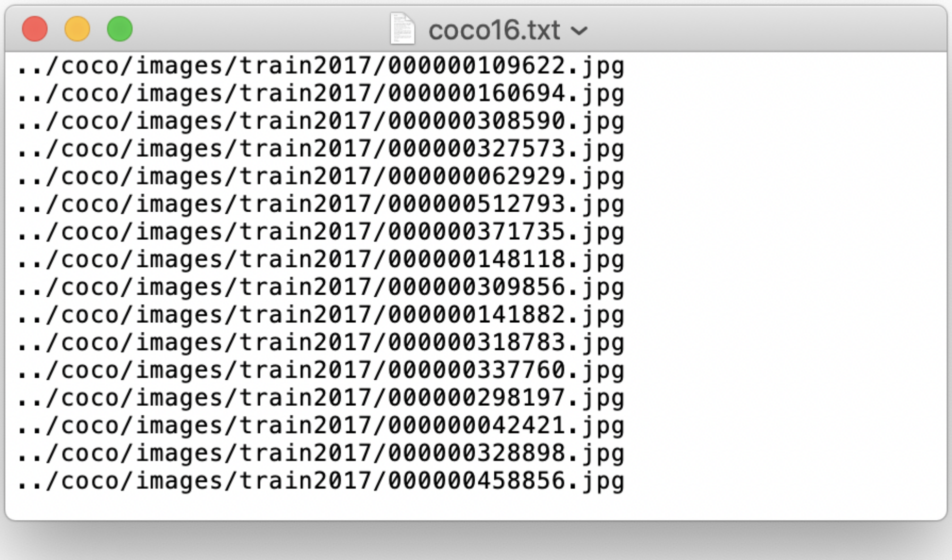
这是一个label文件的例子，包含5个person(class=0)的类别:



```
0 0.550453 0.514613 0.122656 0.373028
0 0.384820 0.413322 0.069453 0.109319
0 0.316094 0.406127 0.085344 0.107089
0 0.242664 0.418674 0.023984 0.042183
0 0.271375 0.415599 0.028844 0.055423
```

2. 创建 train 和 test *.txt 文件.

存放了train和test的图像的路径，例如：



```
../coco/images/train2017/000000109622.jpg
../coco/images/train2017/000000160694.jpg
../coco/images/train2017/000000308590.jpg
../coco/images/train2017/000000327573.jpg
../coco/images/train2017/000000062929.jpg
../coco/images/train2017/000000512793.jpg
../coco/images/train2017/000000371735.jpg
../coco/images/train2017/000000148118.jpg
../coco/images/train2017/000000309856.jpg
../coco/images/train2017/000000141882.jpg
../coco/images/train2017/000000318783.jpg
../coco/images/train2017/000000337760.jpg
../coco/images/train2017/000000298197.jpg
../coco/images/train2017/000000042421.jpg
../coco/images/train2017/000000328898.jpg
../coco/images/train2017/000000458856.jpg
```

3. 创建新的 *.names 文件

存放了类别名称，例如新建`myData.names`(3个类别)

```
class_1
class_2
class_3
```

4. 创建 新的 *.data 文件

新建`myData.data`

```
classes=3
train=data/myData/myData_train.txt
valid=data/myData/myData_val.txt
names=data/myData.names
```

2.环境安装

需要的安装环境

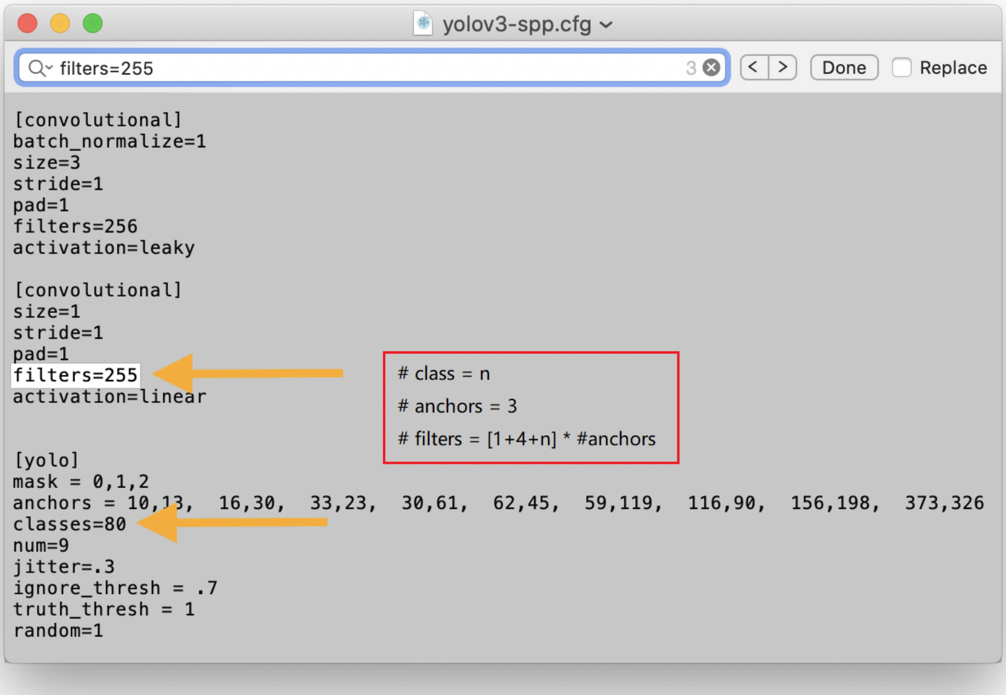
```
numpy == 1.17
opencv-python >= 4.1
torch==1.3.0
torchvision==0.4.1
matplotlib
pycocotools
tqdm
pillow
tensorboard >= 1.14
```

※ 运行Mish model需要安装 https://github.com/thomasbrandon/mish-cuda

```
sudo pip3 install git+https://github.com/thomasbrandon/mish-cuda.git
```

3.模型配置文件修改

配置文件的修改个darknet版本的YOLO v3和YOLO v4是相同的，可以参考其进行修改，主要包括了一些超参数和网络的参数。



```
[convolutional]
batch_normalize=1
size=3
stride=1
pad=1
filters=256
activation=leaky

[convolutional]
size=1
stride=1
pad=1
filters=255
activation=linear


[yolo]
mask = 0,1,2
anchors = 10,13,  16,30,  33,23,  30,61,  62,45,  59,119,  116,90,  156,198,  373,326
classes=80
num=9
jitter=.3
ignore_thresh = .7
truth_thresh = 1
random=1
```

class = n

anchors = 3

filters = [1+4+n] * #anchors

4.预训练模型下载

预训练模型的下载：

baidu链接：https://pan.baidu.com/s/1nyQlH-GHrmddCEkuv-VmAg
提取码：78bg

5.模型训练

```
python3 train.py --data data/myData.data --cfg cfg/wei_score/yolov4-pacsp-x-mish.cfg --weights './weights/yolov4-pacsp-x-mish.pt' --name yolov4-pacsp-x-mish --img 640 640 640
```

6.模型推断

1.在验证集上的性能测试

```
python3 test_half.py --data data/myData.data\
    --cfg cfg/wei_score/yolov4-pacsp-x-mish.cfg\
    --weights weights/best_yolov4-pacsp-x-mish.pt\
    --img 640\
    --iou-thr 0.6\
    --conf-thres 0.5\
    --batch-size 1
```

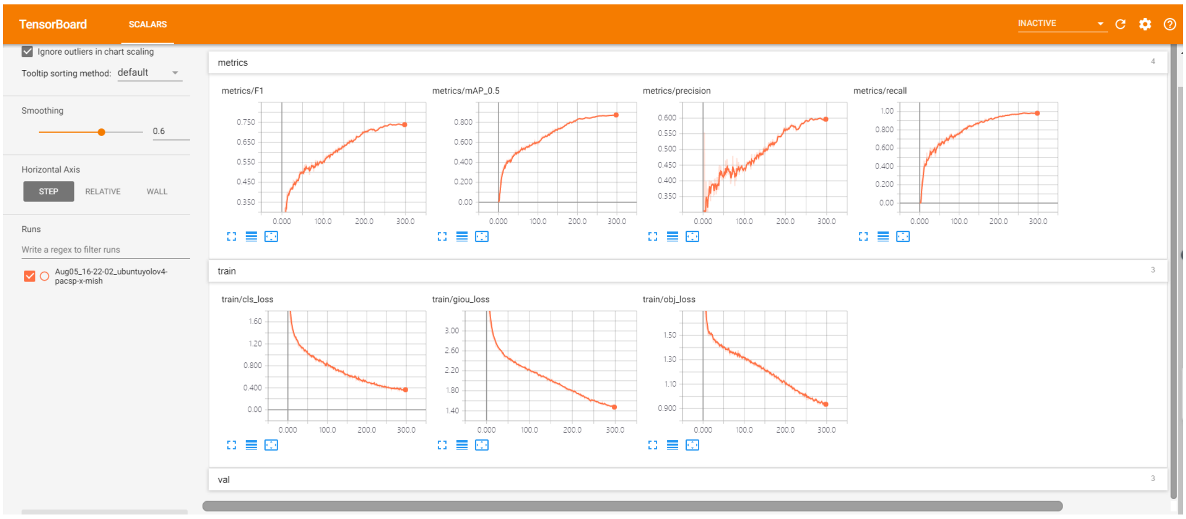
```
python3 test.py --data data/myData.data\
    --cfg cfg/wei_score/yolov4-pacsp-x-mish.cfg\
    --weights weights/best_yolov4-pacsp-x-mish.pt\
    --img 640\
    --iou-thr 0.6\
    --conf-thres 0.5\
    --batch-size 1
```

```
Model Summary: 408 layers, 9.92329e+07 parameters, 9.92329e+07 gradients
Fusing layers...
Model Summary: 274 layers, 9.91849e+07 parameters, 9.91849e+07 gradients
Caching labels (285 found, 0 missing, 0 empty, 0 duplicate, for 285 images): 100%|
████████████████████████████████████████| 285/285 [00:00<00:00, 8858.32it/s]
               Class    Images   Targets         P         R   mAP@0.5        F1:
100%|████████████████████████████████████| 285/285 [00:17<00:00, 16.44it/s]
                 all       285       645     0.847      0.66     0.623      0.74
                  QP       285       175     0.856     0.611     0.586     0.713
                  NY       285       289     0.894     0.671     0.647     0.767
                  QG       285       181     0.792     0.696     0.638     0.741
Speed: 23.4/1.1/24.5 ms inference/NMS/total per 640x640 image at batch-size 1
```

2.单张图片或视频的推断

```
python3 detect.py --cfg cfg/wei_score/yolov4-pacsp-x-mish.cfg\
    --names data/myData.names\
    --weights weights/best_yolov4-pacsp-x-mish.pt\
    --source data/myData/score/images/val\
    --img-size 640\
    --conf-thres 0.3\
    --iou-thres  0.2\
    --device 0
```

```
tensorboard --logdir=runs
```



☑ Ignore outliers in chart scaling

Tooltip sorting method: default

Smoothing 0.6

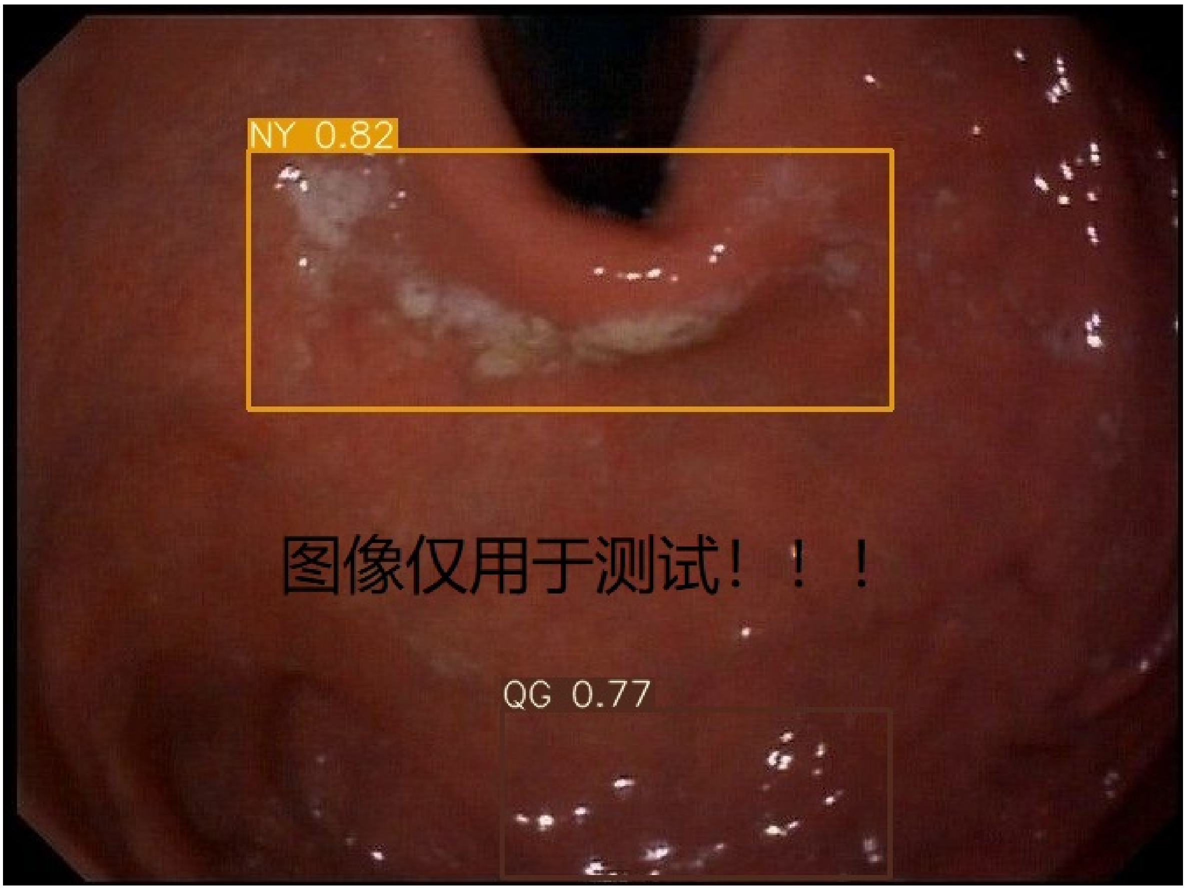
Horizontal Axis: STEP RELATIVE WALL

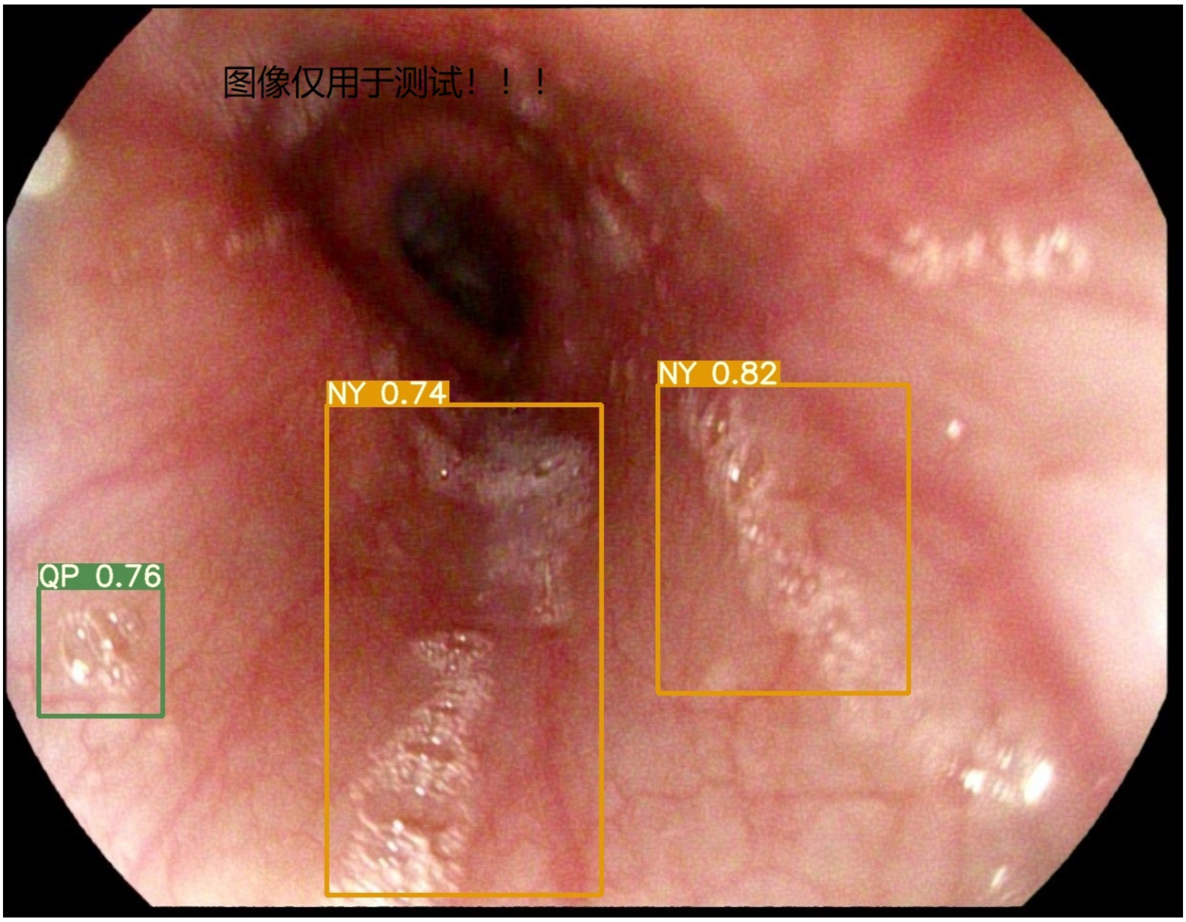
Runs

Write a regex to filter runs

☑ ○ Aug05_16-22-02_ubuntuyolov4-pacsp-x-mish

7.DEMO展示





8.TensorRT加速推断

TODO