训练出自己目标识别模型

产生自己的数据集 训练出自己的模型

目录

- 产生自己的数据集
- 下载预训练模型
- 训练模型

docker 运行显示usb摄像头（注意是video1）

- docker中显示图形化程序
- --network host -e DISPLAY=$DISPLAY -v /tmp/.X11-unix/:/tmp/.X11-unix -v /etc/enctune.conf:/etc/enctune.conf

- 实例：
- 先运行
- xhost +
- 在运行
- docker run -it --rm --runtime nvidia -v ~/jetson-inference/data/:/jetson-inference/data/ -v /dev/video1:/dev/video1 --device /dev/video1 --network host -e DISPLAY=$DISPLAY -v /tmp/.X11-unix/:/tmp/.X11-unix -v /etc/enctune.conf:/etc/enctune.conf 7a7d343029a2 /bin/bash

验证摄像头

```
• import cv2
• cap=cv2.VideoCapture(1)
• while True:
•     success,img=cap.read()
•     cv2.imshow("Video",img)
•     if cv2.waitKey(1)&0xFF==ord('q'):
•         break
```

docker 运行显示csi摄像头（注意是video0）

- docker中显示图形化程序
- --network host -e DISPLAY=$DISPLAY -v /tmp/.X11-unix/:/tmp/.X11-unix -v /etc/enctune.conf:/etc/enctune.conf
- 实例：
- 先运行
- xhost +
- 在运行
- docker run -it --rm --runtime nvidia -v ~/jetson-inference/data/:/jetson-inference/data/ -v /tmp/argus_socket:/tmp/argus_socket -v /dev/video0:/dev/video0 --device /dev/video0 --network host -e DISPLAY=$DISPLAY -v /tmp/.X11-unix/:/tmp/.X11-unix -v /etc/enctune.conf:/etc/enctune.conf 7a7d343029a2 /bin/bash

训练数据集目录说明

- 我们训练数据集例如为乒乓球：pingpang

- 本地路径 ~/detection/data/pingpang
- 训练数据存放目录
- /jetson-inference/python/training/detection/ssd/data/pingpang

- 本地路径 ~/detection/models/pingpang
- 模型存放路径
- /jetson-inference/python/training/detection/ssd/models/pingpang

产生训练数据

- camera-capture

- usb摄像头
- camera-capture --camera=/dev/video1

产生测试数据

下载预训练模型

- cd ~/detection/models
- wget https://nvidia.box.com/shared/static/djf5w54rjvpqocsiztzaandq1m3avr7c.pth -O models/mobilenet-v1-ssd-mp-0_675.pth

新命令启动容器

-
```
docker run -it --rm --runtime nvidia -v ~/jetson-inference/data/:/jetson-inference/data/ -v /tmp/argus_socket:/tmp/argus_socket -v /dev/video0:/dev/video0 --device /dev/video0  --network host -e DISPLAY=$DISPLAY -v /tmp/.X11-unix/:/tmp/.X11-unix -v /etc/enctune.conf:/etc/enctune.conf -v ~/detection/data:/jetson-inference/python/training/detection/ssd/data -v ~/detection/models:/jetson-inference/python/training/detection/ssd/models 7a7d343029a2 /bin/bash
```

训练数据采集程序camera-capture

- --input-flip=horizontal
- --input-flip=vertical

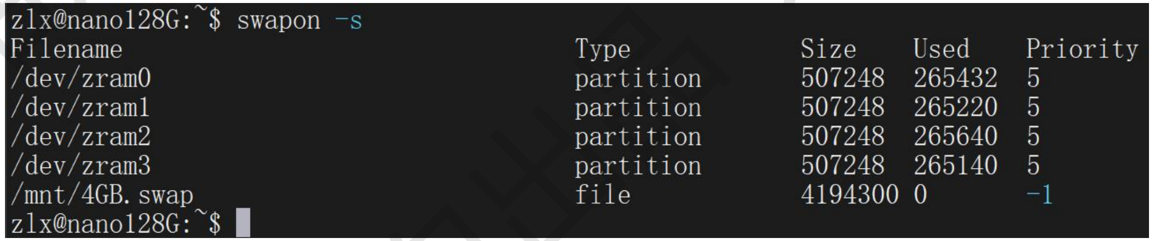
- camera-capture --help

训练非常耗内存【在宿主机上执行】

- 增加内存交换分区 防止训练时内存溢出
- 增加 交换内存 Mounting Swap
- sudo systemctl disable nvzramconfig
- sudo fallocate -l 4G /mnt/4GB.swap
- sudo mkswap /mnt/4GB.swap
- sudo swapon /mnt/4GB.swap

- /etc/fstab 最后一行增加
- /mnt/4GB.swap none swap sw 0 0

- 运行 swapon -s 验证效果



```
zlx@nano128G:~$ swapon -s
Filename                                Type            Size    Used    Priority
/dev/zram0                              partition       507248  265432  5
/dev/zram1                              partition       507248  265220  5
/dev/zram2                              partition       507248  265640  5
/dev/zram3                              partition       507248  265140  5
/mnt/4GB.swap                           file            4194300 0       -1
zlx@nano128G:~$
```

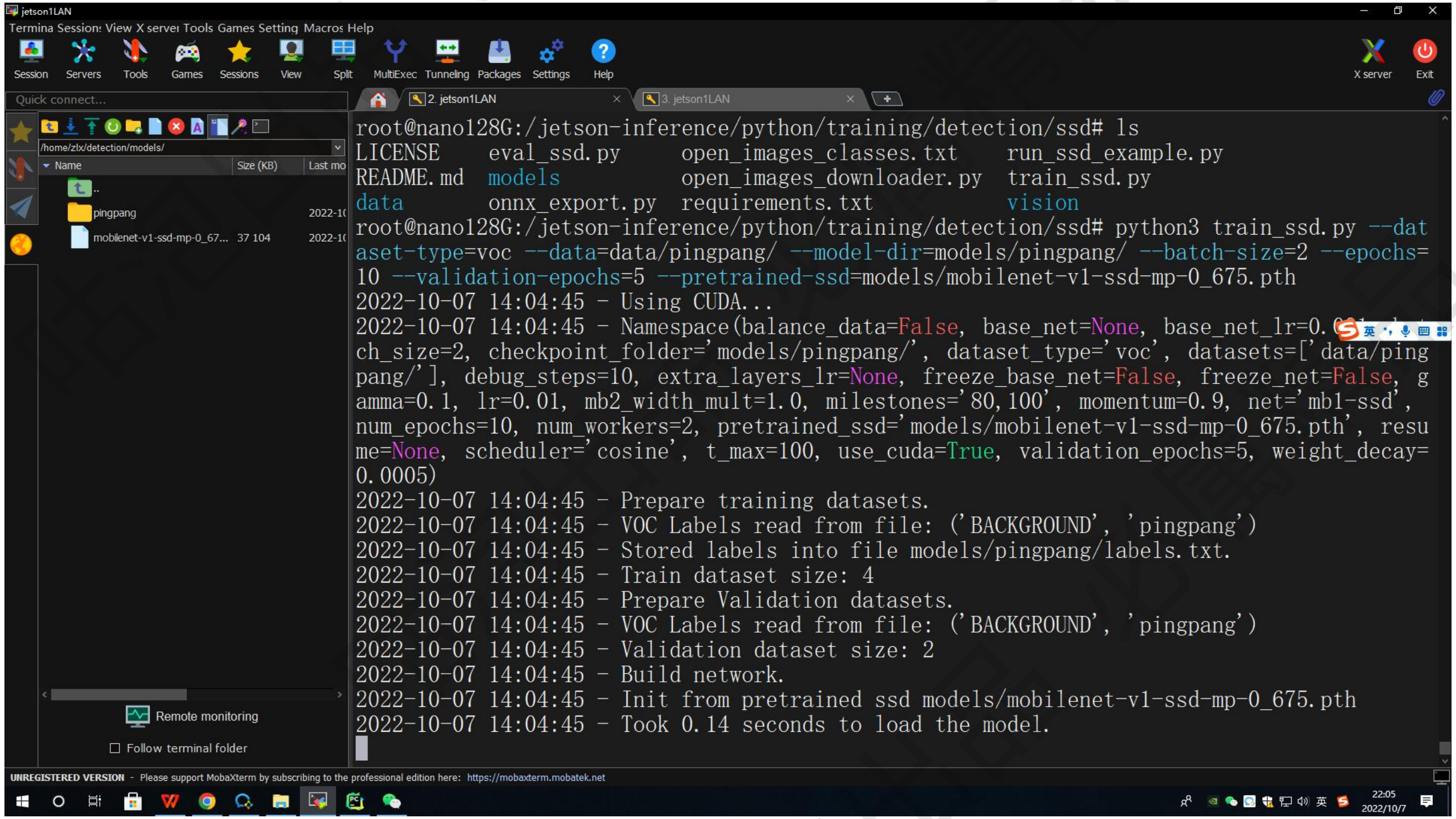
训练非常耗内存【在宿主机上执行】

- 把图形化界面关闭了，训练完后在可以恢复
- sudo init 3   # stop the desktop
- sudo init 5   # restart the desktop

训练命令

```
python3 train_ssd.py --dataset-type=voc --data=data/pingpang/ --model-dir=models/pingpang/ --batch-size=1 --epochs=30 --validation-epochs=5 --pretrained-ssd=models/mobilenet-v1-ssd-mp-0_675.pth
```

训练开始



```
/home/zlx/detection/models/
..
pingpang                                  2022-1(
mobilenet-v1-ssd-mp-0_67...   37 104      2022-1(
```

```
root@nano128G:/jetson-inference/python/training/detection/ssd# ls
LICENSE     eval_ssd.py      open_images_classes.txt     run_ssd_example.py
README.md   models           open_images_downloader.py   train_ssd.py
data        onnx_export.py   requirements.txt            vision
root@nano128G:/jetson-inference/python/training/detection/ssd# python3 train_ssd.py --dat
aset-type=voc --data=data/pingpang/ --model-dir=models/pingpang/ --batch-size=2 --epochs=
10 --validation-epochs=5 --pretrained-ssd=models/mobilenet-v1-ssd-mp-0_675.pth
2022-10-07 14:04:45 - Using CUDA...
2022-10-07 14:04:45 - Namespace(balance_data=False, base_net=None, base_net_lr=0.0[illegible]
ch_size=2, checkpoint_folder='models/pingpang/', dataset_type='voc', datasets=['data/ping
pang/'], debug_steps=10, extra_layers_lr=None, freeze_base_net=False, freeze_net=False, g
amma=0.1, lr=0.01, mb2_width_mult=1.0, milestones='80,100', momentum=0.9, net='mb1-ssd',
num_epochs=10, num_workers=2, pretrained_ssd='models/mobilenet-v1-ssd-mp-0_675.pth', resu
me=None, scheduler='cosine', t_max=100, use_cuda=True, validation_epochs=5, weight_decay=
0.0005)
2022-10-07 14:04:45 - Prepare training datasets.
2022-10-07 14:04:45 - VOC Labels read from file: ('BACKGROUND', 'pingpang')
2022-10-07 14:04:45 - Stored labels into file models/pingpang/labels.txt.
2022-10-07 14:04:45 - Train dataset size: 4
2022-10-07 14:04:45 - Prepare Validation datasets.
2022-10-07 14:04:45 - VOC Labels read from file: ('BACKGROUND', 'pingpang')
2022-10-07 14:04:45 - Validation dataset size: 2
2022-10-07 14:04:45 - Build network.
2022-10-07 14:04:45 - Init from pretrained ssd models/mobilenet-v1-ssd-mp-0_675.pth
2022-10-07 14:04:45 - Took 0.14 seconds to load the model.
```

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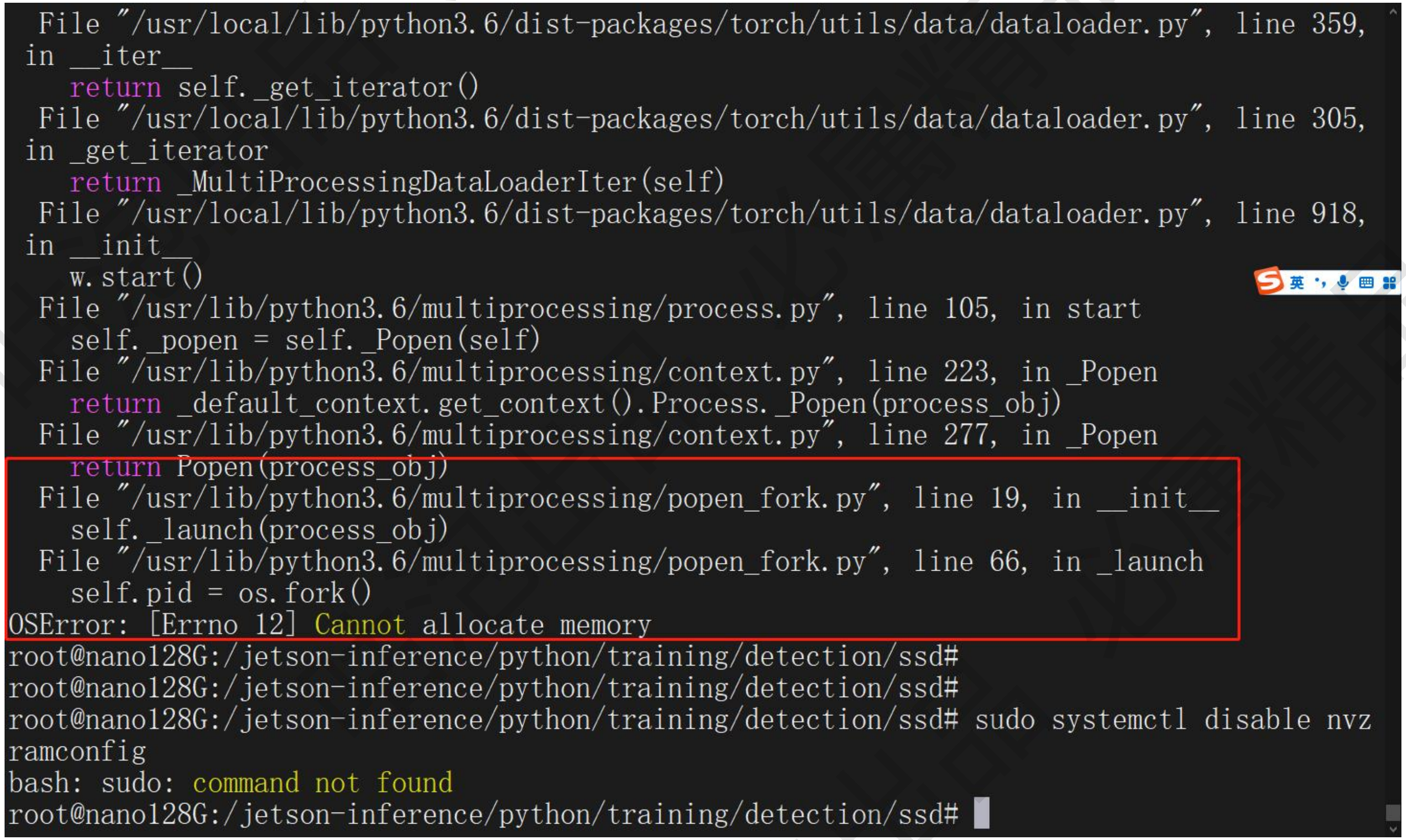
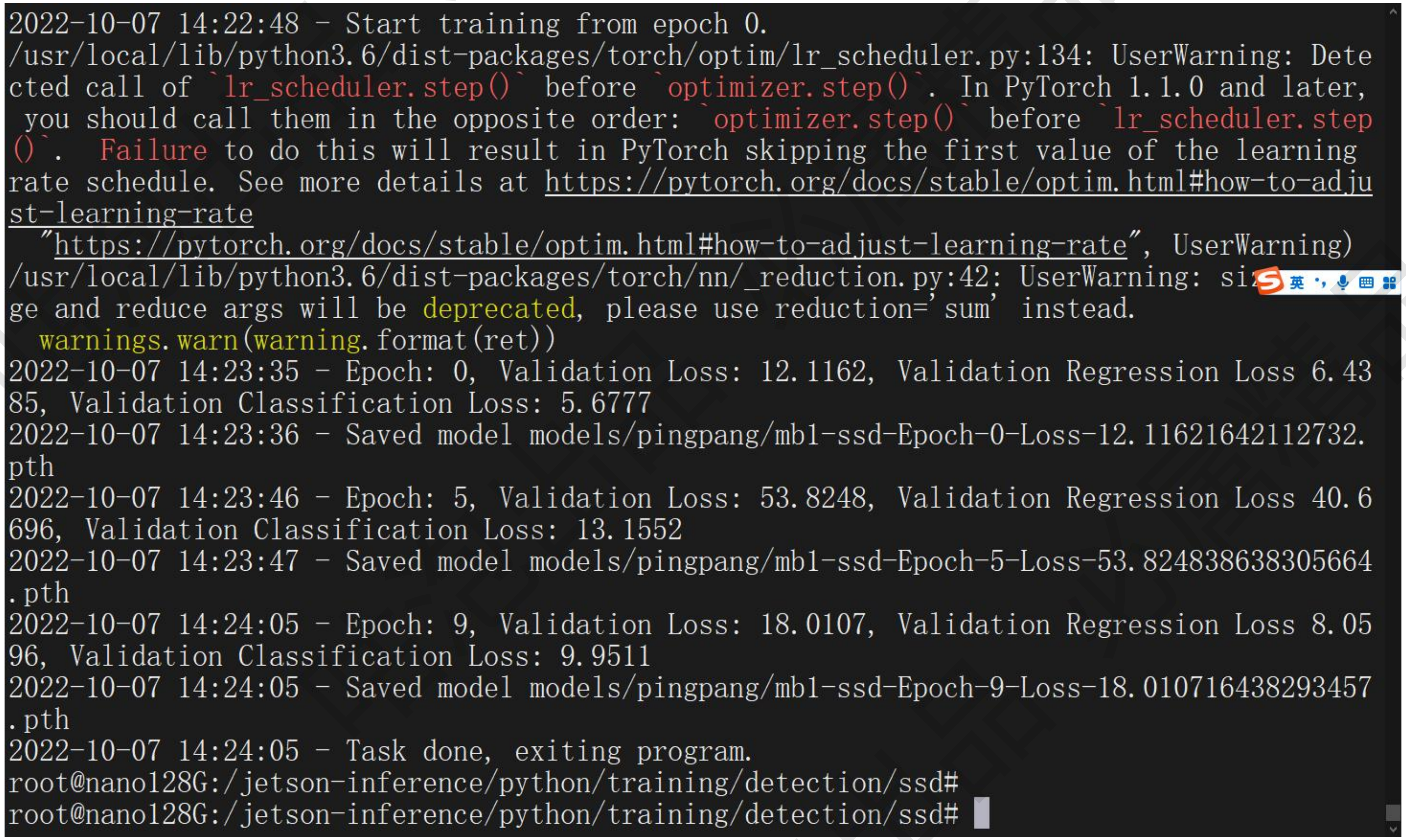
训练可能会显存不足



```
  File "/usr/local/lib/python3.6/dist-packages/torch/utils/data/dataloader.py", line 359,
 in __iter__
    return self._get_iterator()
  File "/usr/local/lib/python3.6/dist-packages/torch/utils/data/dataloader.py", line 305,
 in _get_iterator
    return _MultiProcessingDataLoaderIter(self)
  File "/usr/local/lib/python3.6/dist-packages/torch/utils/data/dataloader.py", line 918,
 in __init__
    w.start()
  File "/usr/lib/python3.6/multiprocessing/process.py", line 105, in start
    self._popen = self._Popen(self)
  File "/usr/lib/python3.6/multiprocessing/context.py", line 223, in _Popen
    return _default_context.get_context().Process._Popen(process_obj)
  File "/usr/lib/python3.6/multiprocessing/context.py", line 277, in _Popen
    return Popen(process_obj)
  File "/usr/lib/python3.6/multiprocessing/popen_fork.py", line 19, in __init__
    self._launch(process_obj)
  File "/usr/lib/python3.6/multiprocessing/popen_fork.py", line 66, in _launch
    self.pid = os.fork()
OSError: [Errno 12] Cannot allocate memory
root@nano128G:/jetson-inference/python/training/detection/ssd#
root@nano128G:/jetson-inference/python/training/detection/ssd#
root@nano128G:/jetson-inference/python/training/detection/ssd# sudo systemctl disable nvz
ramconfig
bash: sudo: command not found
root@nano128G:/jetson-inference/python/training/detection/ssd#
```

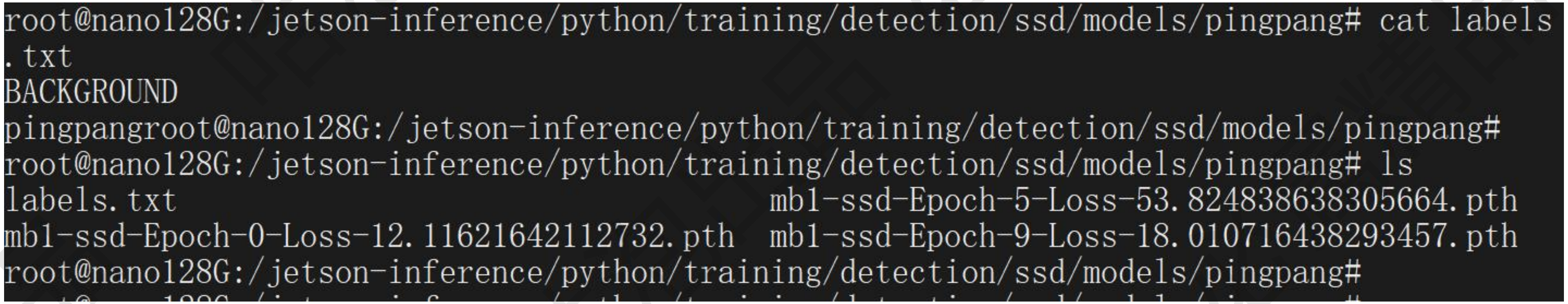
训练成功



```
2022-10-07 14:22:48 - Start training from epoch 0.
/usr/local/lib/python3.6/dist-packages/torch/optim/lr_scheduler.py:134: UserWarning: Dete
cted call of `lr_scheduler.step()` before `optimizer.step()`. In PyTorch 1.1.0 and later,
 you should call them in the opposite order: `optimizer.step()` before `lr_scheduler.step
()`.  Failure to do this will result in PyTorch skipping the first value of the learning
rate schedule. See more details at https://pytorch.org/docs/stable/optim.html#how-to-adju
st-learning-rate
  "https://pytorch.org/docs/stable/optim.html#how-to-adjust-learning-rate", UserWarning)
/usr/local/lib/python3.6/dist-packages/torch/nn/_reduction.py:42: UserWarning: si
ge and reduce args will be deprecated, please use reduction='sum' instead.
  warnings.warn(warning.format(ret))
2022-10-07 14:23:35 - Epoch: 0, Validation Loss: 12.1162, Validation Regression Loss 6.43
85, Validation Classification Loss: 5.6777
2022-10-07 14:23:36 - Saved model models/pingpang/mb1-ssd-Epoch-0-Loss-12.11621642112732.
pth
2022-10-07 14:23:46 - Epoch: 5, Validation Loss: 53.8248, Validation Regression Loss 40.6
696, Validation Classification Loss: 13.1552
2022-10-07 14:23:47 - Saved model models/pingpang/mb1-ssd-Epoch-5-Loss-53.824838638305664
.pth
2022-10-07 14:24:05 - Epoch: 9, Validation Loss: 18.0107, Validation Regression Loss 8.05
96, Validation Classification Loss: 9.9511
2022-10-07 14:24:05 - Saved model models/pingpang/mb1-ssd-Epoch-9-Loss-18.010716438293457
.pth
2022-10-07 14:24:05 - Task done, exiting program.
root@nano128G:/jetson-inference/python/training/detection/ssd#
root@nano128G:/jetson-inference/python/training/detection/ssd#
```

看一下训练出来的文件

- 大坑：关注 models 下面的labels.txt 和我们数据那边的 labels.txt 是不同的 多了一个 BACKGROUND



```
root@nano128G:/jetson-inference/python/training/detection/ssd/models/pingpang# cat labels
.txt
BACKGROUND
pingpangroot@nano128G:/jetson-inference/python/training/detection/ssd/models/pingpang#
root@nano128G:/jetson-inference/python/training/detection/ssd/models/pingpang# ls
labels.txt                                 mb1-ssd-Epoch-5-Loss-53.824838638305664.pth
mb1-ssd-Epoch-0-Loss-12.11621642112732.pth  mb1-ssd-Epoch-9-Loss-18.010716438293457.pth
root@nano128G:/jetson-inference/python/training/detection/ssd/models/pingpang#
```

jtop 性能查看工具

- 安装pip3
- sudo apt install python3-pip

- 安装
- sudo -H pip3 install -U jetson-stats

- 运行jtop服务
- sudo systemctl restart jetson_stats.service

导出模型 为 onnx

- --input
- --output
- --labels
- --batch-size=1

- python3 onnx_export.py --input models/pingpang/mb1-ssd-Epoch-29-Loss-6.877338358334133.pth --output models/pingpang/pingpang.onnx --labels=models/pingpang/labels.txt --batch-size=1

使用模型

-
```
detectnet --model=models/pingpang/pingpang.onnx --labels=models/pingpang/labels.txt --input-blob=input_0 --output-cvg=scores --output-bbox=boxes data/IMG_20220920_181652.jpg data/out.jpg
```

总结

- 用 camera-capture 产生测试数据
- train_ssd.py 训练出 xxx.pth 的模型（pytorch的模型）
- onnx_export.py 把 xxx.pth 模型转换为 xxx.onnx 模型

- 运行 detectnet 把 xxx.onnx 模型 转换为 xxx.engine 文件