环境准备

- OS: Ubuntu16.04
- GPU: TITAN Xp
- caffe：https://github.com/weiliu89/caffe
- MobileNet-SSD：https://github.com/chuanqi305/MobileNet-SSD

编译Caffe-SSD时，我们没有选择 python 接口，不过事后来看也许添加 python 接口会更方便。 工作目录中我们使用的是MobileNet-SSD中的教程

准备数据集

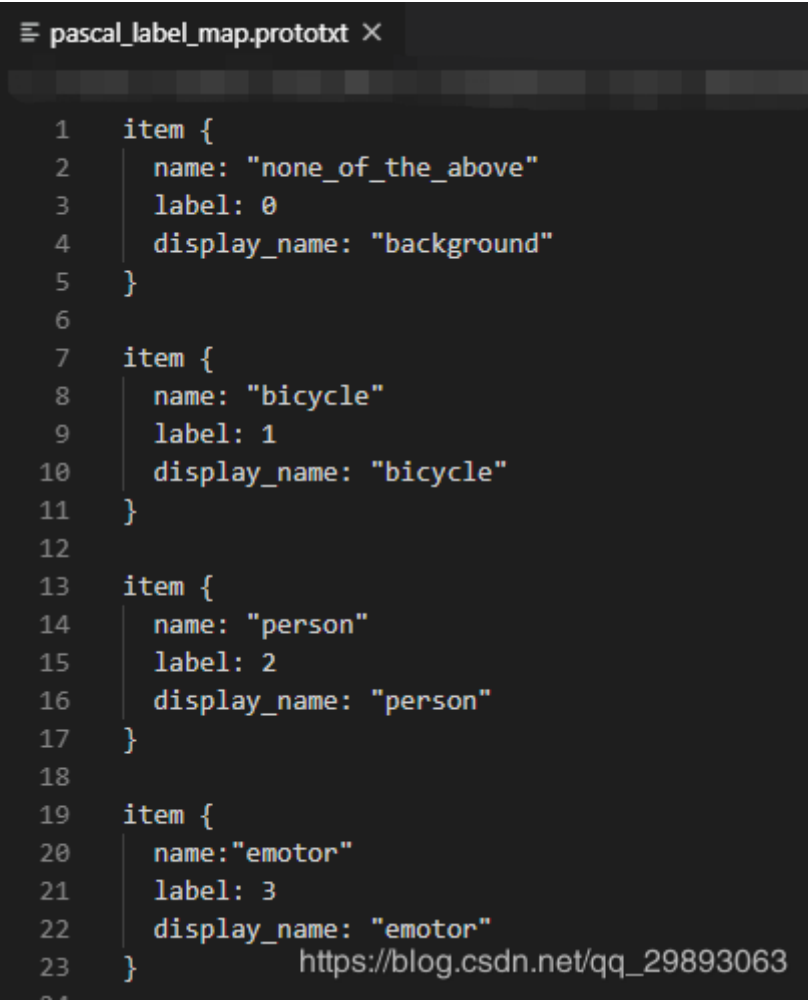为统一标准，我们制作数据集的标准都按照VOC2007数据集的格式，放到caffe-ssd/data/VOC1105目录下

- caffe-ssd:
    - data:
        - VOC1105:
            - create_list.sh
            - pascal_label_map.prototxt
            - VOCdevkit:
                - VOC1105:
                    - Anotations:
                        - all.xml
                    - ImageSets:
                        - trainval.txt
                        - test.txt
                    - JPEGImages:
                        - all pics.jpg

其中create_list.sh用于生成 trainval.txt和test.txt pascal_label_map.prototxt中为数据集中标签说明，需要记住其中label的数量，

后面修改几个prototxt参数时需要用到，我这label数量为13，加上背景，**总类别是**14，格式如下图所

```
≡ pascal_label_map.prototxt  ✕

 1   item {
 2     name: "none_of_the_above"
 3     label: 0
 4     display_name: "background"
 5   }
 6
 7   item {
 8     name: "bicycle"
 9     label: 1
10     display_name: "bicycle"
11   }
12
13   item {
14     name: "person"
15     label: 2
16     display_name: "person"
17   }
18
19   item {
20     name:"emotor"
21     label: 3
22     display_name: "emotor"
23   }                    https://blog.csdn.net/qq_29893063
```

示：

生成trainval.txt和test.txt

首先执行create_list.sh创建trainval.txt和test.txt。需要根据自己文件夹的结构修改create_list.sh中的路

```bash
root_dir=/root/caffe-ssd/data/VOC1105/VOCdevkit
sub_dir=ImageSets/Main
bash_dir="$(cd "$(dirname "${BASH_SOURCE[0]}")" && pwd)"
for dataset in trainval
do
  dst_file=$bash_dir/$dataset.txt
  if [ -f $dst_file ]
  then
    rm -f $dst_file
  fi
  for name in VOC1105
  do
    if [[ $dataset == "test" && $name == "VOC1105" ]]
    then
      continue
    fi
    echo "Create list for $name $dataset..."
    dataset_file=$root_dir/$name/$sub_dir/$dataset.txt

    img_file=$bash_dir/$dataset"_img.txt"
    cp $dataset_file $img_file
    sed -i "s/^/$name\/JPEGImages\//g" $img_file
    sed -i "s/\r$/.jpg/g" $img_file

    label_file=$bash_dir/$dataset"_label.txt"
    cp $dataset_file $label_file
    sed -i "s/^/$name\/Annotations\//g" $label_file
    sed -i "s/\r$/.xml/g" $label_file

    paste -d' ' $img_file $label_file >> $dst_file

    rm -f $label_file
    rm -f $img_file
  done
done
```

径

/root/caffe-ssd/data/VOC1105/	
Name	Size (KB)
..	
VOCdevkit	
create_list.sh	1
pascal_label_map.prototxt	1
test.txt	136
trainval.txt	456

```
root@hzq:~/caffe-ssd/data/VOC1105# ./create_list.sh
Create list for VOC1105 trainval...
```

trainval.txt中的内容如下（一行例子）：

VOC1105/JPEGImages/000344.jpg VOC1105/Annotations/000344.xml 作用是记录.jpg和对应的.xml的位置

```
trainval.txt        test.txt
 1 VOC1105/JPEGImages/2019_06_16-16_47_13_lightup_3.jpg VOC1105/Annotations/2019_06_16-16_47_13_lightup_3.xml
 2 VOC1105/JPEGImages/n_2019_11_04-09_57_32_730.jpg VOC1105/Annotations/n_2019_11_04-09_57_32_730.xml
 3 VOC1105/JPEGImages/2019_06_11-09_49_07_lightup_3.jpg VOC1105/Annotations/2019_06_11-09_49_07_lightup_3.xml
 4 VOC1105/JPEGImages/n_c_2019_06_11-07_33_21.jpg VOC1105/Annotations/n_c_2019_06_11-07_33_21.xml
 5 VOC1105/JPEGImages/000344.jpg VOC1105/Annotations/000344.xml
 6 VOC1105/JPEGImages/2019_06_15-14_45_13.jpg VOC1105/Annotations/2019_06_15-14_45_13.xml
 7 VOC1105/JPEGImages/n_w_1970_00_03-17_03_07_713.jpg VOC1105/Annotations/n_w_1970_00_03-17_03_07_713.xml
 8 VOC1105/JPEGImages/000842.jpg VOC1105/Annotations/000842.xml
 9 VOC1105/JPEGImages/n_1970_00_03-20_08_38_401.jpg VOC1105/Annotations/n_1970_00_03-20_08_38_401.xml
10 VOC1105/JPEGImages/n_w_000198_lightup.jpg VOC1105/Annotations/n_w_000198_lightup.xml
11 VOC1105/JPEGImages/d_000923.jpg VOC1105/Annotations/d_000923.xml
12 VOC1105/JPEGImages/n_000104.jpg VOC1105/Annotations/n_000104.xml
```

生成 lmdb 文件

caffe提供了用于转换带标注的数据集的工具。位于/caffe-ssd/build/tools下的conver_annoset，实际的位置跟编译caffe时候的设置有关。需要分别生成**emotor_lmdb1105**和**emotor_lmdb1105test** 在我们的例子中参数设置如下：

```
./convert_annoset --anno_type=detection --encode_type=jpg --encoded=true  --shuffle=true \
        --label_map_file=../../data/VOC1105/pascal_label_map.prototxt \
        ../../data/VOC1105/VOCdevkit/ \
        ../../data/VOC1105/trainval.txt \
        ../../data/emotor_lmdb1105
```


生成emotor_lmdb1105

```
./convert_annoset --anno_type=detection --encode_type=jpg --encoded=true  --shuffle=true \
        --label_map_file=../../data/VOC1105/pascal_label_map.prototxt \
        ../../data/VOC1105/VOCdevkit/ \
        ../../data/VOC1105/test.txt \
        ../../data/emotor_lmdb1105test
```

```
root@hzq:~/caffe-ssd/build/tools# ./convert_annoset --anno_type=detection --encode_type=jpg --encoded=true  --shuffle=true \
> --label_map_file=../../data/VOC1105/pascal_label_map.prototxt \
> ../../data/VOC1105/VOCdevkit/ \
> ../../data/VOC1105/test.txt \
> ../../data/emotor_lmdb1105test
I1211 05:09:16.160306 16235 convert_annoset.cpp:119] Shuffling data
I1211 05:09:16.976408 16235 convert_annoset.cpp:122] A total of 1546 images.
I1211 05:09:16.976866 16235 db_lmdb.cpp:35] Opened lmdb ../../data/emotor_lmdb1105test
E1211 05:09:17.474304 16235 io.cpp:90] Could not open or find file ../../data/VOC1105/VOCdevkit/VOC1105/Annotations/2019_06_17-14_20_24
W1211 05:09:17.474684 16235 convert_annoset.cpp:170] Failed to read VOC1105/Annotations/2019_06_17-14_20_24
E1211 05:09:20.075389 16235 io.cpp:90] Could not open or find file ../../data/VOC1105/VOCdevkit/VOC1105/JPEGImages/2019_06_17-14_20_24
W1211 05:09:20.075479 16235 convert_annoset.cpp:170] Failed to read VOC1105/JPEGImages/2019_06_17-14_20_24
I1211 05:09:23.958886 16235 convert_annoset.cpp:195] Processed 1000 files.
I1211 05:09:27.991808 16235 convert_annoset.cpp:201] Processed 1544 files.
```
https://blog.csdn.net/qq_29893063

/root/caffe-ssd/data/emotor_lmdb1105test/				
Name	Size (KB)	Last modified	Owner	Group
..				
data.mdb	97 736	2019-12-11 ...	root	root
lock.mdb	8	2019-12-11 ...	root	root

生成emotor_lmdb1105test
至此数据准备完毕。

准备训练

我们用来进行迁移学习的基础模型是 ssd_mobilenet_V1，其他预训练模型可以去 caffe model zoo 找
找。

1.修改train.protxt

ssd_mobilenet_V1 这个 github 仓库里的脚本gen.py可用来创建训练用的train.prototxt也可以使用
templete下的模板来自行修改。 train.prototxt需要修改的分别是：**source、label_map_file、
num_classes、6个后缀为_my的层中的num_output**，以我们数据集为例，依次说明

```
data_param {
    source: "/root/caffe-ssd/data/emotor_lmdb1105"
    batch_size: 24
    backend: LMDB
}
```

1.source为emotor_lmdb1105路径
2.label_map_file为pascal_label_map.prototxt路径

```
    }
  label_map_file: "~/caffe-ssd/data/VOC1105/pascal_label_map.prototxt"
```

3.num_classes为

```
multibox_loss_param {
  loc_loss_type: SMOOTH_L1
  conf_loss_type: SOFTMAX
  loc_weight: 1.0
  num_classes: 14
  share_location: true
  match_type: PER_PREDICTION
  overlap_threshold: 0.5
  use_prior_for_matching: true
  background_label_id: 0
  use_difficult_gt: true
  neg_pos_ratio: 3.0
  neg_overlap: 0.5
  code_type: CENTER_SIZE
  ignore_cross_boundary_bbox: false
  mining_type: MAX_NEGATIVE
}
                          https://blog.csdn.net/qq_29893063
```

总类数量，我们数据集是14个总类别

4. 6个后缀为_my的层中的num_output 其中除了conv11_mbox_conf_my中

```
layer {
  name: "conv11_mbox_conf_my"
  type: "Convolution"
  bottom: "conv11"
  top: "conv11_mbox_conf"
  param {
    lr_mult: 1.0
    decay_mult: 1.0
  }
  param {
    lr_mult: 2.0
    decay_mult: 0.0
  }
  convolution_param {
    num_output: 42
    kernel_size: 1
    weight_filler {
      type: "msra"
    }
    bias_filler {
      type: "constant"
      value: 0.0
    }
  }
}
                          https://blog.csdn.net/qq_29893063
```

num_output=3$num\_classes$，本文中取42 后面的
conv13_mbox_conf_my conv14_2_mbox_conf_my conv15_2_mbox_conf_my

conv16_2_mbox_conf_my conv17_2_mbox_conf_my 中*num_output*=6num_classes，本文中取84

```
layer {
  name: "conv13_mbox_conf_my"
  type: "Convolution"
  bottom: "conv13"
  top: "conv13_mbox_conf"
  param {
    lr_mult: 1.0
    decay_mult: 1.0
  }
  param {
    lr_mult: 2.0
    decay_mult: 0.0
  }
  convolution_param {
    num_output: 84
    kernel_size: 1
    weight_filler {
      type: "msra"
    }
    bias_filler {
      type: "constant"
      value: 0.0
    }
  }
}
```
https://blog.csdn.net/qq_29893063

至此train.prototxt修改完毕

2.配置solver_train.prototxt

```
1   train_net: "/root/caffe-ssd/workplace/emotorwork1105/MobileNet-SSD/train.prototxt"
2   base_lr: 0.0005
3   display: 10
4   max_iter: 100000
5   lr_policy: "multistep"
6   gamma: 0.5
7   weight_decay: 0.00005
8   snapshot: 2000
9   snapshot_prefix: "/root/caffe-ssd/workplace/emotorwork1105/train"
10  solver_mode: GPU
11  debug_info: false
12  snapshot_after_train: true
13  test_initialization: false
14  average_loss: 10
15  stepvalue: 20000
16  stepvalue: 40000
17  iter_size: 1
18  type: "RMSProp"
19  eval_type: "detection"
20  ap_version: "11point"
```
https://blog.csdn.net/qq_29893063

一般修改**train_net路径**、**max_iter**(迭代次数)、**snapshot**(模型保存间隔)即可

至此solver_train.prototxt修改完毕，下面开始训练

回到caffe-ssd目录下，执行以下指令

```
./build/tools/caffe train --solver=./workplace/emotorwork1105/MobileNet-SSD/solver_train.proto
    --weights=./workplace/emotorwork1105/MobileNet-SSD/mobilenet_iter_73000.caffemodel
```

输入指令

```
root@hzq:~/caffe-ssd# ./build/tools/caffe train --solver=./workplace/emotorwork1105/MobileNet-SSD/solver_train.prototxt \
> --weights=./workplace/emotorwork1105/MobileNet-SSD/mobilenet_iter_73000.caffemodel
I1211 06:23:24.790685 10636 caffe.cpp:217] Using GPUs 0
I1211 06:23:24.879321 10636 caffe.cpp:222] GPU 0: TITAN Xp
I1211 06:23:25.984016 10636 solver.cpp:63] Initializing solver from parameters:
```

开始迭代，当loss稳定到1.5-2的时候，可以使用保存的模型进行测试，训练可以按Ctrl+c暂停

```
I1211 06:23:26.406036 10636 net.cpp:226] conv4/dw/relu needs backward computation.
I1211 06:23:26.406044 10636 net.cpp:226] conv4/dw/scale needs backward computation.
I1211 06:23:26.406049 10636 net.cpp:226] conv4/dw/bn needs backward computation.
I1211 06:23:26.406057 10636 net.cpp:226] conv4/dw needs backward computation.
I1211 06:23:26.406065 10636 net.cpp:226] conv3/relu needs backward computation.
I1211 06:23:26.406071 10636 net.cpp:226] conv3/scale needs backward computation.
I1211 06:23:26.406078 10636 net.cpp:226] conv3/bn needs backward computation.
I1211 06:23:26.406085 10636 net.cpp:226] conv3 needs backward computation.
I1211 06:23:26.406093 10636 net.cpp:226] conv3/dw/relu needs backward computation.
I1211 06:23:26.406100 10636 net.cpp:226] conv3/dw/scale needs backward computation.
I1211 06:23:26.406107 10636 net.cpp:226] conv3/dw/bn needs backward computation.
I1211 06:23:26.406114 10636 net.cpp:226] conv3/dw needs backward computation.
I1211 06:23:26.406122 10636 net.cpp:226] conv2/relu needs backward computation.
I1211 06:23:26.406128 10636 net.cpp:226] conv2/scale needs backward computation.
I1211 06:23:26.406136 10636 net.cpp:226] conv2/bn needs backward computation.
I1211 06:23:26.406141 10636 net.cpp:226] conv2 needs backward computation.
I1211 06:23:26.406149 10636 net.cpp:226] conv2/dw/relu needs backward computation.
I1211 06:23:26.406157 10636 net.cpp:226] conv2/dw/scale needs backward computation.
I1211 06:23:26.406163 10636 net.cpp:226] conv2/dw/bn needs backward computation.
I1211 06:23:26.406170 10636 net.cpp:226] conv2/dw needs backward computation.
I1211 06:23:26.406178 10636 net.cpp:226] conv1/relu needs backward computation.
I1211 06:23:26.406185 10636 net.cpp:226] conv1/scale needs backward computation.
I1211 06:23:26.406193 10636 net.cpp:226] conv1/bn needs backward computation.
I1211 06:23:26.406199 10636 net.cpp:226] conv1 needs backward computation.
I1211 06:23:26.406208 10636 net.cpp:226] conv1/dw/relu needs backward computation.
I1211 06:23:26.406214 10636 net.cpp:226] conv1/dw/scale needs backward computation.
I1211 06:23:26.406220 10636 net.cpp:226] conv1/dw/bn needs backward computation.
I1211 06:23:26.406227 10636 net.cpp:226] conv1/dw needs backward computation.
I1211 06:23:26.406246 10636 net.cpp:226] conv0/relu needs backward computation.
I1211 06:23:26.406253 10636 net.cpp:226] conv0/scale needs backward computation.
I1211 06:23:26.406260 10636 net.cpp:226] conv0/bn needs backward computation.
I1211 06:23:26.406267 10636 net.cpp:226] conv0 needs backward computation.
I1211 06:23:26.406274 10636 net.cpp:228] data_data_0_split does not need backward computation.
I1211 06:23:26.406286 10636 net.cpp:228] data does not need backward computation.
I1211 06:23:26.406293 10636 net.cpp:270] This network produces output mbox_loss
I1211 06:23:26.406436 10636 net.cpp:283] Network initialization done.
I1211 06:23:26.407881 10636 solver.cpp:75] Solver scaffolding done.
I1211 06:23:26.416458 10636 caffe.cpp:155] Finetuning from ./workplace/emotorwork1105/MobileNet-SSD/mobilenet_iter_73000.caffemodel
I1211 06:23:26.443045 10636 upgrade_proto.cpp:77] Attempting to upgrade batch norm layers using deprecated params: ./workplace/emotorwork1105/MobileNet
iter_73000.caffemodel
I1211 06:23:26.443121 10636 upgrade_proto.cpp:80] Successfully upgraded batch norm layers using deprecated params.
I1211 06:23:26.448657 10636 net.cpp:761] Ignoring source layer conv11_mbox_conf
I1211 06:23:26.448748 10636 net.cpp:761] Ignoring source layer conv13_mbox_conf
I1211 06:23:26.448794 10636 net.cpp:761] Ignoring source layer conv14_2_mbox_conf
I1211 06:23:26.448817 10636 net.cpp:761] Ignoring source layer conv15_2_mbox_conf
I1211 06:23:26.448840 10636 net.cpp:761] Ignoring source layer conv16_2_mbox_conf
I1211 06:23:26.448858 10636 net.cpp:761] Ignoring source layer conv17_2_mbox_conf
I1211 06:23:26.449174 10636 caffe.cpp:251] Starting Optimization
I1211 06:23:26.449187 10636 solver.cpp:294] Solving MobileNet-SSD
I1211 06:23:26.449209 10636 solver.cpp:295] Learning Rate Policy: multistep
I1211 06:23:26.453902 10636 blocking_queue.cpp:50] Data layer prefetch queue empty
I1211 06:23:31.645777 10636 solver.cpp:243] Iteration 0, loss = 24.1133
I1211 06:23:31.645869 10636 solver.cpp:259]     Train net output #0: mbox_loss = 24.1133 (* 1 = 24.1133 loss)
I1211 06:23:31.646064 10636 sgd_solver.cpp:138] Iteration 0, lr = 0.0005
I1211 06:23:02.635417 10636 solver.cpp:243] Iteration 10, loss = 12.309
I1211 06:24:02.635630 10636 solver.cpp:259]     Train net output #0: mbox_loss = 9.84834 (* 1 = 9.84834 loss)
I1211 06:24:02.635651 10636 sgd_solver.cpp:138] Iteration 10, lr = 0.0005
```

跑一段时间以后，模型会自动保存

/root/caffe-ssd/workplace/emotorwork1105/

Name	Size (KB)	Last modified	Owner	Group
..				
MobileNet-SSD		2019-11-05 ...	root	root
deploy.prototxt	43	2019-11-05 ...	root	root
train_iter_10000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_10000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_12000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_12000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_14000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_14000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_16000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_16000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_18000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_18000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_2000.caffemodel	22 359	2019-11-05 ...	root	root
train_iter_2000.solverstate	22 343	2019-11-05 ...	root	root
train_iter_20000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_20000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_21.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_21.solverstate	22 343	2019-11-06 ...	root	root
train_iter_22000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_22000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_24000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_24000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_26000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_26000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_28000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_28000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_30000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_30000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_32000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_32000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_34000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_34000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_36000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_36000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_38000.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_38000.solverstate	22 343	2019-11-06 ...	root	root
train_iter_39490.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_39490.solverstate	22 343	2019-11-06 ...	root	root
train_iter_4.caffemodel	22 359	2019-11-06 ...	root	root
train_iter_4.solverstate	22 343	2019-11-06 ...	root	root
train_iter_4000.caffemodel	22 359	2019-11-05 ...	root	root
train_iter_4000.solverstate	22 343	2019-11-05 ...	root	root

PS：如果不想用迁移学习，只需要在输入训练指令时，删除一条指令即可 用以下指令训练

```
./build/tools/caffe train --solver=./workplace/emotorwork1105/MobileNet-SSD/solver_train.proto
```

过程和上面一样，针对不同的情况，可以尝试迁移学习或者从头开始训练这两种模式

进行测试

和训练过程类似，需要修改solver_test.prototxt和test.prototxt这两个文件

1.修改test.prototxt

其中test.prototxt中修改**source、 label_map_file、 num_classes**、 ****6个后缀为**_my**的层中的
num_output 过程和train.prototxt中类似，注意source路径为emotor_lmdb1105test，另外需要修改

dim参数

dim=num_classes

2.修改solver_test.prototxt

```
1   train_net: "/root/caffe-ssd/workplace/emotorwork1105/MobileNet-SSD/train.prototxt"
2   test_net: "/root/caffe-ssd/workplace/emotorwork1105/MobileNet-SSD/test.prototxt"
3   test_iter: 673
4   test_interval: 10000
5   base_lr: 0.0005
6   display: 10
7   max_iter: 0
8   lr_policy: "multistep"
9   gamma: 0.5
10  weight_decay: 0.00005
11  snapshot: 0
12  snapshot_prefix: "/root/caffe-ssd/workplace/emotorwork1105/train_iter"
13  solver_mode: GPU
14  debug_info: false
15  snapshot_after_train: false
16  test_initialization: true
17  average_loss: 10
18  stepvalue: 20000
19  stepvalue: 40000
20  iter_size: 1
21  type: "RMSProp"
22  eval_type: "detection"
23  ap_version: "11point"
24
```

https://blog.csdn.net/qq_29893063

至此测试配置文件修改完毕，下面开始测试 回到caffe-ssd目录下，执行以下指令

```
./build/tools/caffe train -solver=./workplace/emotorwork1105/MobileNet-SSD/solver_test.prototx
    --weights=./workplace/emotorwork1105/train_iter_30000.caffemodel
```

输入指令

```
root@hzq:~/caffe-ssd# ./build/tools/caffe train -solver=./workplace/emotorwork1105/MobileNet-SSD/solver_test.prototxt \
> --weights=./workplace/emotorwork1105/train_iter_30000.caffemodel
I1211 06:52:10.319587 22079 caffe.cpp:217] Using GPUs 0
I1211 06:52:10.356510 22079 caffe.cpp:222] GPU 0: TITAN Xp
```

测试结果，mAP=65.2%

```
I1211 06:46:48.700222 19959 upgrade_proto.cpp:80] Successfully upgraded batch norm layers using deprecated params.
I1211 06:46:48.715873 19959 upgrade_proto.cpp:77] Attempting to upgrade batch norm layers using deprecated params: ./workplace/emot
odel
I1211 06:46:48.715943 19959 upgrade_proto.cpp:80] Successfully upgraded batch norm layers using deprecated params.
I1211 06:46:48.721067 19959 net.cpp:761] Ignoring source layer mbox_loss
I1211 06:46:48.721391 19959 caffe.cpp:251] Starting Optimization
I1211 06:46:48.721403 19959 solver.cpp:294] Solving MobileNet-SSD
I1211 06:46:48.721410 19959 solver.cpp:295] Learning Rate Policy: multistep
I1211 06:46:48.721459 19959 blocking_queue.cpp:50] Data layer prefetch queue empty
I1211 06:46:51.707727 19959 solver.cpp:332] Iteration 0, loss = 2.17772
I1211 06:46:51.707837 19959 solver.cpp:433] Iteration 0, Testing net (#0)
I1211 06:46:51.715247 19959 net.cpp:693] Ignoring source layer mbox_loss
W1211 06:50:26.213999 19959 solver.cpp:524] Missing true_pos for label: 6
W1211 06:50:26.215704 19959 solver.cpp:524] Missing true_pos for label: 11
I1211 06:50:26.216022 19959 solver.cpp:546]      Test net output #0: detection_eval = 0.65277
I1211 06:50:26.216078 19959 solver.cpp:337] Optimization Done.
I1211 06:50:26.216086 19959 caffe.cpp:254] Optimization Done.
```

https://blog.csdn.net/qq_29893063

可视化测试效果

这部分，我们使用的工具是实验室同学编写的，网上应该也有相应的画框的工具，只做简单效果展示

至此关于

Caffe-SSD的迁移学习过程就基本完成了

后记

部署到1H8上，需要**deploy.prototxt**和**train_iter_30000.caffemodel** 其中deploy.prototxt中需要修改**dim参数**、num_classes、6个后缀为_my的层中的**num_output**


另外上面记录的训练方式，没有记录训练过程中的loss函数，如有需要，可以参考下面这篇博客 只需要新建一个log文件夹，然后训练指令添加一行，如下所示

```
GLOG_logtostderr=0 GLOG_log_dir=/root/caffe-ssd/workplace/emotorwork1105/log/ \
./build/tools/caffe train --solver=./workplace/emotorwork1105/MobileNet-SSD/solver_train.proto
    --weights=./workplace/emotorwork1105/MobileNet-SSD/mobilenet_iter_73000.caffemodel
```

后记

caffe.ERROR	1
caffe.FATAL	1
caffe.hzq.root.log.ERROR.20...	1
caffe.hzq.root.log.ERROR.20...	1
caffe.hzq.root.log.ERROR.20...	1
caffe.hzq.root.log.ERROR.20...	1
caffe.hzq.root.log.FATAL.201...	1
caffe.hzq.root.log.FATAL.201...	1
caffe.hzq.root.log.FATAL.201...	1
caffe.hzq.root.log.FATAL.201...	1
caffe.hzq.root.log.INFO.2019...	154
caffe.hzq.root.log.INFO.2019...	154
caffe.hzq.root.log.INFO.2019...	154
caffe.hzq.root.log.INFO.2019...	154
caffe.hzq.root.log.INFO.2019...	923
caffe.hzq.root.log.INFO.2019...	182
caffe.hzq.root.log.WARNING....	1
caffe.hzq.root.log.WARNING....	1
caffe.hzq.root.log.WARNING....	1
caffe.hzq.root.log.WARNING....	1
caffe.INFO	1
caffe.WARNING	1
extract_seconds.py	1
m.log	2 735
m.log.test	1
m.log.train	384
my.log	154
parse_log.sh	1
plot_training_log.py	6
train_iters.png	61

日志文件   **loss曲线可视化**
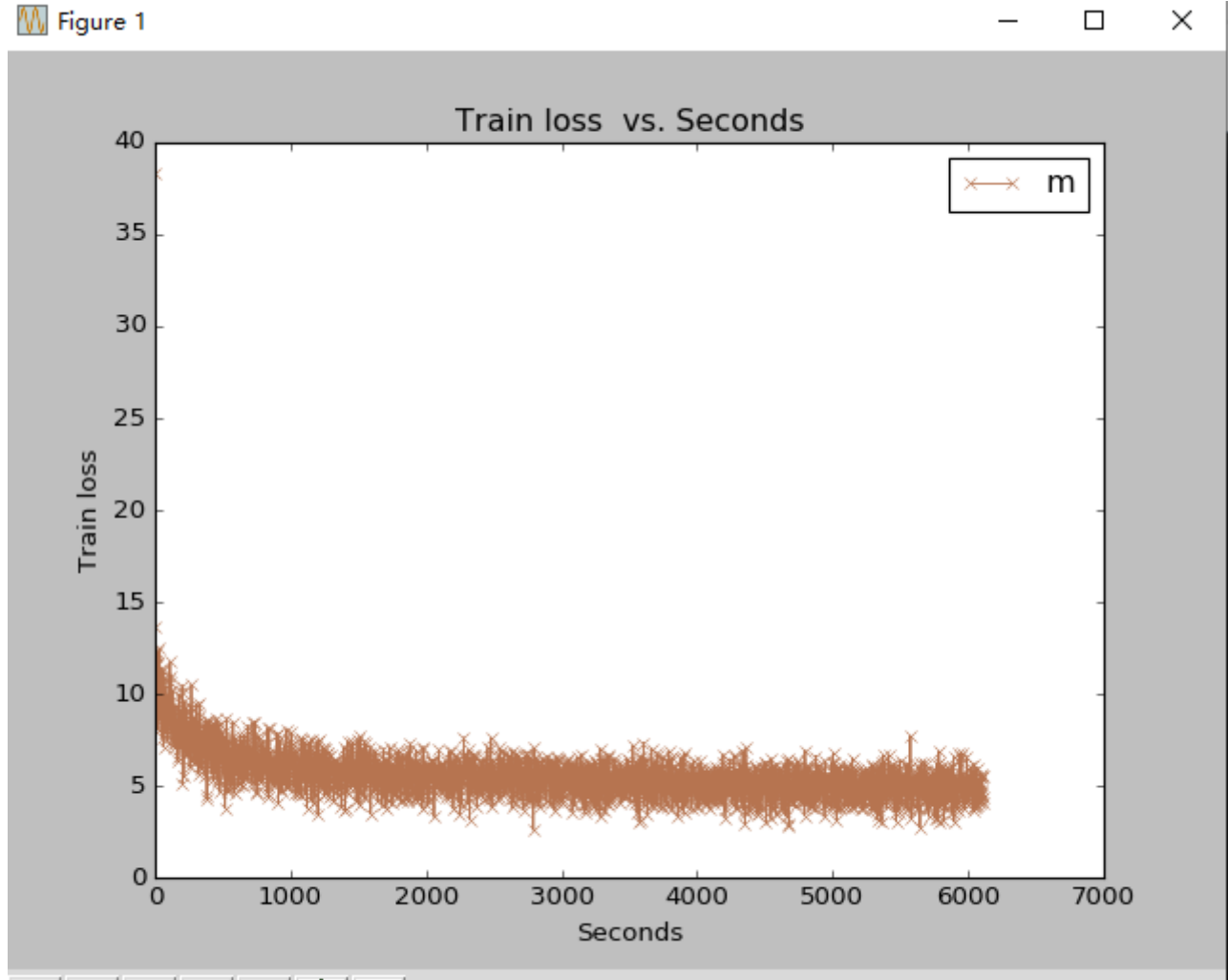
其他

以上就是整个训练过程的记录，期间还有一些小 bug 没记下来，但应该问题不大，网上查查就解决了。 建议编译时添加caffe-ssd的python接口，因为很多用于推理的脚本都是python写的，不然需要自己写。

其他