Retinanet偷油测试

# 8类、data(812train、202val)

## 实验：resnet101

### 详细实验：

#### 实验1: freeze0、NUM\_CONVS4、model\_final.pkl、p2-p7、（900,1536）、O4、S4、R6 – zj

**存放位置（100）：**/home/zhangjing/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6.9G + 6.9G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-101-FPN\_1x.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2。

BASE\_LR: 0.001

STEPS: [0, 60000,80000]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | |
| AP | AP50 | AP | AP50 |
| 8000 |  |  |  | 0.5493 | 0.8972 |
| 1万 |  | 0.8308 | 0.9990 | 0.5614 | 0.8931 |
| 2万 |  | 0.9064 | 0.9984 | 0.5518 | 0.9028 |
| 3万 |  | 0.9514 | 0.9985 | 0.5510 | 0.9015 |
| 5万 |  | 0.8589 | 0.9979 | 0.5447 | 0.9020 |
| 6万 |  | 0.9712 | 0.9985 | 0.5491 | 0.9032 |
| 7万 |  | 0.9772 | 0.9985 | 0.5469 | 0.9038 |
| 8万 |  | 0.9784 | 0.9985 | 0.5454 | 0.9048 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 8000 | 0.5493 | 0.8972 | 0.5786 | 0.3430 | 0.5174 | 0.5791 |
| 1万 | 0.5614 | 0.8931 | 0.6253 | 0.3628 | 0.5534 | 0.5887 |
| 2万 | 0.5518 | 0.9028 | 0.5759 | 0.3537 | 0.5346 | 0.5772 |
| 3万 | 0.5510 | 0.9015 | 0.5786 | 0.3783 | 0.5419 | 0.5712 |
| 5万 | 0.5447 | 0.9020 | 0.5858 | 0.4190 | 0.5328 | 0.5737 |
| 8万 | 0.5454 | 0.9048 | 0.5715 | 0.4030 | 0.5310 | 0.5721 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **1万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 83.1 | 61.8 |
| **2** | forklift | 576 | 152 | 80.4 | 55.1 |
| **3** | digger | 783 | 200 | 84.7 | 74.1 |
| **4** | car | 437 | 84 | 82.5 | 49.7 |
| **5** | bus | 61 | 10 | 83.6 | 52.8 |
| **6** | tanker | 48 | 17 | 91.3 | 59.7 |
| **7** | person | 721 | 187 | 75.3 | 39.8 |

#### 实验2: NUM\_CONVS5、freeze2、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6 – lg

**存放位置（213）：**/data/ligang/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6.9G + 6.9G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-101-FPN\_2x\_illbuild\_P2\_P7\_S4\_anchors6.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | time |
| AP | AP50 | AP | AP50 |  |
| 1万 |  | 0.8219 | 0.9989 | 0.5499 | 0.8985 | 127 |
| 2万 |  | 0.9013 | 0.9984 | 0.5452 | 0.9016 |  |
| 3万 |  | 0.9184 | 0.9970 | 0.5524 | 0.8939 |  |
| 4万 |  | 0.9708 | 0.9985 | 0.5467 | 0.9066 |  |
| 5万 |  | 0.9798 | 0.9985 | 0.5456 | 0.9078 |  |
| 8万 |  | 0.9890 | 0.9985 | 0.5404 | 0.9085 |  |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1万 | 0.5499 | 0.8985 | 0.5785 | 0.3843 | 0.5221 | 0.5764 |
| 2万 | 0.5452 | 0.9016 | 0.5748 | 0.3518 | 0.5250 | 0.5732 |
| 3万 | 0.5524 | 0.8939 | 0.6070 | 0.3557 | 0.5404 | 0.5712 |
| 4万 | 0.5467 | 0.9066 | 0.6030 | 0.4083 | 0.5347 | 0.5704 |
| 5万 | 0.5456 | 0.9078 | 0.5823 | 0.4015 | 0.5390 | 0.5691 |
| 8万 | 0.5404 | 0.9085 | 0.5851 | 0.3975 | 0.5322 | 0.5620 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **3万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 90.2 | 62.9 |
| **2** | forklift | 576 | 152 | 90.6 | 54.8 |
| **3** | digger | 783 | 200 | 90.8 | 72.5 |
| **4** | car | 437 | 84 | 91.7 | 46.7 |
| **5** | bus | 61 | 10 | 92.4 | 49.1 |
| **6** | tanker | 48 | 17 | 97.2 | 60.4 |
| **7** | person | 721 | 187 | 90.0 | 40.3 |

#### 实验3: freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6 – ys

**存放位置（214）：**/data/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6G

**参数设置：**

**网络结构**：configs/illbuld/ retinanet\_X-101-64x4d-FPN\_p7\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4，

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0, 5.0, 0.5, 0.2),6个ratios；

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2。（768\*1280）

BASE\_LR: 0.001

STEPS: [0, 50000]

模型存储位置：output/oil/retinanet\_R-101-FPN\_p7\_2\_r6\_L\_ft文件夹中

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | |
| AP | AP50 | AP | AP50 |
| 1万次 | 0.03 | 0.8331 | 0.9975 | 0.5530 | 0.8950 |
| 2万次 | 0.01 | 0.9132 | 0.9984 | 0.5605 | 0.9165 |
| 4万次 | 0.003 | 0.9739 | 0.9985 | 0.5487 | 0.9094 |
| 5万次 | 0.01 | 0.8785 | 0.9980 | 0.5714 | 0.9246 |
| 5.5万次 | 0.007 | 0.9394 | 0.9984 | 0.5642 | 0.9156 |
| 6万次 | 0.003 | 0.9537 | 0.9985 | 0.5614 | 0.9131 |
| 7万次 | 0.002 | 0.9673 | 0.9985 | 0.5568 | 0.9122 |
| 10万次 | 0.002 |  |  | 0.5499 | 0.9106 |
| 20万次 | 0.002 |  |  | 0.5519 | 0.9113 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 5万 | 0.5714 | 0.9246 | 0.6328 | 0.4707 | 0.5364 | 0.6011 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 87.3 | 64.4 |
| **2** | forklift | 576 | 152 | 85.0 | 53.8 |
| **3** | digger | 783 | 200 | 88.5 | 73.9 |
| **4** | car | 437 | 84 | 87.0 | 51.9 |
| **5** | bus | 61 | 10 | 88.6 | 56.9 |
| **6** | tanker | 48 | 17 | 93.7 | 57.2 |
| **7** | person | 721 | 187 | 84.8 | 41.9 |

#### 实验4: freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、灰度图、O4、S4、R6 、（step-120000）（step-50000/100000）– lg

**存放位置（214）：**/data/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6G

**参数设置：**

**网络结构**：configs/illbuld/ retinanet\_X-101-64x4d-FPN\_p7\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4，

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0, 5.0, 0.5, 0.2),6个ratios；

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2。（768\*1280）

模型存储位置：output/oil/retinanet\_R-101-FPN\_p7\_2\_r6\_L\_ft文件夹中

（step-120000）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | |
| AP | AP50 | AP | AP50 |
| 1万次 | 0.05 | 0.8159 | 0.9984 | 0.544 | 0.882 |
| 1.5万次 | 0.028 | 0.8558 | 0.9981 | 0.551 | 0.891 |
| 2万次 | 0.011 | 0.909 | 0.9984 | 0.542 | 0.883 |
| 2.5万次 | 0.007 | 0.9258 | 0.9984 | 0.543 | 0.886 |
| 3万次 | 0.006 | 0.9538 | 0.9985 | 0.536 | 0.869 |
| 3.5万次 | 0.004 | 0.9631 | 0.9985 | 0.533 | 0.877 |
| 4万次 | 0.003 | 0.9721 | 0.9985 | 0.529 | 0.869 |
| 4.5万次 | 0.0025 | 0.9742 | 0.9985 | 0.525 | 0.876 |
| 5万次 | 0.019 | 0.8649 | 0.9980 | 0.549 | 0.898 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1.5万次 | 0.551 | 0.891 | 0.609 | 0.402 | 0.512 | 0.579 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **1.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 84.9 | 64.1 |
| **2** | forklift | 576 | 152 | 83.3 | 55.5 |
| **3** | digger | 783 | 200 | 86.5 | 73.4 |
| **4** | car | 437 | 84 | 85.8 | 49.1 |
| **5** | bus | 61 | 10 | 86.3 | 50.7 |
| **6** | tanker | 48 | 17 | 91.5 | 54.7 |
| **7** | person | 721 | 187 | 80.7 | 40.8 |

（step-50000/100000）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | |
| AP | AP50 | AP | AP50 |
| 1万次 |  | 0.826 | 0.998 | 0.546 | 0.872 |
| 1.5万次 |  | 0.88 | 0.998 | 0.545 | 0.88 |
| 2万次 |  | 0.889 | 0.9968 | 0.539 | 0.879 |
| 2.5万次 |  | 0.9268 | 0.998 | 0.542 | 0.879 |
| 3万次 |  | 0.948 | 0.999 | 0.541 | 0.88 |
| 3.5万次 |  | 0.9615 | 0.999 | 0.535 | 0.878 |
| 4万次 |  | 0.972 | 0.999 | 0.538 | 0.88 |
| 4.5万次 |  | 0.976 | 0.999 | 0.538 | 0.88 |
| 5万次 |  | 0.982 | 0.999 | 0.535 | 0.886 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1万次 | 0.546 | 0.872 | 0.5927 | 0.4283 | 0.5166 | 0.5521 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **1万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 83.3 | 61.5 |
| **2** | forklift | 576 | 152 | 80.3 | 54.5 |
| **3** | digger | 783 | 200 | 85.2 | 72.6 |
| **4** | car | 437 | 84 | 82.2 | 48.5 |
| **5** | bus | 61 | 10 | 83.3 | 53.2 |
| **6** | tanker | 48 | 17 | 89.1 | 53.6 |
| **7** | person | 721 | 187 | 75.0 | 38.5 |

#### 实验5: freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900,1536）、O4、S4、R6、WEIGHT\_DECAY 0.001– zj

**存放位置（100）：**/home/zhangjing/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6.9G + 6.9G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-101-FPN\_1x.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2。

BASE\_LR: 0.001 #0.1

STEPS: [0, 50000, 100000, 150000]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | 耗时（ms）  多gpu测试 |
| AP | AP50 | AP | AP50 |
| 1万 |  | 0.8022 | 0.9976 | 0.5630 | 0.9218 | 219 |
| 2万 |  | 0.8620 | 0.9989 | 0.5686 | 0.9156 | 219 |
| 2.5万 |  | 0.8825 | 0.9989 | 0.5778 | 0.9212 | 219 |
| 3万 |  | 0.8692 | 0.9983 | 0.5625 | 0.9076 | 219 |
| 4万 |  | 0.8092 | 0.9907 | 0.5174 | 0.8525 | 219 |
| 5万 |  | 0.8497 | 0.9983 | 0.5435 | 0.9044 | 219 |
| 6万 |  | 0.9156 | 0.9984 | 0.5491 | 0.9068 | 219 |
| 7万 |  | 0.9263 | 0.9985 | 0.5500 | 0.9036 | 219 |

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**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1万 | 0.5630 | 0.9218 | 0.6299 | 0.4053 | 0.5545 | 0.5923 |
| 2万 | 0.5686 | 0.9156 | 0.6329 | 0.3976 | 0.5542 | 0.5890 |
| 2.5万 | 0.5778 | 0.9212 | 0.6529 | 0.4270 | 0.5572 | 0.5990 |
| 3万 | 0.5625 | 0.9076 | 0.6299 | 0.3801 | 0.5465 | 0.5897 |
| 4万 | 0.5174 | 0.8525 | 0.5611 | 0.3875 | 0.4994 | 0.5248 |
| 5万 | 0.5435 | 0.9044 | 0.5862 | 0.4047 | 0.5103 | 0.5626 |
| 6万 | 0.5491 | 0.9068 | 0.6086 | 0.4161 | 0.5073 | 0.5725 |
| 7万 | 0.5500 | 0.9036 | 0.6287 | 0.3840 | 0.5192 | 0.5777 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **2.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 86.9 | 63.3 |
| **2** | forklift | 576 | 152 | 85.8 | 56.1 |
| **3** | digger | 783 | 200 | 87.9 | 73.3 |
| **4** | car | 437 | 84 | 88.5 | 49.6 |
| **5** | bus | 61 | 10 | 89.1 | 59.3 |
| **6** | tanker | 48 | 17 | 93.6 | 62.0 |
| **7** | person | 721 | 187 | 86.0 | 40.9 |

**WEIGHT\_DECAY 0.005**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | 耗时（ms）  多gpu测试 |
| AP | AP50 | AP | AP50 |
| 1万 |  | 0.6756 | 0.9859 | 0.5246 | 0.8855 | 198 |
| 2万 |  | 0.5855 | 0.9202 | 0.4660 | 0.7877 | 198 |
| 3万 |  | 0.5890 | 0.9169 | 0.4392 | 0.7567 | 198 |
| 4万 |  | 0.6604 | 0.9767 | 0.4541 | 0.7795 | 198 |
| 5万 |  | 0.5453 | 0.9072 | 0.3696 | 0.7174 | 198 |
| 6万 |  | 0.7589 | 0.9905 | 0.4706 | 0.7873 | 198 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1万 | 0.5246 | 0.8855 | 0.5521 | 0.4437 | 0.4789 | 0.5505 |
| 2万 | 0.4660 | 0.7877 | 0.5071 | 0.3715 | 0.4672 | 0.4543 |
| 3万 | 0.4392 | 0.7567 | 0.4765 | 0.3974 | 0.4287 | 0.4257 |
| 4万 | 0.4541 | 0.7795 | 0.5023 | 0.4136 | 0.4164 | 0.4405 |
| 5万 | 0.3696 | 0.7174 | 0.3526 | 0.2702 | 0.3603 | 0.3652 |
| 6万 | 0.4706 | 0.7873 | 0.4825 | 0.3492 | 0.4260 | 0.4669 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **？万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 70.7 | 59.1 |
| **2** | forklift | 576 | 152 | 66.9 | 51.7 |
| **3** | digger | 783 | 200 | 74.6 | 71.6 |
| **4** | car | 437 | 84 | 68.4 | 47.3 |
| **5** | bus | 61 | 10 | 63.1 | 56.0 |
| **6** | tanker | 48 | 17 | 74.0 | 44.7 |
| **7** | person | 721 | 187 | 55.2 | 36.6 |

### 实验对比：

#### 输入图像为彩色图的实验对比

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **参数** | **训练集 (812)** | | **验证集 (202)** | | **备注** |
| **AP** | **AP50** | **AP** | **AP50** |
| freeze0、NUM\_CONVS4、model\_final.pkl、p2-p7、（900,1536）、O4、S4、R6、8类 | 0.8308 | 0.9990 | 0.5614 | 0.8931 | [实验1](#_实验1:_freeze0、NUM_CONVS4、model_final)  1万次  zj  train |
| NUM\_CONVS5、freeze2、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 | 0.9184 | 0.9970 | 0.5524 | 0.8939 | [实验2](#_实验2:_NUM_CONVS5、freeze2、model_final)  3万次  lg  train |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 (**默认的**) | 0.8785 | 0.9980 | 0.5714 | 0.9246 | [实验3](#_实验3:_freeze2、NUM_CONVS4、model_final)  5万次  ys  train |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 (**默认的**)、WEIGHT\_DECAY 0.001 | 0.8825 | 0.9989 | 0.5778 | 0.9212 | [实验5](#_实验5:_freeze2、NUM_CONVS4、model_final)  2.5万次  zj  train |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 实验 | 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 实验1 | 1万 | 0.5614 | 0.8931 | 0.6253 | 0.3628 | 0.5534 | 0.5887 |
| 实验2 | 3万 | 0.5524 | 0.8939 | 0.6070 | 0.3557 | 0.5404 | 0.5712 |
| 实验3 | 5万 | 0.5714 | 0.9246 | 0.6328 | 0.4707 | 0.5364 | 0.6011 |
| 实验5 | 2.5万 | 0.5778 | 0.9212 | 0.6529 | 0.4270 | 0.5572 | 0.5990 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **5万迭代、AP、实验3** | | **2.5万迭代、AP、实验5** | |
| **train** | **val** | **tain** | **val** |
| **1** | autotruck | 666 | 128 | 87.3 | 64.4 | 86.9 | 63.3 |
| **2** | forklift | 576 | 152 | 85.0 | 53.8 | 85.8 | 56.1 |
| **3** | digger | 783 | 200 | 88.5 | 73.9 | 87.9 | 73.3 |
| **4** | car | 437 | 84 | 87.0 | 51.9 | 88.5 | 49.6 |
| **5** | bus | 61 | 10 | 88.6 | 56.9 | 89.1 | 59.3 |
| **6** | tanker | 48 | 17 | 93.7 | 57.2 | 93.6 | 62.0 |
| **7** | person | 721 | 187 | 84.8 | 41.9 | 86.0 | 40.9 |

#### 输入图像为彩色图、灰度图的实验对比：

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **参数** | **训练集 (812)** | | **验证集 (202)** | | **备注** |
| **AP** | **AP50** | **AP** | **AP50** |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 (**默认的**) 、灰度图 | 0.8558 | 0.9981 | 0.551 | 0.891 | [实验4](#_实验4:_freeze2、NUM_CONVS4、model_final)  ？万次  lg  train |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 (**默认的**)、彩色图 | 0.8785 | 0.9980 | 0.5714 | 0.9246 | [实验3](#_实验3:_freeze2、NUM_CONVS4、model_final)  5万次  ys  train |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 实验 | 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 实验3 | 5万 | 0.5714 | 0.9246 | 0.6328 | 0.4707 | 0.5364 | 0.6011 |
| 实验4 | 1.5万 | 0.551 | 0.891 | 0.609 | 0.402 | 0.512 | 0.579 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **5万迭代、AP、彩色图** | | **1.5万迭代、AP、灰度图** | |
| **tain** | **val** | **train** | **val** |
| **1** | autotruck | 666 | 128 | 87.3 | 64.4 | 84.9 | 64.1 |
| **2** | forklift | 576 | 152 | 85.0 | 53.8 | 83.3 | 55.5 |
| **3** | digger | 783 | 200 | 88.5 | 73.9 | 86.5 | 73.4 |
| **4** | car | 437 | 84 | 87.0 | 51.9 | 85.8 | 49.1 |
| **5** | bus | 61 | 10 | 88.6 | 56.9 | 86.3 | 50.7 |
| **6** | tanker | 48 | 17 | 93.7 | 57.2 | 91.5 | 54.7 |
| **7** | person | 721 | 187 | 84.8 | 41.9 | 80.7 | 40.8 |

### 结论

默认的情况是最好的，person的AP最低，原因是person比较小。

## 实验：resnet50

### 实验目的：

使用resnet101网络结构检测目标，检测结果表明对person效果不好，原因是person目标比较小，1920\*1080图像中最小目标为16\*29，进（900，1536）大小的网络后最小目标还会缩到13\*24，这样目标就会更小。所以想将resnet101换成resnet50，输入图片换成（1080,1920），这样最小目标就不会变的更小。希望测试的AP会有所提高。

### 详细实验：

#### 实验1: NUM\_CONVS2、model\_final50.pkl、p2-p6、（1080,1920）、freeze2、O4、S4、R6 – zj

**存放位置（100）：**/home/zhangjing/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-50-FPN\_1x.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：配置为1080，1920，2个GPU，batchsize总共为2。

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | 耗时  （ms） |
| AP | AP50 | AP | AP50 |
| 5000 | 0.107213 |  |  | 0.5297 | 0.8973 | 365(val) |
| 1万 | 0.060084 | 0.7997 | 0.9990 | 0.5479 | 0.9116 | 357(train) |
| 2万 | 0.014922 | 0.8953 | 0.9984 | 0.5484 | 0.9072 | 357 |
| 3万 | 0.009838 | 0.9283 | 0.9985 | 0.5487 | 0.9102 | 357 |
| 4万 | 0.006558 | 0.9480 | 0.9985 | 0.5459 | 0.9075 | 357 |
| 5万 | 0.004715 | 0.9499 | 0.9985 | 0.5432 | 0.9037 | 357 |
| 6万 | 0.006068 | 0.9521 | 0.9985 | 0.5426 | 0.9047 | 357 |

**备注**： 100机器上: 耗时365ms， 213机器上: 耗时500ms

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 5000 | 0.5297 | 0.8973 | 0.5717 | 0.4350 | 0.4922 | 0.5487 |
| 1万 | 0.5479 | 0.9116 | 0.5992 | 0.4603 | 0.4973 | 0.5674 |
| 2万 | 0.5484 | 0.9072 | 0.6159 | 0.4935 | 0.4890 | 0.5749 |
| 3万 | 0.5487 | 0.9102 | 0.5945 | 0.4497 | 0.4864 | 0.5898 |
| 4万 | 0.5459 | 0.9075 | 0.6036 | 0.4678 | 0.4782 | 0.5861 |
| 5万 | 0.5432 | 0.9037 | 0.5968 | 0.4678 | 0.4770 | 0.5826 |
| 6万 | 0.5426 | 0.9047 | 0.5992 | 0.4673 | 0.4770 | 0.5830 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **3迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 91.8 | 62.0 |
| **2** | forklift | 576 | 152 | 95.1 | 54.4 |
| **3** | digger | 783 | 200 | 94.0 | 72.6 |
| **4** | car | 437 | 84 | 92.6 | 49.3 |
| **5** | bus | 61 | 10 | 91.9 | 54.2 |
| **6** | tanker | 48 | 17 | 95.6 | 51.0 |
| **7** | person | 721 | 187 | 88.8 | 40.7 |

#### 实验2: NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080,1920）、freeze2、O4、S4、R6 – lg

**存放位置（100）：**/home/zhangjing/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-50-FPN\_1x.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：配置为1080，1920，2个GPU，batchsize总共为2。

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | Time(ms) |
| AP | AP50 | AP | AP50 |  |
| 1万 | 0.05 | 0.80 | 0.99 | 0.55 | 0.90 | 650 |
| 2万 | 0.012 | 0.89 | 0.99 | 0.54 | 0.89 | 650 |
| 3万 | 0.007 | 0.94 | 0.99 | 0.54 | 0.89 | 650 |
| 4万 | 0.004 | 0.95 | 0.99 | 0.54 | 0.90 | 650 |
| 5万 | 0.0035 | 0.95 | 0.99 | 0.54 | 0.90 | 650 |
| 6万 | 0.004 | 0.96 | 0.99 | 0.54 | 0.90 | 350 |

**备注**：213机器上: 耗时650ms 100机器上: 耗时398ms

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1万 | 0.55 | 0.9019 | 0.5824 | 0.4746 | 0.4991 | 0.5853 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **1万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 81 | 63.7 |
| **2** | forklift | 576 | 152 | 80.7 | 57 |
| **3** | digger | 783 | 200 | 83.4 | 73.1 |
| **4** | car | 437 | 84 | 80.7 | 53.1 |
| **5** | bus | 61 | 10 | 76.9 | 52.3 |
| **6** | tanker | 48 | 17 | 86.8 | 44.9 |
| **7** | person | 721 | 187 | 72.5 | 40.8 |

213的GPU略慢一些， 实验1的500ms左右

#### 实验3: NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080,1920）、freeze2、O4、S4、R6、WEIGHT\_DECAY 0.001 –ys

**存放位置（214）：**/home/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/oil /retinanet\_R-50-FPN\_p6\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：配置为1080，1920，2个GPU，batchsize总共为2。

模型存储位置：output/oil/ retinanet\_R-50-FPN\_p7\_2\_r6\_L\_ft文件夹中

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | Time(ms) |
| AP | AP50 | AP | AP50 |  |
| 2万 | 0.04 | 0.8605 | 0.9984 | 0.5576 | 0.9106 | 661 |
| 2.5万 | 0.03 | 0.8753 | 0.9985 | 0.5690 | 0.9174 | 661 |
| 3万 | 0.02 | 0.8423 | 0.9981 | 0.5687 | 0.9149 | 661 |
| 3.5万 | 0.01 | 0.9070 | 0.9985 | 0.5710 | 0.9119 | 661 |
| 4万 | 0.01 | 0.9130 | 0.9983 | 0.5676 | 0.9107 | 661 |
| 4.5万 | 0.01 | 0.9184 | 0.9983 | 0.5672 | 0.9106 | 661 |
| 6万 | 0.008 | 0.9276 | 0.9982 | 0.5644 | 0.9098 | 661 |
| 8万 | 0.007 |  |  | 0.5647 | 0.9094 | 661 |
| 10万次 | 0.007 |  |  | 0.5645 | 0.9094 | 661 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 3.5万 | 0.5710 | 0.9119 | 0.6538 | 0.4851 | 0.5380 | 0.6074 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **3.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 89.0 | 62.1 |
| **2** | forklift | 576 | 152 | 90.0 | 57.9 |
| **3** | digger | 783 | 200 | 90.9 | 74.7 |
| **4** | car | 437 | 84 | 90.3 | 51.8 |
| **5** | bus | 61 | 10 | 89.8 | 59.0 |
| **6** | tanker | 48 | 17 | 97.3 | 55.1 |
| **7** | person | 721 | 187 | 87.6 | 39.1 |

#### 实验4: NUM\_CONVS2、model\_final50.pkl、p2-p6、（1080,1920）、灰度图、freeze2、O4、S4、R6 – zj

**存放位置（100）：**/home/zhangjing/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-50-FPN\_1x.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：灰度图，配置为1080，1920，2个GPU，batchsize总共为2。

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | 耗时  （ms） |
| AP | AP50 | AP | AP50 |
| 1万 | 0.066067 | 0.7965 | 0.9974 | 0.5450 | 0.8964 | 359 |
| 2万 | 0.016683 | 0.8842 | 0.9984 | 0.5471 | 0.8871 | 359 |
| 3万 | 0.009980 | 0.9305 | 0.9985 | 0.5472 | 0.8941 | 359 |
| 4万 | 0.005420 | 0.9498 | 0.9985 | 0.5377 | 0.8916 | 359 |
| 5万 | 0.005688 | 0.9546 | 0.9985 | 0.5361 | 0.8919 | 359 |
| 6万 | 0.004995 | 0.9581 | 0.9985 | 0.5399 | 0.8907 | 359 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1万 | 0.5450 | 0.8964 | 0.5849 | 0.5151 | 0.4919 | 0.5757 |
| 2万 | 0.5471 | 0.8871 | 0.5831 | 0.4705 | 0.4977 | 0.5775 |
| 3万 | 0.5472 | 0.8941 | 0.5859 | 0.4687 | 0.4903 | 0.5778 |
| 4万 | 0.5377 | 0.8916 | 0.5625 | 0.4899 | 0.4833 | 0.5711 |
| 5万 | 0.5361 | 0.8919 | 0.5628 | 0.4908 | 0.4809 | 0.5715 |
| 6万 | 0.5399 | 0.8907 | 0.5826 | 0.4934 | 0.4844 | 0.5733 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **3迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 93.1 | 60.9 |
| **2** | forklift | 576 | 152 | 93.8 | 55.8 |
| **3** | digger | 783 | 200 | 94.0 | 70.3 |
| **4** | car | 437 | 84 | 92.4 | 50.3 |
| **5** | bus | 61 | 10 | 91.4 | 53.8 |
| **6** | tanker | 48 | 17 | 97.5 | 54.6 |
| **7** | person | 721 | 187 | 89.1 | 37.4 |

#### 实验5: NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080,1920）、freeze2、O4、S4、R6、WEIGHT\_DECAY 0.01 彩色图–ys

**存放位置（214）：**/home/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/oil /retinanet\_R-50-FPN\_p6\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：配置为1080，1920，2个GPU，batchsize总共为2。

模型存储位置：output/oil/ retinanet\_R-50- FPN\_p7\_2\_r6\_L\_ft\_decay\_00文件夹中

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | Time(ms) |
| AP | AP50 | AP | AP50 |  |
| 2万 | 0.3 |  |  | 0.3875 | 0.7201 | 691 |
| 3万 | 0.3 | 0.4513 | 0.8253 | 0.3698 | 0.7051 | 691 |
| 4万 | 0.1 | 0.5950 | 0.9211 | 0.4217 | 0.7577 | 691 |
| 5万 | 0.1 | 0.6147 | 0.9369 | 0.4234 | 0.7577 | 691 |
| 6万 | 0.1 | 0.6372 | 0.9473 | 0.4309 | 0.7608 | 691 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 6万 | 0.4309 | 0.7608 | 0.4110 | 0.3824 | 0.4039 | 0.4118 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **3迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 666 | 128 | 71.5 | 60.9 |
| **2** | forklift | 576 | 152 | 64.7 | 55.8 |
| **3** | digger | 783 | 200 | 75.5 | 70.3 |
| **4** | car | 437 | 84 | 61.4 | 50.3 |
| **5** | bus | 61 | 10 | 60.5 | 53.8 |
| **6** | tanker | 48 | 17 | 63.3 | 54.6 |
| **7** | person | 721 | 187 | 49.1 | 37.4 |

WEIGHT\_DECAY 0.01的效果明显较差。

#### 实验6: NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080,1920）、freeze2、O4、S4、R6、WEIGHT\_DECAY 0.01 彩色图–ys

**存放位置（214）：**/home/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**812训练集，验证集202， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/oil /retinanet\_R-50-FPN\_p6\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：配置为1080，1920，2个GPU，batchsize总共为2。

模型存储位置：output/oil/ retinanet\_R-50- FPN\_p7\_2\_r6\_L\_ft\_decay\_005文件夹中

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (812) | | 验证集 (202) | | Time(ms) |
| AP | AP50 | AP | AP50 |  |
| 1万 | 0.3 |  |  | 0.5180 | 0.8897 | 691 |
| 2万 | 0.2 |  |  | 0.4779 | 0.8303 | 691 |
| 3万 | 0.1 |  |  | 0.4500 | 0.7963 | 691 |
| 4万 | 0.1 |  |  | 0.4900 | 0.8447 | 691 |
| 5万 | 0.02 |  |  | 0.4938 | 0.8277 | 691 |
| 6万 | 0.06 |  |  | 0.4827 | 0.8294 | 691 |
| 7万 | 0.06 |  |  | 0.4827 | 0.8227 | 691 |
| 8万 | 0.07 |  |  | 0.4819 | 0.8229 | 691 |

WEIGHT\_DECAY 0.01，0.005的效果明显较差。

#### 输入图像为彩色图时的不同参数的实验对比:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **参数** | **训练集 (812)** | | **验证集 (202)** | | **备注** |
| **AP** | **AP50** | **AP** | **AP50** |
| Freeze2、NUM\_CONVS2、model\_final50.pkl、p2-p6、（1080,1920）、O4、S4、R6、8类 | 0.9283 | 0.9985 | 0.5487 | 0.9102 | [实验1](#_实验1:_NUM_CONVS2、model_final50.pkl、p)  3次  Zj train |
| NUM\_CONVS3、freeze2、model\_final50.pkl、p2-p6、（1080, 1920）、O4、S4、R6、8类 | 0.80 | 0.99 | 0.55 | 0.90 | [实验2](#_实验2:_NUM_CONVS3、model_final50.pkl、p)  1万次  Lg train |
| freeze2、NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080, 1920）、O4、S4、R6、8类 | 0.9070 | 0.9985 | 0.5710 | 0.9119 | [实验3](#_实验3:_NUM_CONVS3、model_final50.pkl、p)  3.5万次  Ys train |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 实验 | 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 实验1 | 3万 | 0.5487 | 0.9102 | 0.5945 | 0.4497 | 0.4864 | 0.5898 |
| 实验2 | 1万 | 0.55 | 0.9019 | 0.5824 | 0.4746 | 0.4991 | 0.5853 |
| 实验3 | 3.5万 | 0.5710 | 0.9119 | 0.6538 | 0.4851 | 0.5380 | 0.6074 |

#### 输入图像为彩色图、灰度图的实验对比

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **参数** | **训练集 (812)** | | **验证集 (202)** | | **备注** |
| **AP** | **AP50** | **AP** | **AP50** |
| Freeze2、NUM\_CONVS2、model\_final50.pkl、p2-p6、（1080,1920）、O4、S4、R6、8类、彩色图 | 0.9283 | 0.9985 | 0.5487 | 0.9102 | [实验1](#_实验1:_NUM_CONVS2、model_final50.pkl、p)  3次  Zj train |
| Freeze2、NUM\_CONVS2、model\_final50.pkl、p2-p6、（1080,1920）、O4、S4、R6、8类、灰度图 | 0.9305 | 0.9985 | 0.5472 | 0.8941 | [实验4](#_实验4:_NUM_CONVS2、model_final50.pkl、p)  3万次  zj train |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 实验 | 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 实验1 | 3万 | 0.5487 | 0.9102 | 0.5945 | 0.4497 | 0.4864 | 0.5898 |
| 实验4 | 3万 | 0.5472 | 0.8941 | 0.5859 | 0.4687 | 0.4903 | 0.5778 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **3迭代、AP、彩色图** | | **？迭代、AP、灰度图** | |
| **tain** | **val** | **train** | **val** |
| **1** | autotruck | 666 | 128 | 91.8 | 62.0 | 93.1 | 60.9 |
| **2** | forklift | 576 | 152 | 95.1 | 54.4 | 93.8 | 55.8 |
| **3** | digger | 783 | 200 | 94.0 | 72.6 | 94.0 | 70.3 |
| **4** | car | 437 | 84 | 92.6 | 49.3 | 92.4 | 50.3 |
| **5** | bus | 61 | 10 | 91.9 | 54.2 | 91.4 | 53.8 |
| **6** | tanker | 48 | 17 | 95.6 | 51.0 | 97.5 | 54.6 |
| **7** | person | 721 | 187 | 88.8 | 40.7 | 89.1 | 37.4 |

### 结论

1920\*1080的输入，回归分类前的卷积层数为3时，且weight\_decay为0.001时，效果最好。

输入图像为彩色图或灰度图，AP基本没啥变化，但是灰度图的AP50、AP75都有所下降。

## resnet101与resnet50实验对比

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **参数** | **训练集 (812)** | | **验证集 (202)** | | **备注** |
| **AP** | **AP50** | **AP** | **AP50** |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 (**默认的**) **resnet101** | 0.8785 | 0.9980 | 0.5714 | 0.9246 | [实验3](#_实验3:_freeze2、NUM_CONVS4、model_final)  5万次  ys  train |
| freeze2、NUM\_CONVS3、model\_final.pkl、p2-p7、（1080, 1920）、O4、S4、R6,weight\_decay:0.001  、8类 (**默认的**) **resnet50** | 0.9070 | 0.9985 | 0.5710 | 0.9119 | [实验3](#_实验3:_NUM_CONVS3、model_final50.pkl、p)  3.5万次  ys  train |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 实验 | 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| Resnet101实验3 | 5万 | 0.5714 | 0.9246 | 0.6328 | 0.4707 | 0.5364 | 0.6011 |
| Resnet50 实验3 | 3.5万 | 0.5710 | 0.9119 | 0.6538 | 0.4851 | 0.5380 | 0.6074 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （812图、3292**bbox**） | **验证集**  （202图、778**bbox**） | **Resnet101**  **5万迭代、AP** | | **Resnet50**  **3.5万迭代、AP** | |
| **tain** | **val** | **train** | **Val** |
| **1** | autotruck | 666 | 128 | 87.3 | 64.4 | 89.0 | 62.1 |
| **2** | forklift | 576 | 152 | 85.0 | 53.8 | 90.0 | 57.9 |
| **3** | digger | 783 | 200 | 88.5 | 73.9 | 90.9 | 74.7 |
| **4** | car | 437 | 84 | 87.0 | 51.9 | 90.3 | 51.8 |
| **5** | bus | 61 | 10 | 88.6 | 56.9 | 89.8 | 59.0 |
| **6** | tanker | 48 | 17 | 93.7 | 57.2 | 97.3 | 55.1 |
| **7** | person | 721 | 187 | 84.8 | 41.9 | 87.6 | 39.1 |

### 结论

Res50虽然将图片放大，小目标（小于32个像素）的AP略有提升，但是人的AP并没有提升。最终平均的AP相差不大。

# 8类、data(1374train、342val)

## 实验：resnet101

### 详细实验：

#### 实验1: freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6 – lg

**存放位置（214）：**/data/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**1374训练集，342验证集， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6G

**参数设置：**

**网络结构**：configs/illbuld/ retinanet\_X-101-64x4d-FPN\_p7\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4，

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0, 5.0, 0.5, 0.2),6个ratios；

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2。

BASE\_LR: 0.001

STEPS: [0, 50000]

WEIGHT\_DECAY: 0.0001

模型存储位置：output/oil/retinanet\_R-101-FPN\_p7\_2\_r6\_L\_ft文件夹中

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (1374) | | 验证集 (342) | |
| AP | AP50 | AP | AP50 |
| 1万次 | 0.05471 | 0.776 | 0.994 | 0.56 | 0.89 |
| 1.5万次 | 0.03680 | 0.8353 | 0.997 | 0.565 | 0.89 |
| 2万次 | 0.02442 | 0.838 | 0.997 | 0.56 | 0.88 |
| 2.5万次 | 0.01019 | 0.89 | 0.998 | 0.566 | 0.89 |
| 3万次 | 0.01086 | 0.9138 | 0.999 | 0.56 | 0.89 |
| 3.5万次 | 0.00784 | 0.93 | 0.999 | 0.55 | 0.89 |
| 4万次 | 0.00346 | 0.94 | 0.999 | 0.558 | 0.89 |
| 4.5万次 | 0.00893 | 0.918 | 0.998 | 0.555 | 0.889 |
| 5万次 | 0.02011 | 0.8541 | 0..996 | 0.555 | 0.878 |
| 5.5万次 | 0.00723 | 0.9 | 0.998 | 0.56 | 0.89 |
| 6万次 | 0.00981 | 0.91 | 0.998 | 0.56 | 0.89 |
| 10万次 | 0.00304 |  |  | 0.558 | 0.889 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 2.5万 | 0.566 | 0.89 | 0.64 | 0.135 | 0.53 | 0.646 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **2.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 89.7 | 61.3 |
| **2** | forklift | 812 | 218 | 85.2 | 58.1 |
| **3** | digger | 957 | 264 | 88.0 | 71.3 |
| **4** | car | 826 | 240 | 90.5 | 53.8 |
| **5** | bus | 112 | 23 | 91.5 | 51.4 |
| **6** | tanker | 105 | 26 | 92.9 | 55.3 |
| **7** | person | 1086 | 204 | 86.7 | 45.1 |

**以下是输入为灰度图的测试结果：**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (1374) | | 验证集 (342) | |
| AP | AP50 | AP | AP50 |
| 1万次 |  | 0.7690 | 0.9929 | 0.5415 | 0.8670 |
| 1.5万次 |  | 0.8227 | 0.9942 | 0.5555 | 0.8805 |
| 2万次 |  | 0.7865 | 0.9947 | 0.5279 | .8529 |
| 2.5万次 |  | 0.8869 | 0.9980 | 0.5455 | 0.8715 |
| 3万次 |  | 0.8957 | 0.9994 | 0.5419 | 0.8765 |
| 3.5万次 |  | 0.9226 | 0.9978 | 0.5349 | 0.8714 |
| 4万次 |  | 0.9417 | 0.9994 | 0.5378 | 0.8780 |
| 4.5万次 |  | 0.9487 | 0.9997 | 0.5325 | 0.8719 |
| 5万次 |  | 0.9572 | 0.9995 | 0.5302 | 0.8704 |
| 5.5万次 |  | 0.9662 | 0.9996 | 0.5319 | 0.8718 |
| 6万次 |  |  |  |  |  |
| 10万次 |  |  |  |  |  |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 1.5万 | 0.5555 | 0.8805 | 0.5993 | 0.1925 | 0.5155 | 0.6372 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **1.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 84.0 | 59.7 |
| **2** | forklift | 812 | 218 | 78.1 | 56.6 |
| **3** | digger | 957 | 264 | 84.2 | 70.6 |
| **4** | car | 826 | 240 | 82.7 | 52.0 |
| **5** | bus | 112 | 23 | 83.2 | 49.5 |
| **6** | tanker | 105 | 26 | 87.1 | 59.3 |
| **7** | person | 1086 | 204 | 76.4 | 41.2 |

#### 实验2: freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900,1536）、O4、S4、R6、WEIGHT\_DECAY 0.001– zj

**存放位置（100）：**/home/zhangjing/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**1374训练集，342验证集， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：6.9G + 6.9G

**参数设置：**

**网络结构**：configs/12\_2017\_baselines/ retinanet\_R-101-FPN\_1x.yaml

**预训练模型：**model\_final.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 7，RPN\_MIN\_LEVEL为

2，COARSEST\_STRIDE为128； RETINANET中 SCALES\_PER\_OCTAVE为 4

ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

**图片大小**：配置为900，1536，2个GPU，batchsize总共为2。

WEIGHT\_DECAY: 0.001

BASE\_LR: 0.001 #0.1

STEPS: [0, 50000, 100000, 150000]

**模型存储位置**：output/oil/ retinanet\_R-101-FPN\_P7\_2\_R6\_S4\_O4\_Conv4\_fre2\_ft\_my\_newData0.001文件夹中

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (1374) | | 验证集 (342) | |
| AP | AP50 | AP | AP50 |
| 1万次 | 0.052880 | 0.7614 | 0.9912 | 0.5544 | 0.8961 |
| 2万次 | 0.037545 | 0.7980 | 0.9929 | 0.5362 | 0.8591 |
| 2.5万次 | 0.029785 | 0.8333 | 0.9965 | 0.5639 | 0.8890 |
| 3万次 | 0.029785 | 0.8518 | 0.9980 | 0.5648 | 0.8995 |
| 4万次 | 0.036011 | 0.8141 | 0.9965 | 0.5374 | 0.8808 |
| 5万次 | 0.018164 | 0.8678 | 0.9993 | 0.5550 | 0.8963 |
| 6万次 | 0.011427 | 0.9060 | 0.9996 | 0.5526 | 0.8928 |
| 7万次 | 0.007230 | 0.9092 | 0.9996 | 0.5498 | 0.8888 |
| 10万次 | 0.005165 | 0.9213 | 0.9996 | 0.5403 | 0.8826 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 3万 | 0.5648 | 0.8995 | 0.6356 | 0.3117 | 0.5349 | 0.6472 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **3万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 85.7 | 59.9 |
| **2** | forklift | 812 | 218 | 80.9 | 58.1 |
| **3** | digger | 957 | 264 | 84.6 | 71.1 |
| **4** | car | 826 | 240 | 86.3 | 53.2 |
| **5** | bus | 112 | 23 | 87.7 | 52.2 |
| **6** | tanker | 105 | 26 | 88.2 | 55.9 |
| **7** | person | 1086 | 204 | 82.9 | 45.0 |

**以下是输入为灰度图的测试结果：**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 (1374) | | 验证集 (342) | |
| AP | AP50 | AP | AP50 |
| 1万次 |  | 0.7617 | 0.9910 | 0.5541 | 0.8868 |
| 1.5万次 |  | 0.8053 | 0.9970 | 0.5553 | 0.8829 |
| 2万次 |  | 0.8100 | 0.9985 | 0.5473 | 0.8802 |
| 2.5万次 |  | 0.8461 | 0.9981 | 0.5563 | 0.8845 |
| 3万次 |  | 0.8371 | 0.9970 | 0.5376 | 0.8789 |
| 3.5万次 |  | 0.8290 | 0.9962 | 0.5368 | 0.8788 |
| 4万次 |  | 0.8567 | 0.9989 | 0.5391 | 0.8640 |
| 4.5万次 |  | 0.6328 | 0.9021 | 0.4087 | 0.7275 |
| 5万次 |  | 0.8529 | 0.9985 | 0.5349 | 0.8750 |
| 5.5万次 |  | 0.8921 | 0.9992 | 0.5444 | 0.8765 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 2.5万 | 0.5563 | 0.8845 | 0.6204 | 0.1264 | 0.5278 | 0.6373 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **2.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 85.2 | 60.3 |
| **2** | forklift | 812 | 218 | 80.3 | 57.0 |
| **3** | digger | 957 | 264 | 85.1 | 70.8 |
| **4** | car | 826 | 240 | 85.7 | 52.4 |
| **5** | bus | 112 | 23 | 87.8 | 48.5 |
| **6** | tanker | 105 | 26 | 88.0 | 61.0 |
| **7** | person | 1086 | 204 | 80.2 | 39.4 |

#### 实验3: NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080,1920）、freeze2、O4、S4、R6、WEIGHT\_DECAY 0.001 –ys

**存放位置（214）：**/home/yushan/Detectron

**容器：**detectron\_gpu

**镜像：**/home/tar/detectron\_gpu.tar

**训练图片：**1374训练集，342验证集， (8:2，1920\*1080h)；

**类别**：1+7：[autotruck、forklift、digger、car、bus、tanker、person]

**GPU内存**：7.4G + 7.4G

**参数设置：**

**网络结构**：configs/oil /retinanet\_R-50-FPN\_p6\_2\_r6\_L\_ft.yaml

**预训练模型：**model\_final50.pkl

FPN中 MULTILEVEL\_RPN为 True，并且RPN\_MAX\_LEVEL为 6，RPN\_MIN\_LEVEL为 2，COARSEST\_STRIDE为64；RETINANET中 SCALES\_PER\_OCTAVE为 4 ，ANCHOR\_SCALE为 4，ASPECT\_RATIOS为 (1.0, 2.0, 3.0,5.0,0.2,0.5),6个ratio;

BASE\_LR: 0.001

STEPS: [0, 30000, 60000, 90000]

**图片大小**：配置为1080，1920，2个GPU，batchsize总共为2。

模型存储位置：output/oil/ retinanet\_R-50-FPN\_p7\_2\_r6\_L\_ft\_decay\_moredata文件夹中

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 1374) | | 验证集 (342) | |
| AP | AP50 | AP | AP50 |
| 5千 | 0.1 | 0.6457 | 0.9732 | 0.5262 | 0.8797 |
| 1万 | 0.07 | 0.7492 | 0.9915 | 0.5657 | 0.8952 |
| 2万 | 0.03 | 0.8141 | 0.9947 | 0.5640 | 0.8910 |
| 3万 | 0.03 | 0.8241 | 0.9952 | 0.5657 | 0.8973 |
| 4万 | 0.02 | 0.8726 | 0.9985 | 0.5657 | 0.8958 |
| 5万 | 0.01 | 0.8828 | 0.9988 | 0.5650 | 0.8981 |
| 6万 | 0.01 | 0.8901 | 0.9990 | 0.5644 | 0.8972 |
| 7万 | 0.01 | 0.8915 | 0.9990 | 0.5628 | 0.8968 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 4万 | 0.5657 | 0.8958 | 0.6413 | 0.1442 | 0.5456 | 0.6383 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **4万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 87.9 | 60.0 |
| **2** | forklift | 812 | 218 | 84.3 | 57.7 |
| **3** | digger | 957 | 264 | 88.1 | 71.8 |
| **4** | car | 826 | 240 | 87.8 | 53.5 |
| **5** | bus | 112 | 23 | 88.5 | 47.5 |
| **6** | tanker | 105 | 26 | 91.5 | 60.2 |
| **7** | person | 1086 | 204 | 82.6 | 45.1 |

**以下是输入为灰度图的测试结果：**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 迭代次数 | Loss | 训练集 1374) | | 验证集 (342) | |
| AP | AP50 | AP | AP50 |
| 5千 |  | 0.6417 | 0.9657 | 0.5076 | 0.8492 |
| 1万 |  | 0.7402 | 0.9885 | 0.5257 | 0.8376 |
| 1.5万 |  | 0.7860 | 0.9949 | 0.5459 | 0.8754 |
| 2万 |  | 0.7251 | 0.9628 | 0.4852 | 0.7982 |
| 2.5万 |  | 0.8332 | 0.9988 | 0.5548 | 0.8740 |
| 3万 |  | 0.7993 | 0.9966 | 0.5469 | 0.8752 |
| 3.5万 |  | 0.8496 | 0.9976 | 0.5599 | 0.8779 |
| 4万 |  | 0.8590 | 0.9976 | 0.5547 | 0.8762 |
| 4.5万 |  | 0.8659 | 0.9979 | 0.5516 | 0.8674 |
| 5万 |  | 0.8711 | 0.9979 | 0.5519 | 0.8742 |
| 5.5万 |  | 0.8758 | 0.9977 | 0.5502 | 0.8752 |

**验证集**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 3.5万 | 0.5599 | 0.8779 | 0.6538 | 0.1290 | 0.5223 | 0.6406 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **3.5万迭代、AP** | |
| **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 85.5 | 58.6 |
| **2** | forklift | 812 | 218 | 81.8 | 59.0 |
| **3** | digger | 957 | 264 | 86.2 | 71.3 |
| **4** | car | 826 | 240 | 85.4 | 53.0 |
| **5** | bus | 112 | 23 | 87.3 | 47.4 |
| **6** | tanker | 105 | 26 | 89.5 | 57.9 |
| **7** | person | 1086 | 204 | 79.0 | 44.7 |

### 实验对比

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **参数** | **输入图片Gray/color** | **训练集 (812)** | | **验证集 (202)** | | **备注** |
| **AP** | **AP50** | **AP** | **AP50** |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 (**默认的**) 、WEIGHT\_DECAY 0.0001 | color | 0.89 | 0.998 | 0.566 | 0.89 | [实验1](#_实验1:_freeze2、NUM_CONVS4、model_final)  2.5万次  lg  train |
| gray | 0.8227 | 0.9942 | 0.5555 | 0.8805 | [实验1](#_实验1:_freeze2、NUM_CONVS4、model_final)  1.5万次  lg  train |
| freeze2、NUM\_CONVS4、model\_final.pkl、p2-p7、（900, 1536）、O4、S4、R6  、8类 、WEIGHT\_DECAY 0.001 | color | 0.8518 | 0.9980 | 0.5648 | 0.8995 | [实验2](#_实验2:_freeze2、NUM_CONVS4、model_final)  3万次  zj  train |
| gray | 0.8461 | 0.9981 | 0.5563 | 0.8845 | [实验2](#_实验2:_freeze2、NUM_CONVS4、model_final)  2.5万次  zj  train |
| freeze2、NUM\_CONVS3、model\_final50.pkl、p2-p6、（1080, 1920）、O4、S4、R6、8类 | color | 0.8726 | 0.9985 | 0.5657 | 0.8958 | [实验3](#_实验3:_NUM_CONVS3、model_final50.pkl、p_1)  4万次  ys  train |
| gray | 0.8496 | 0.9976 | 0.5599 | 0.8779 | [实验3](#_实验3:_NUM_CONVS3、model_final50.pkl、p_1)  3.5万次  ys  train |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 实验 | **输入图片Gray/color** | 迭代次数 | AP | AP50 | AP75 | APs | APm | APl |
| 实验1 | color | 2.5万 | 0.566 | 0.89 | 0.64 | 0.135 | 0.53 | 0.646 |
| gray | 1.5万 | 0.5555 | 0.8805 | 0.5993 | 0.1925 | 0.5155 | 0.6372 |
| 实验2 | color | 3万 | 0.5648 | 0.8995 | 0.6356 | 0.3117 | 0.5349 | 0.6472 |
| gray | 2.5万 | 0.5563 | 0.8845 | 0.6204 | 0.1264 | 0.5278 | 0.6373 |
| 实验3 | color | 4万 | 0.5657 | 0.8958 | 0.6413 | 0.1442 | 0.5456 | 0.6383 |
| gray | 3.5万 | 0.5599 | 0.8779 | 0.6538 | 0.1290 | 0.5223 | 0.6406 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **索引** | **类别** | **训练集**  （1374图、5070**bbox**） | **验证集**  （342图、1244**bbox**） | **实验1、color、2.5万迭代、AP** | | **实验1、gray、3万迭代、AP** | | **实验2、color、3万迭代、AP** | | **实验2、gray、2.5万迭代、AP** | | **实验3、color、4万迭代、AP** | | **实验3、gray、3.5万迭代、AP** | |
| **train** | **val** | **train** | **val** | **train** | **val** | **train** | **val** | **train** | **val** | **tain** | **val** |
| **1** | autotruck | 1172 | 269 | 89.7 | 61.3 | 84.0 | 61.3 | 85.7 | 59.9 | 85.2 | 60.3 | 87.9 | 60.0 | 85.5 | 58.6 |
| **2** | forklift | 812 | 218 | 85.2 | 58.1 | 78.1 | 58.1 | 80.9 | 58.1 | 80.3 | 57.0 | 84.3 | 57.7 | 81.8 | 59.0 |
| **3** | digger | 957 | 264 | 88.0 | 71.3 | 84.2 | 71.3 | 84.6 | 71.1 | 85.1 | 70.8 | 88.1 | 71.8 | 86.2 | 71.3 |
| **4** | car | 826 | 240 | 90.5 | 53.8 | 82.7 | 53.8 | 86.3 | 53.2 | 85.7 | 52.4 | 87.8 | 53.5 | 85.4 | 53.0 |
| **5** | bus | 112 | 23 | 91.5 | 51.4 | 83.2 | 51.4 | 87.7 | 52.2 | 87.8 | 48.5 | 88.5 | 47.5 | 87.3 | 47.4 |
| **6** | tanker | 105 | 26 | 92.9 | 55.3 | 87.1 | 55.3 | 88.2 | 55.9 | 88.0 | 61.0 | 91.5 | 60.2 | 89.5 | 57.9 |
| **7** | person | 1086 | 204 | 86.7 | 45.1 | 76.4 | 45.1 | 82.9 | 45.0 | 80.2 | 39.4 | 82.6 | 45.1 | 79.0 | 44.7 |