# 行人重识别：PCB+RPP

# 提取部件信息的方法

- 1. 姿势估计模型

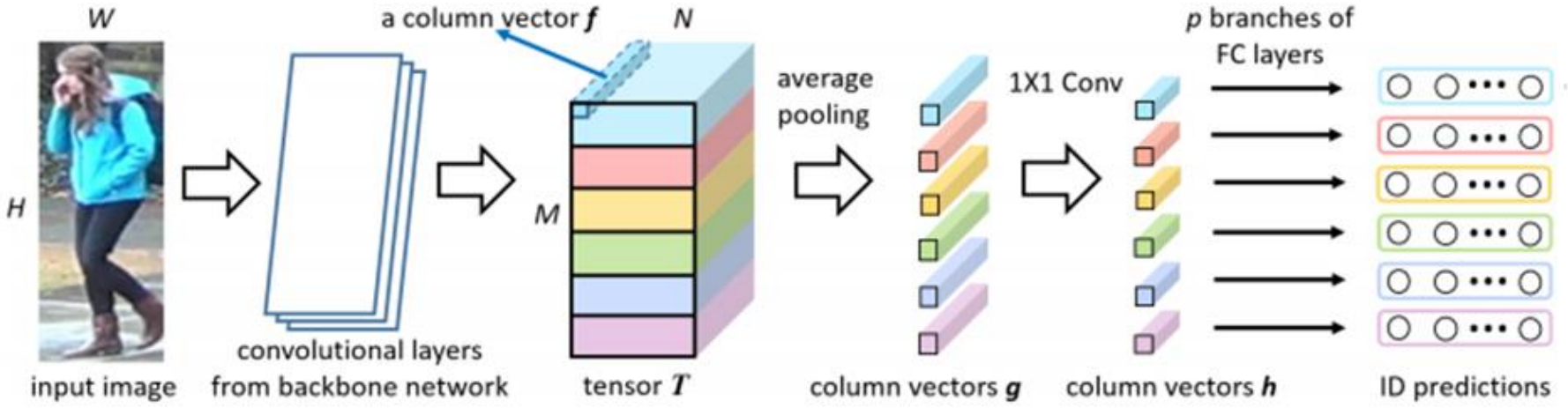
- 2. 统一分块

# 论文主要思路

- 1. Part-based Convolutional Baseline（PCB）
- 2. Refined Part Pooling（RPP）

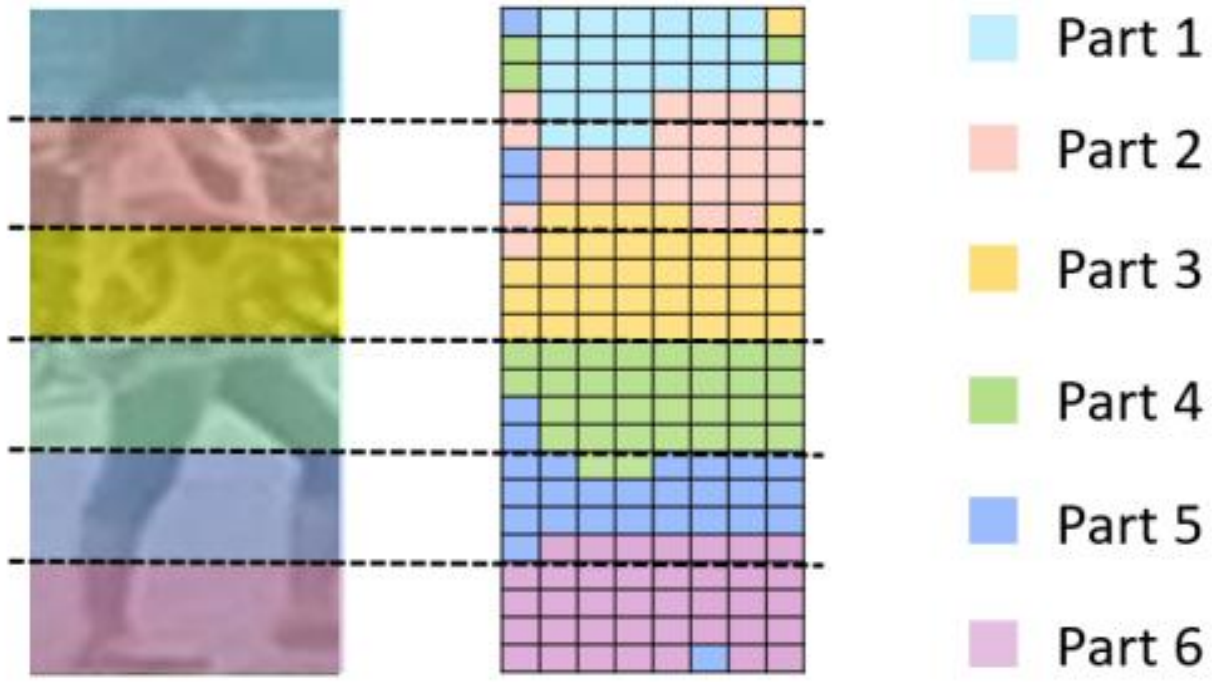
# PCB: A Part-based Convolutional Baseline

主干网络：ResNet50



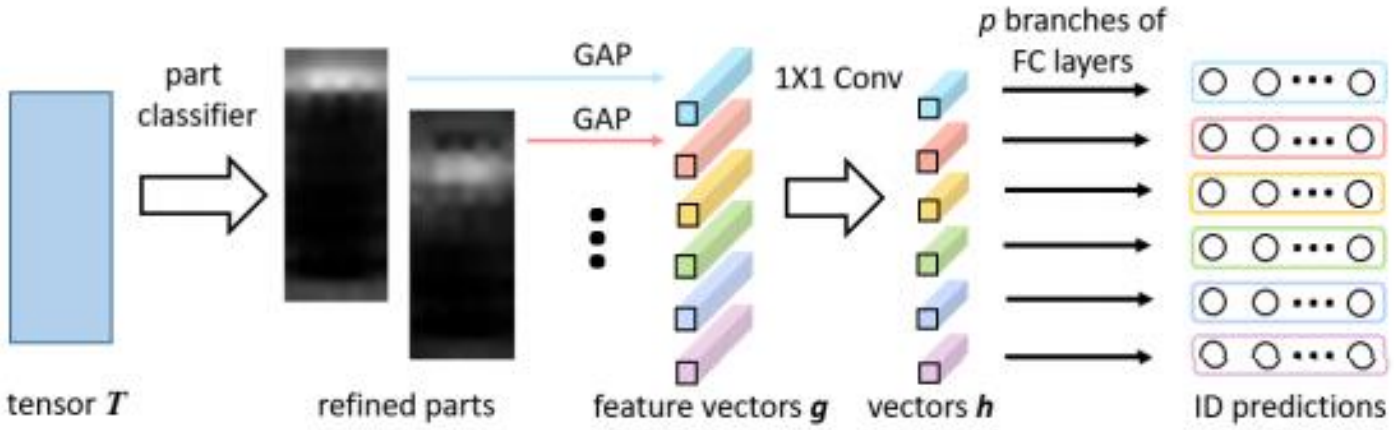

输入图片：384*128*3　　p=6　　T=(24*8*2048)　　g=(1*1*2048)　　h=(1*1*256)

# Within-Part Inconsistency



# RPP: Refined Part Pooling

$$P(P_i|f) = softmax(W_i^T f) = \frac{\exp(W_i^T f)}{\sum_{j=1}^{p} \exp(W_j^T f)}$$



# 训练步骤

**Algorithm 1:** Induced training for part classifier

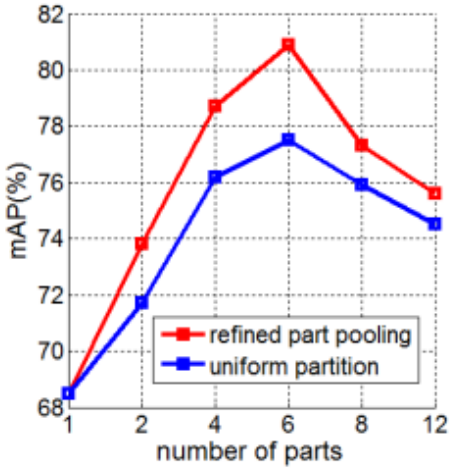
**Step 1.** A standard PCB is trained to convergence with uniform partition.

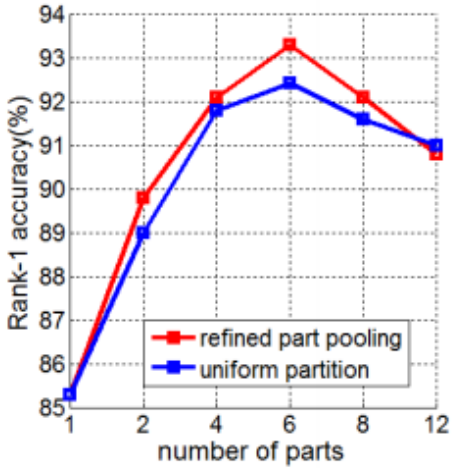
**Step 2.** A $p$-category part classifier is appended on the tensor $\boldsymbol{T}$.

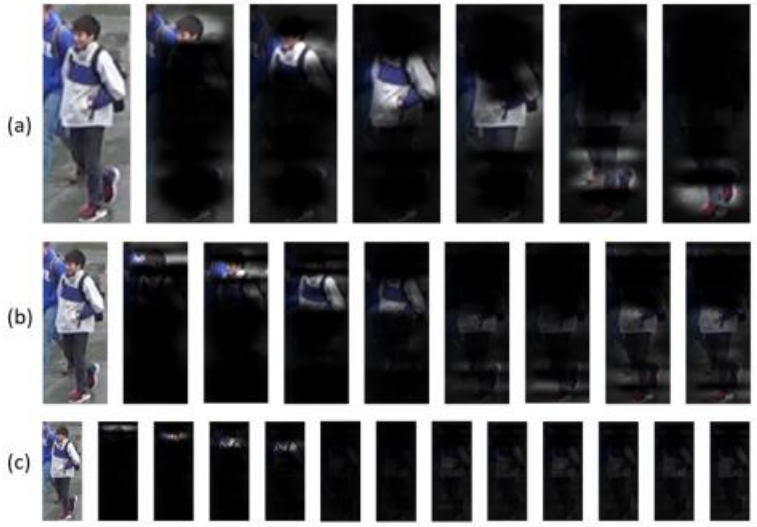
**Step 3.** All the pre-trained layers of PCB are fixed. Only the part classifier is trainable. The model is trained until convergence again.

**Step 4.** The whole net is fine-tuned to convergence for overall optimization.

# P的取值


mAP(%)
number of parts
refined part pooling
uniform partition


Rank-1 accuracy(%)
number of parts
refined part pooling
uniform partition


(a)
(b)
(c)

# 实验结果

| Models | Feature | dim | Market-1501 | | | | DukeMTMC-reID | | | | CUHK03 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R-1 | R-5 | R-10 | mAP | R-1 | R-5 | R-10 | mAP | R-1 | R-5 | R-10 | mAP |
| IDE | pool5 | 2048 | 85.3 | 94.0 | 96.3 | 68.5 | 73.2 | 84.0 | 87.6 | 52.8 | 43.8 | 62.7 | 71.2 | 38.9 |
| IDE | FC | 256 | 83.8 | 93.1 | 95.8 | 67.7 | 72.4 | 83.0 | 87.1 | 51.6 | 43.3 | 62.5 | 71.0 | 38.3 |
| Variant 1 | *G* | 12288 | 86.7 | 95.2 | 96.5 | 69.4 | 73.9 | 84.6 | 88.1 | 53.2 | 43.6 | 62.9 | 71.3 | 38.8 |
| Variant 1 | *H* | 1536 | 85.6 | 94.3 | 96.3 | 68.3 | 72.8 | 83.3 | 87.2 | 52.5 | 44.1 | 63.0 | 71.5 | 39.1 |
| Variant 2 | *G* | 12288 | 91.2 | 96.6 | 97.7 | 75.0 | 80.2 | 88.8 | 91.3 | 62.8 | 52.6 | 72.4 | 80.9 | 45.8 |
| Variant 2 | *H* | 1536 | 91.0 | 96.6 | 97.6 | 75.3 | 80.0 | 88.1 | 90.4 | 62.6 | 54.0 | 73.7 | 81.4 | 47.2 |
| PCB | *G* | 12288 | 92.3 | 97.2 | 98.2 | 77.4 | 81.7 | 89.7 | 91.9 | 66.1 | 59.7 | 77.7 | 85.2 | 53.2 |
| PCB | *H* | 1536 | 92.4 | 97.0 | 97.9 | 77.3 | 81.9 | 89.4 | 91.6 | 65.3 | 61.3 | 78.6 | 85.6 | 54.2 |
| PCB+RPP | *G* | 12288 | **93.3** | **97.4** | **98.2** | **80.9** | **82.9** | **90.3** | **92.3** | **68.1** | 62.8 | 79.8 | 86.8 | 56.7 |
| PCB+RPP | *H* | 1536 | 92.8 | 97.1 | 98.1 | 80.1 | 82.6 | 89.8 | 91.8 | 67.4 | **63.7** | **80.6** | **86.9** | **57.5** |

# 实验结果

| Methods | R-1 | R-5 | R-10 | mAP |
|---|---|---|---|---|
| BoW+kissme [39] | 44.4 | 63.9 | 72.2 | 20.8 |
| WARCA[16] | 45.2 | 68.1 | 76.0 | - |
| KLFDA[17] | 46.5 | 71.1 | 79.9 | - |
| SOMAnet[1] | 73.9 | - | - | 47.9 |
| SVDNet[28] | 82.3 | 92.3 | 95.2 | 62.1 |
| PAN[42] | 82.8 | - | - | 63.4 |
| Transfer [10] | 83.7 | - | - | 65.5 |
| Triplet Loss [14] | 84.9 | 94.2 | - | 69.1 |
| DML [36] | 87.7 | - | - | 68.8 |
| MultiRegion [30] | 66.4 | 85.0 | 90.2 | 41.2 |
| HydraPlus [22] | 76.9 | 91.3 | 94.5 | - |
| PAR [37] | 81.0 | 92.0 | 94.7 | 63.4 |
| MultiLoss [19] | 83.9 | - | - | 64.4 |
| PDC* [27] | 84.4 | 92.7 | 94.9 | 63.4 |
| PartLoss [35] | 88.2 | - | - | 69.3 |
| MultiScale [3] | 88.9 | - | - | 73.1 |
| GLAD* [31] | 89.9 | - | - | 73.9 |
| PCB | 92.3 | 97.2 | 98.2 | 77.4 |
| PCB+RPP | **93.3** | **97.4** | **98.2** | **80.9** |

| Methods | DukeMTMC-reID | | CUHK03 | |
|---|---|---|---|---|
| | rank-1 | mAP | rank-1 | mAP |
| BoW+kissme [39] | 25.1 | 12.2 | 6.4 | 6.4 |
| LOMO+XQDA [20] | 30.8 | 17.0 | 12.8 | 11.5 |
| GAN [43] | 67.7 | 47.1 | - | - |
| PAN [42] | 71.6 | 51.5 | 36.3 | 34.0 |
| SVDNet [28] | 76.7 | 56.8 | 41.5 | 37.3 |
| MultiScale [3] | 79.2 | 60.6 | 40.7 | 37.0 |
| TriNet+Era [45] | 73.0 | 56.6 | 55.5 | 50.7 |
| SVDNet+Era [45] | 79.3 | 62.4 | 48.7 | 43.5 |
| PCB (UP) | 81.8 | 66.1 | 61.3 | 54.2 |
| PCB (RPP) | **82.9** | **68.1** | **63.7** | **57.5** |

# 复现过程

代码地址：https://github.com/syfafterzy/PCB_RPP_for_reID

配置环境：python 2.7

pytorch 0.3+

数据集：~/datasets/Market-1501/(DukeMTMC-reID)

训练PCB： python PCB.py -d market -a resnet50 -b 64 -j 4 --epochs 60 --log logs/market-1501/PCB/ --combine-trainval --feature 256 --height 384 --width 128 --step-size 40 --data-dir datasets/Market-1501

训练RPP+PCB： python PCB.py -d market -a resnet50 -b 64 -j 4 --epochs 60 --log logs/market-1501/PCB/ --combine-trainval --feature 256 --height 384 --width 128 --step-size 40 --data-dir datasets/Market-1501

# 复现过程

```
(tensorflow_gpuenv) C:\Users\Jd\Desktop\PCB_RPP_for_reID-master>cd C:\Users\Jd\Anaconda3\Tools\scripts

(tensorflow_gpuenv) C:\Users\Jd\Anaconda3\Tools\scripts>python 2to3.py
At least one file or directory argument required.
Use --help to show usage.

(tensorflow_gpuenv) C:\Users\Jd\Anaconda3\Tools\scripts>_
```

Market-1501(epoch=60)

| | Rank-1 | mAP |
|---|---|---|
| PCB | 93.3% | 77.8% |
| PCB+RPP | 93.8% | 81.7% |