IVMSP-38.3

Paper ID: 1754

PROGRESSIVE-GRANULARITY RETRIEVAL VIA HIERARCHICAL FEATURE ALIGNMENT FOR PERSON RE-IDENTIFICATION

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Introduction of Person re-identification

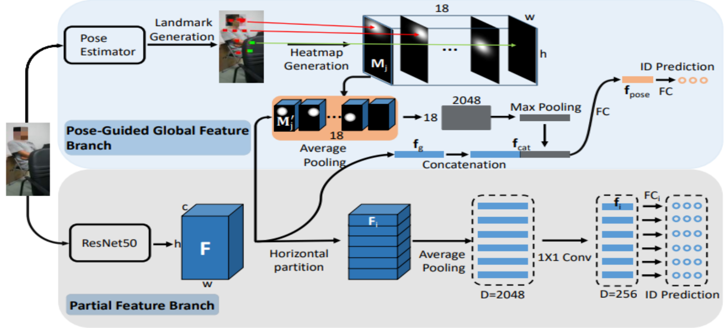
Gallery

Person re-identification (re-ID) aims at retrieving images of a specific person from a large database.

A key challenge: occlusions → feature misalignment

- Occlusions result in feature misalignment issue
- Occlusions bring additional noise

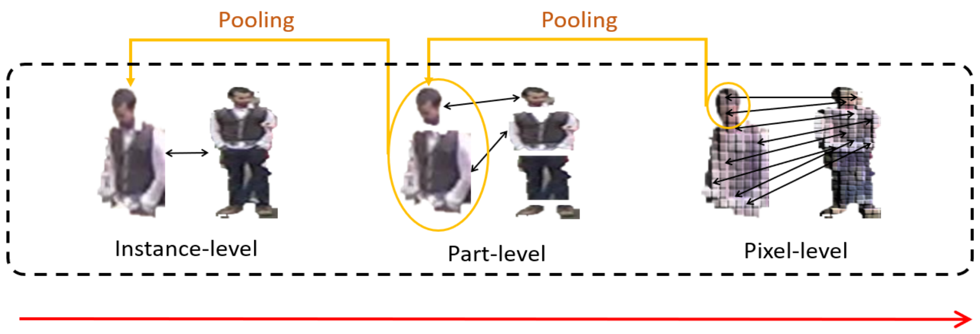
Previous arts: part matching via external model



Limitations:

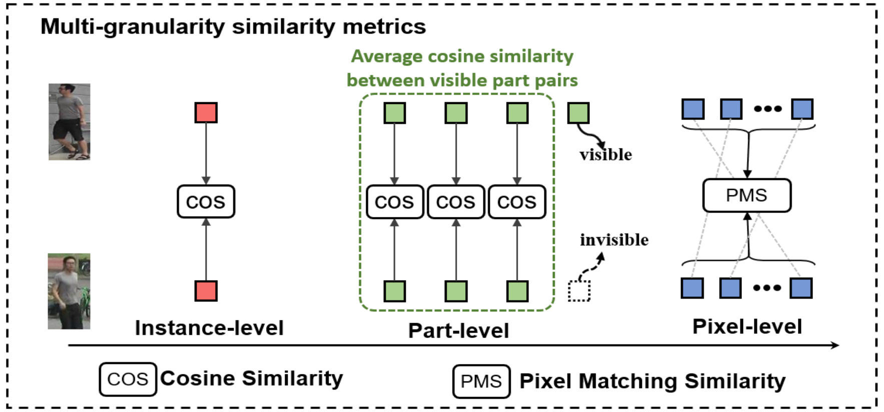
- It brings irretrievable errors when external models fail
- Part features are still coarse-grained. It may fail when a part itself is partially occluded.

Our method: extracting multi-granularity features



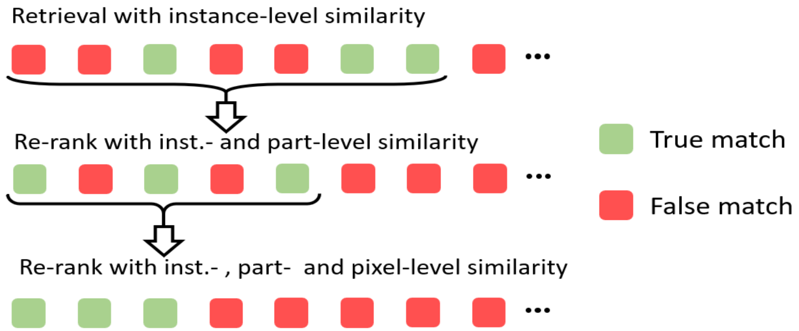
We extract instance-level, part-level and pixel-level features for an image. These features are inherently related but different in perceptual granularity. They can provide complementary information.

Our method: alignment-based similarity metric



For each type of feature, we propose an alignment-based similarity metric. The main idea is to consider the instance-level, part-level and pixel-level correspondences.

Our method: progressive-granularity retrieval



To efficiently utilize the complementary information from these features, we propose a progressive retrieval manner. We first use the instance similarity to rank the gallery. Then we gradually add the part- and pixel-level metric to re-rank the gallery and narrow it down.

Results

Table 1. Performance comparison on Occluded-Duke [4]

Methods	Backbone	Occluded-Duke R@1	Occluded-Duke mAP
PCB+RPP [8]	ResNet50	42.6	33.7
SFR [21]	ResNet50	42.3	32.0
PGFA [4]	ResNet50	51.4	37.3
HOReID [6]	ResNet50	55.1	43.8
PGR (Ours)	ResNet50	**62.8**	**50.1**
ISP [7]	HRNet-W32	62.8	52.3
PAT [22]	transformer	64.5	53.6
PGR (Ours)	HRNet-W32	**69.0**	**57.4**

Table 2. Performance comparison on holistic-body datasets: Market-1501 [16] and DukeMTMC-reID [17].

Methods	Backbone	Market-1501 R@1	Market-1501 mAP	Duke R@1	Duke mAP
PCB+RPP [8]	ResNet50	92.3	77.4	81.8	66.1
PGFA [4]	ResNet50	91.2	76.8	82.6	65.5
SSP-ReID [23]	ResNet50	92.5	75.8	81.8	68.9
HOReID [6]	ResNet50	94.2	84.9	86.9	75.6
PGR (Ours)	ResNet50	**94.8**	**85.3**	**87.1**	**76.5**
ISP [7]	HRNet-W32	95.3	88.6	89.6	80.0
PAT [22]	transformer	95.4	88.2	88.8	78.2
PGR (Ours)	HRNet-W32	**95.8**	**89.3**	**90.9**	**81.0**

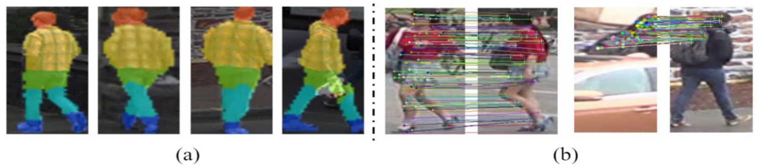


Fig. 4. Visualization of the hierarchical feature alignment. (a) the learned parts. (b) the mined pixel correspondences.

Acknowledgement: This work was supported by the state key development program in 14th Five-Year under Grant No. 2021YFF0602103, 2021YFF0602102, 2021QY1702. We also thank for the research fund under Grant No.2019GQG0001 from the Institute for Guo Qiang, Tsinghua University.