

Definition of person re-identification

CAM A











CAM A

Ranking list from CAM B



Challenges of person re-identification

Background

Pose

Occlusion

Light











Contributions

An efficient multi-scale context-aware network for fine-grained 1) pedestrian feature learning.

2) A latent part localization network to atomically localize pedestrian parts without explicitly human parts supervision.

3) An efficient pedestrian representation by fusing global full body and local body parts for pedestrian retrieval.

Learning Deep Context-aware Features over Body and Latent Parts for Person Re-identification Dangwei Li, Xiaotang Chen, Zhang Zhang, Kaiqi Huang

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Our method

1) Prior constraints of body part's center	4) Pr
$L_{cen} = \frac{1}{2} \max\{0, (t_x - C_x)^2 + (t_y - C_y)^2 - \alpha\}$	L_{loc}
2) Prior constraints on value range of scale	5) Id
$L_{pos} = \max\{0, \beta - s_x\} + \max\{0, \beta - s_y\}$	L_{cls}
3) Prior constraints of cropped body parts	6) Fin
$L_{in} = \frac{1}{2} \max\{0, s_x \pm t_x ^2 - \gamma\} + \frac{1}{2} \max\{0, s_y \pm t_y ^2 - \gamma\}$	L =

$$_{oc} = L_{cen} + \xi_1 L_{pos} + \xi_2 L_{in}$$

$$s = -\sum_{i=1}^{N} \log \frac{\exp(W_{y_i}^T x_i + b_{y_i})}{\sum_{j=1}^{C} \exp(W_j^T x_i + b_j)}$$

$$= L_{cls} + \lambda L_{loc}$$

Experimental results

Market-1501 Datas Rank Single queryR1mAP Evaluation metrics BOW + HS21.88 WARCA 37.21 PersonNet S-LSTM SCSP [2 CAN [25 DNS [47 Gate-SCNN Our-Part 75.45 52.41 83.43 62.03 Our-Body 80.31 57.53 86.79 66.70 **Our-Fusion**

MARS (Single query)

Query	Single query			
Evaluation metrics	1	5	20	mAP
CNN+Eulidean [52]	58.70	77.10	86.80	40.40
CNN+KISSME [52]	65.00	81.10	88.90	45.60
CNN+XQDA [52]	65.30	82.00	89.00	47.60
Our-Fusion+Eulidean	68.38	84.19	91.52	51.13
Our-Fusion+KISSME	69.24	85.15	92.17	53.00
Our-Part+XQDA	66.62	82.07	90.76	49.74
Our-Body+XQDA	68.23	83.99	92.17	51.82
Our-Fusion+XQDA	71.77	86.57	93.08	56.05

Query		Multiple query			
Evaluation metrics	1	5	20	mAP	
CNN+KISSME+MQ [52]	68.30	82.60	89.40	49.30	
Our-Fusion+Euclidean+MQ	78.28	91.97	96.87	61.62	
Our-Fusion+KISSME+MQ	80.51	93.18	97.22	63.50	
Our-Fusion+XQDA+MQ	83.03	93.69	97.63	66.43	

Visualization of original image, rigid parts, and learned latent body parts



Visualization of query image and its corresponding retrieval results (body, parts, fusion)



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CUHK03-labeled

Dataset	CUHK03 labeled			
Rank	1	5	10	20
FPNN [20]	20.65	51.50	66.50	80.00
IDLA [1]	54.74	86.50	93.88	98.10
XQDA [22]	52.20	82.23	92.14	96.25
MLAPG [23]	57.96	87.09	94.74	98.00
Ensemble [28]	62.10	89.10	94.80	98.10
SS-SVM [49]	57.00	85.70	94.30	97.80
DNS [47]	62.55	90.05	94.80	98.10
EDM [31]	61.32	88.90	96.44	99.94
DGD [39]	72.58	91.59	95.21	97.72
Our-Part	69.41	92.68	96.68	99.02
Our-Body	71.88	93.66	97.46	99.18
Our-Fusion	74.21	94.33	97.54	99.25

CUHK03-detected

Dataset	CUHK03 detected				
Rank	1	5	10	20	
FPNN [20]	19.89	50.00	64.00	78.50	
IDLA [1]	44.96	76.01	83.47	93.15	
XQDA [22]	46.25	78.90	88.55	94.25	
MLAPG [23]	51.15	83.55	92.05	96.90	
SS-SVM [49]	51.20	80.80	89.60	95.50	
SI-CI [36]	52.17	84.30	92.30	95.00	
DNS [47]	54.70	84.75	94.80	95.20	
S-LSTM [35]	57.30	80.10	88.30	-	
Gate-SCNN [34]	61.80	80.90	88.30	-	
EDM [31]	52.09	82.87	91.78	97.17	
Our-Part	62.74	88.53	93.97	97.21	
Our-Body	64.95	89.82	94.58	97.56	
Our-Fusion	67.99	91.04	95.36	97.83	

MARS (multiple query)

Cross-dataset ReID on VIPeR

Methods	Training Set	1	10	20	30
DTRSVM [26]	i-LIDS	8.26	31.39	44.83	53.88
DTRSVM [26]	PRID	10.90	28.20	37.69	44.87
DML [44]	CUHK Campus	16.17	45.82	57.56	64.24
Ours-Fusion	CUHK03 detected	17.30	44.58	55.51	61.77
Ours-Fusion	CHUK03 labeled	19.44	49.99	60.78	66.74
Ours-Fusion	MRAS	18.46	43.65	52.96	59.34
Ours-Fusion	Market1501	22.21	47.24	57.13	62.26

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