UNSUPERVISED DOMAIN ADAPTATION FOR PERSON RE-IDENTIFICATION THROUGH SOURCE-GUIDED PSEUDO-LABELING

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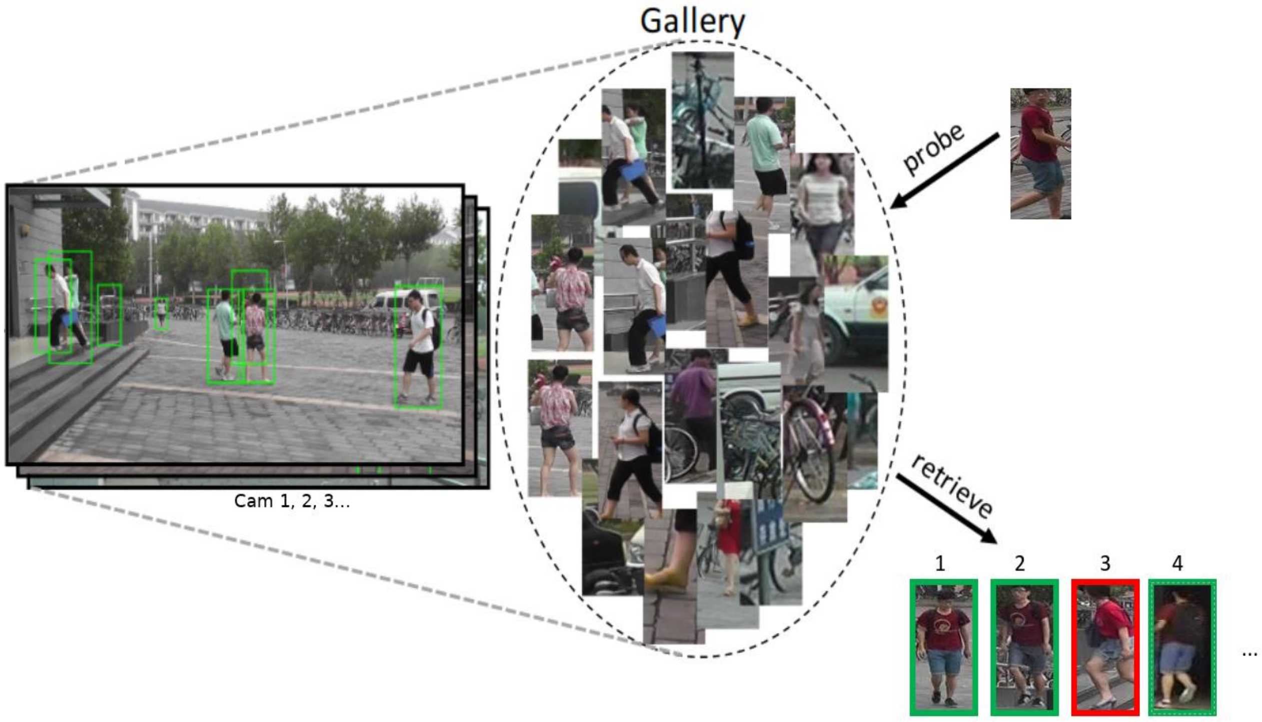
CONTEXT - PERSON RE-IDENTIFICATION : A RETRIEVAL TASK



- **Goal : identifying the same person across different non-overlapping cameras in a gallery of images [1]**

[1] Zheng, Liang, Yi Yang, and Alexander G. Hauptmann. "Person re-identification: Past, present and future." arXiv preprint arXiv:1610.02984 (2016).

CONTEXT - PERFORMANCE DROP FOR CROSS DOMAIN TESTING

Market-1501 dataset [2]

DukeMTMC-ReID dataset [3]

Train on \Test on (mAP %)	Market-1501 [2]	DukeMTMC-ReID [3]
Market-1501	78.2	11.9
DukeMTMC-ReID	19.1	65.4

Example of performance drops in the cross-domain setting compared to intra-domain performance.

[2] Zheng, Liang, et al. "Scalable person re-identification: A benchmark." *Proceedings of the IEEE international conference on computer vision*. 2015.

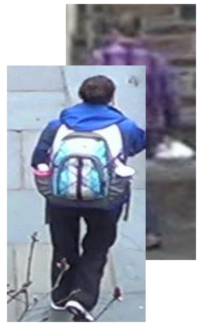
[3] Zheng, Zhedong, Liang Zheng, and Yi Yang. "Unlabeled samples generated by gan improve the person re-identification baseline in vitro." *Proceedings of the IEEE International Conference on Computer Vision*. 2017.

CONTEXT - UNSUPERVISED DOMAIN ADAPTATION (UDA)

ID 2

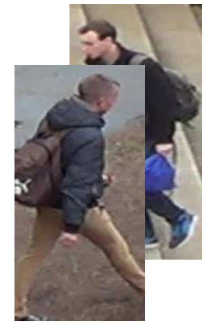
ID 1

Source training set (labeled)



Target training set (unlabeled)

TRAIN PHASE

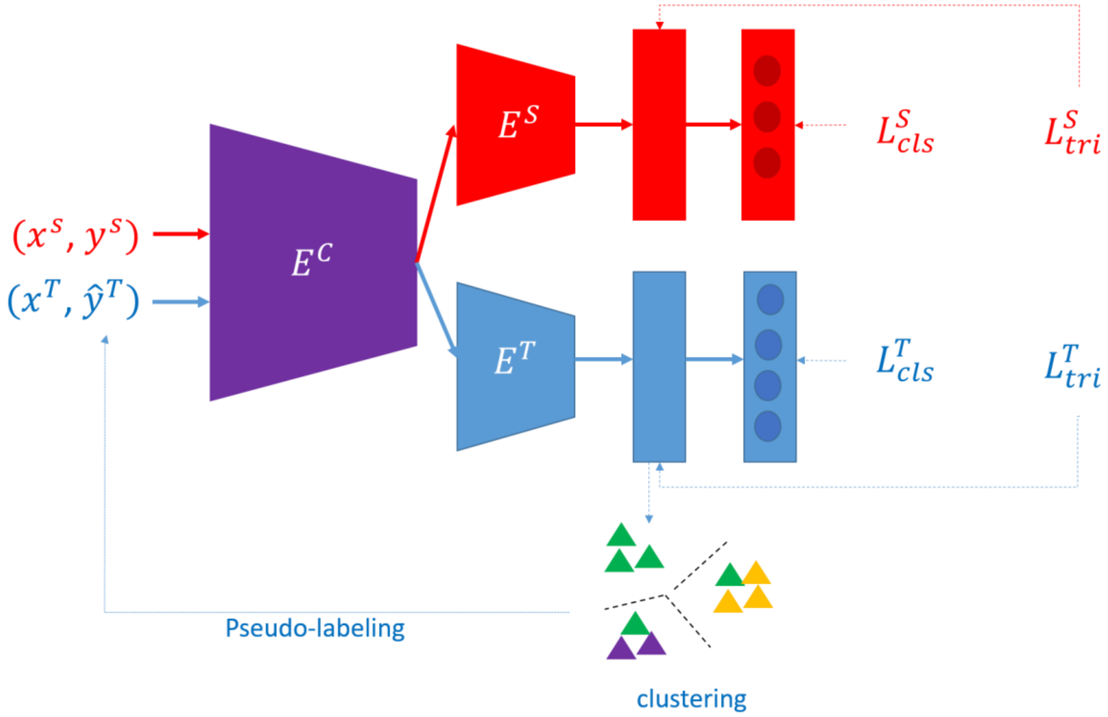


Target test set (labeled for eval)

TEST PHASE

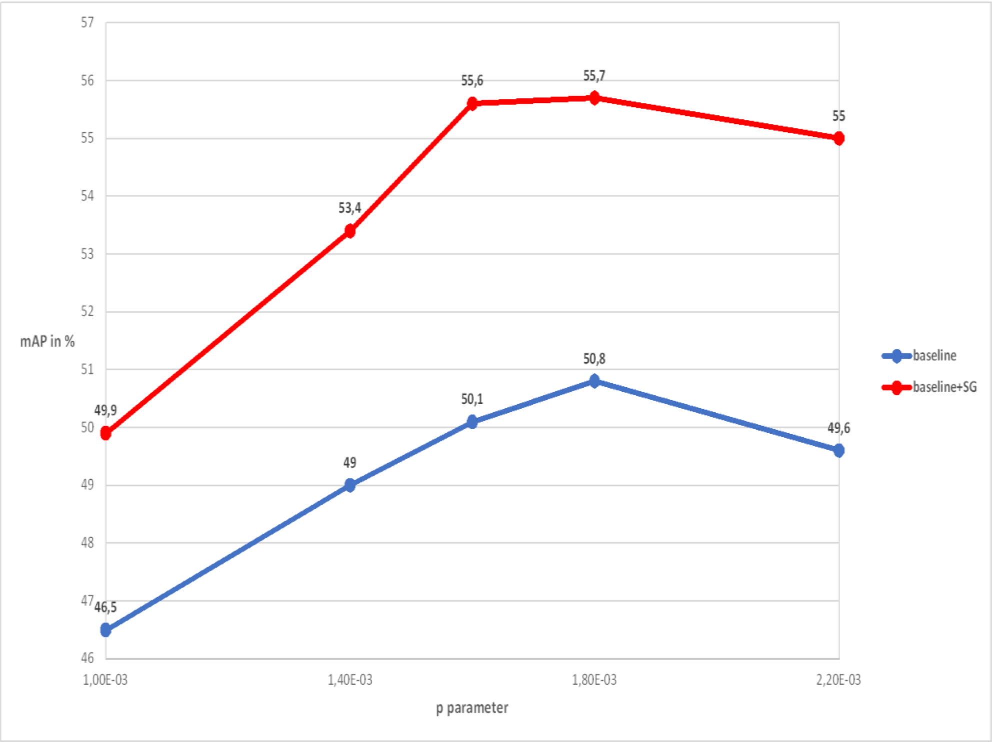
UDA goal: reaching the best perf on the target domain with labeled source domain samples and unlabeled target samples

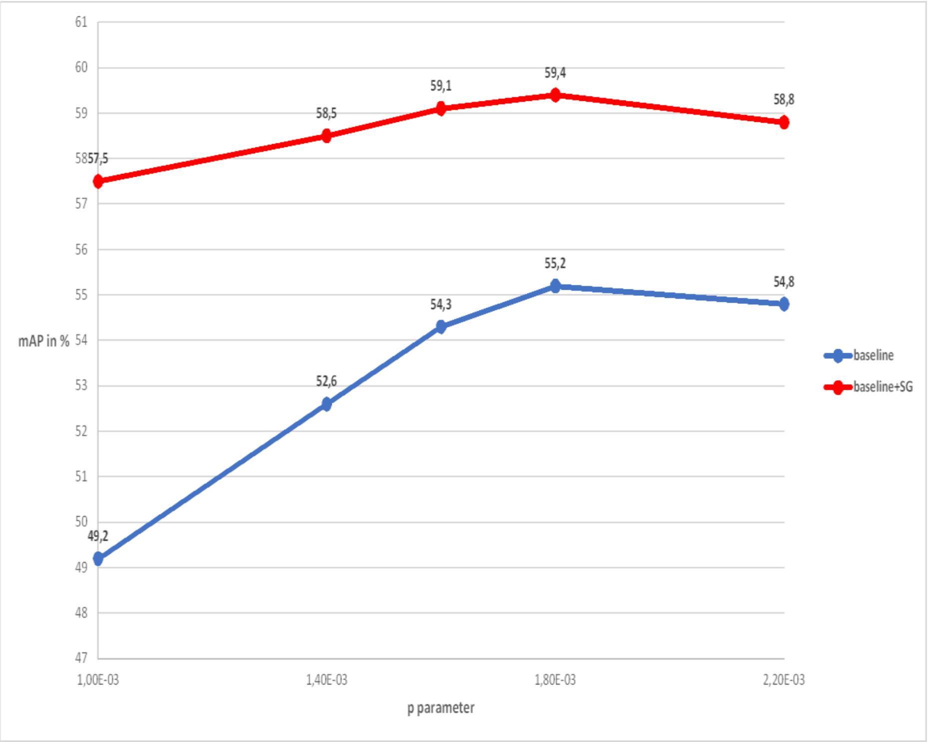
CONTRIBUTION - UNSUPERVISED DOMAIN ADAPTATION FOR PERSON RE-IDENTIFICATION THROUGH SOURCE-GUIDED PSEUDO-LABELING



- Keep learning re-ID features with source data => Source-guidance as a regularizer to reduce pseudo-label error overfitting
- 2 specialized branches => High-level domain-specific re-ID features that avoid source bias in target re-ID features
- Domain-specific batch normalization => Cope with domain discrepancy that degrades learning with batch norm

CONTRIBUTION - SOURCE-GUIDED VS TARGET ONLY PSEUDO-LABELING BASELINE





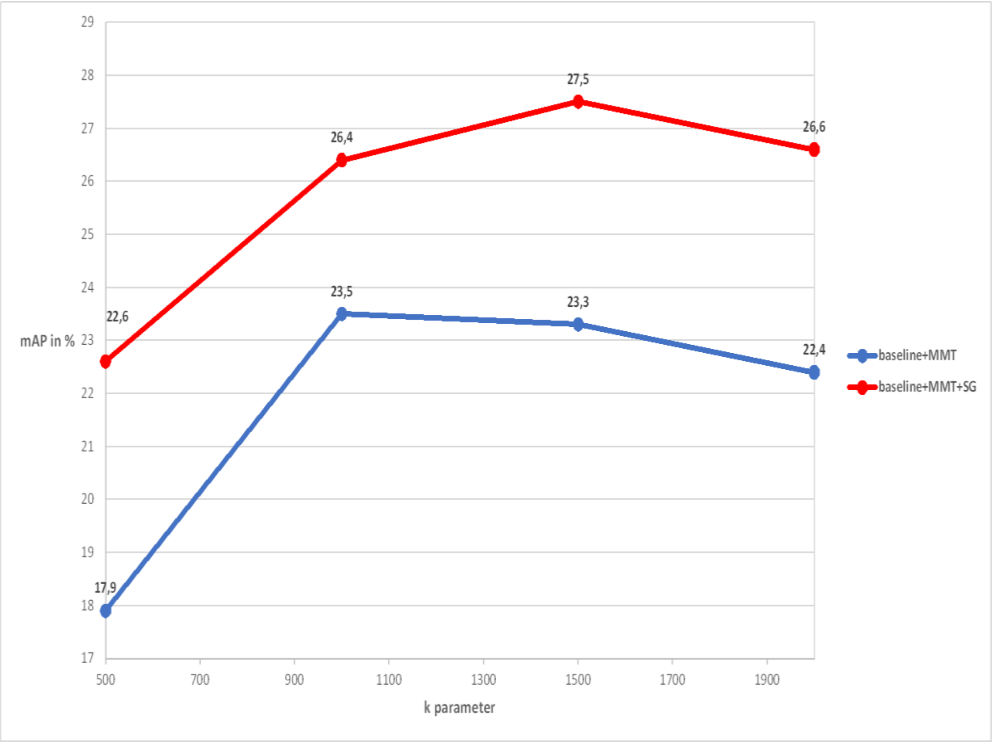
mAP in % for Maket to Duke

mAP in % for Duke to Market

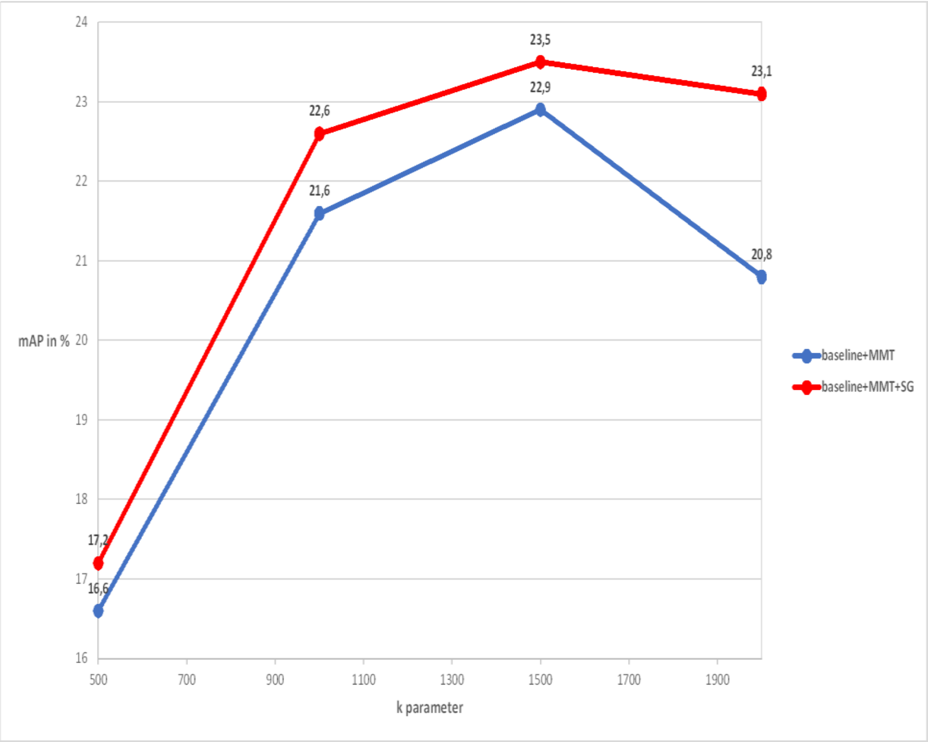
- **Improvement of performances by our Source-Guided (+SG) framework [4] for several clustering (DBSCAN) parameters**

[4] Song, Liangchen, et al. "Unsupervised domain adaptive re-identification: Theory and practice." *Pattern Recognition* 102 (2020): 107173.

CONTRIBUTION - SOURCE GUIDED VS TARGET ONLY MMT [5]



mAP in % for Duke to MSMT



mAP in % for Market to MSMT

- **Improvement of performances by our source-guided (+SG) Mutual Mean Teaching (+MMT) framework for several clustering (k-means) parameters**

[5] Ge, Yixiao, Dapeng Chen, and Hongsheng Li. "Mutual mean-teaching: Pseudo label refinery for unsupervised domain adaptation on person re-identification." arXiv preprint arXiv:2001.01526 (2020).

CONTRIBUTION - SOTA COMPARISON

COMPARISON WITH STATE-OF-THE-ART METHODS.

Methods	Market-to-Duke		Duke-to-Market	
	mAP	top-1	mAP	top-1
SPGAN [2]	22.3	41.1	22.8	51.5
TJ-AIDL [16]	23.0	44.3	26.5	58.2
MMFA [9]	24.7	45.3	38.3	66.2
HHL [23]	27.2	46.9	31.4	62.2
CFSM [1]	27.3	49.8	28.3	61.2
UCDA-CCE [12]	31.0	47.7	30.9	60.4
ARN [7]	33.4	60.2	39.4	70.3
ECN [24]	40.4	63.3	43.0	75.1
PoseDA-Net [8]	45.1	63.2	47.6	75.2
UDAP [14]	49.0	68.4	53.7	75.8
SSG [3]	53.4	73.0	58.3	80.0
ISSDA-re-ID [15]	54.1	72.8	63.1	81.3
PCB-PAST [21]	54.3	72.4	54.6	78.4
ACT [18]	54.5	72.4	60.6	80.5
MMT [4]	**65.1**	78.0	**71.2**	87.7
(target-only) baseline	50.1	70.1	54.3	73.5
baseline+SG	55.6	73.2	59.1	80.8
baseline+MMT+SG	64.8	**78.5**	70.5	**88.1**

Methods	Market-to-MSMT		Duke-to-MSMT	
	mAP	top-1	mAP	top-1
PTGAN [17]	2.9	10.2	3.3	11.8
ECN [12]	8.5	25.3	10.2	30.2
UDAP [14]	12.0	30.5	16.0	39.2
SSG [3]	13.2	49.6	13.3	32.2
MMT [4]	22.9	49.2	23.5	50.1
(target-only) baseline	11.6	29.8	14.8	36.1
baseline+SG	14.9	35.4	19.3	45.6
baseline+MMT+SG	**23.5**	**50.2**	**27.5**	**56.1**

- **Competitive performances on Market to Duke and Duke to Market**
- **+ 0,6% mAP on Market to MSMT and + 4% on Duke to MSMT**
- **SG interesting for hard adaptation tasks & pseudo-label methods without noise robusteness strategy**

CONTRIBUTION - CONCLUSION

- **Wisely leveraging the source domain in pseudo-label methods improves performances on the target domain**
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- **Thanks for your attention !**

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