Diversity-Authenticity Co-constrained Stylization for Federated Domain Generalization in Person Re-identification

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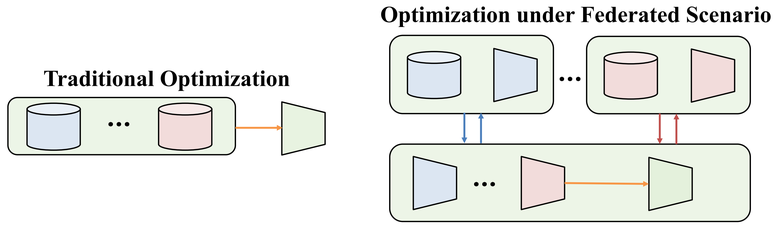
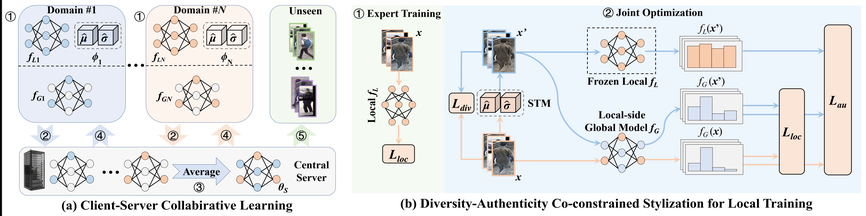
Problem Definition



Motivation: Training Generalized re-ID under Federated Constraint.

Approach: Improve Local Generalization by Local Data Stylization.

Framework



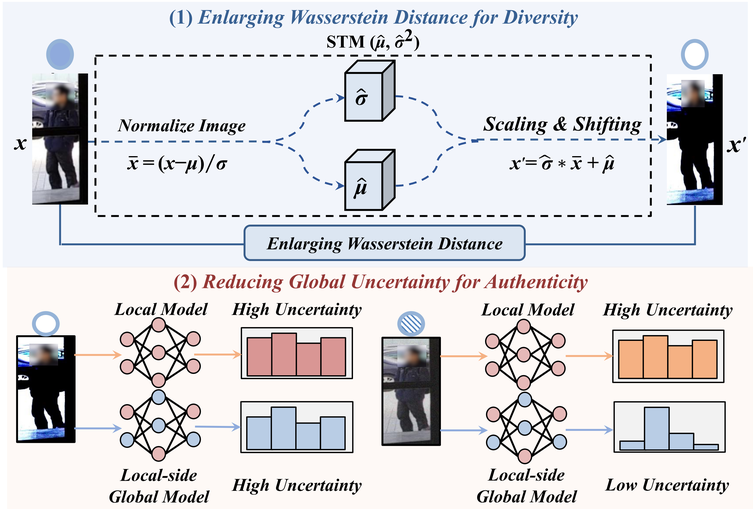
(a) Client-Server Collabirative Learning (b) Diversity-Authenticity Co-constrained Stylization for Local Training

Step1: Local Train with STM-augmented Data (see (b)).

Step2: Collaborative Learning under Federated Scenario (see (a)).

Our Solution & Contributions

- Most DG methods [1,2] cannot be applied to decentralized scenario.
- **Challenge**: Lack of information for image stylization.
- **Solution**: Improving local generalization with stylized data.

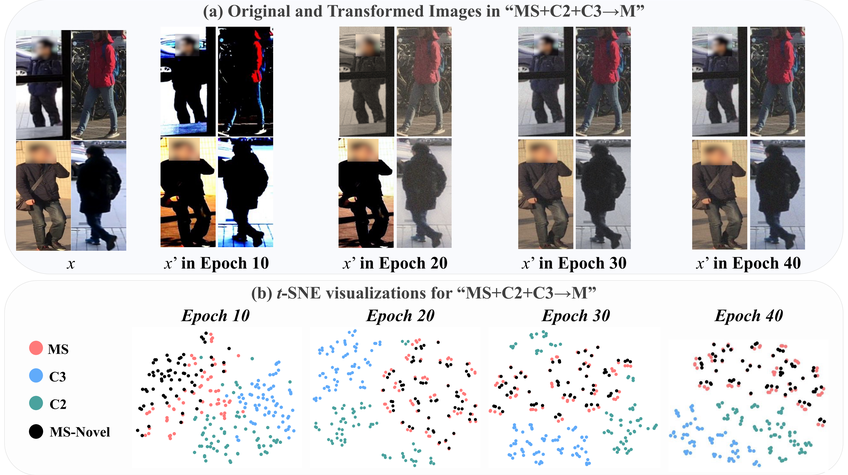


Contributions: $H(f_G(x)) < H(f_G(x')) < H(f_L(x'))$

(1) Style Transformation Module (Stylize Data with re-param trick [3]).

(2) Diversity-authenticity Co-constraint Stylization (Generate Useful Data).

Visualization



STM tends to generate diverse data at the beginning of optimization, but is liable to focus on data authenticity at the end of optimization.

Contact Us

If you have any problem, please send email to us (**yangfx@stu.xmu.edu.cn**) or ask in Github.

Scan the right QR code for code and other resources.

Experimental Results

Tab. 1. Comparison with SoTA

Methods	MS + C3 +C2 → M		C2 + C3 +M → MS		MS + C2 +M → C3	
	mAP	rank-1	mAP	rank-1	mAP	rank-1
Single Model (1)	23.3	47.5	2.7	8.8	18.0	18.5
Single Model (2)	13.2	31.1	1.7	6.0	21.6	22.5
Single Model (3)	18.9	41.2	3.3	10.0	10.2	11.2
MOON	26.8	51.1	4.8	14.5	20.9	22.5
SCAFFOLD	26.0	50.5	5.3	15.8	22.9	26.0
FedPav	25.4	49.4	5.2	15.5	22.5	24.3
FedReID	30.1	53.7	4.5	13.7	26.4	26.5
MixStyle	31.2	53.5	5.5	16.0	28.6	31.5
CrossStyle	32.5	59.6	4.6	14.0	27.8	28.0
SNR	32.7	59.4	5.1	15.3	28.5	30.0
Ours	**36.3**	**61.2**	**10.4**	**27.5**	**30.7**	**34.1**
SNR+Ours	**37.7**	**65.9**	**11.6**	**29.4**	**33.6**	**37.5**
Joint	32.2	58.6	5.6	16.3	29.5	29.0
FedPav (ViT)	37.4	62.6	14.6	33.7	23.7	25.0
CrossStyle (ViT)	41.4	65.8	17.9	40.8	31.0	38.4
Ours (ViT)	**45.4**	**70.7**	**20.3**	**44.2**	**36.6**	**42.1**

- **We compare four types of methods under federated learning and achieves SoTA performance.**
- **We also evaluate our method with different backbones (ResNet and ViT) to show its efficacy.**

Tab. 2. Ablation Study

Method	Attributes			MS+C2 +C3→M		MS+M +C2→C3	
	ϕ	L_{div}	L_{au}	mAP	rank-1	mAP	rank-1
Baseline	×	×	×	25.4	49.4	22.5	24.3
RS	✓	×	×	25.1	50.6	20.4	22.8
DC	✓	✓	×	31.9	57.1	29.1	30.0
AC	✓	×	✓	34.5	59.7	27.3	28.0
DACS	✓	✓	✓	**36.3**	**61.2**	**30.7**	**34.1**

- **Ablation study shows the efficacy of each component.**
- **Check more experiments in our paper !**

References

[1] Dai et al. eneralizable Person Re-identification with Relevance-aware Mixture of Experts. CVPR'21.
[2] Zhao et al. Learning to generalize unseen domains via memory-based multi-source meta-learning for person re-identification. CVPR'21.
[3] Kingma et al. Auto-encoding variational bayes. In ICLR 2014.