


Feature Alignment and Uniformity for Test Time Adaptation

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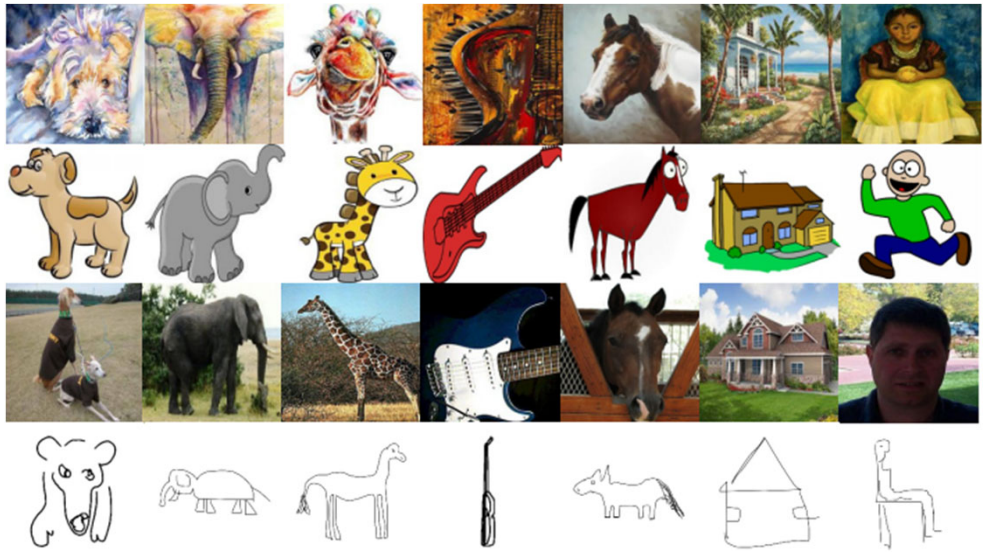
Presentation data: June 22, 2023
#Poster: 339
Tag: THU-AM-339

Highlight

- ✓ The challenging but practical problem: test time adaptation (TTA)
- ✓ A new perspective for TTA: feature alignment and uniformity
- ✓ Two complementary strategies: TSD and MSLC
- ✓ SOTA performance on multiple datasets

Domain Shift in Real World

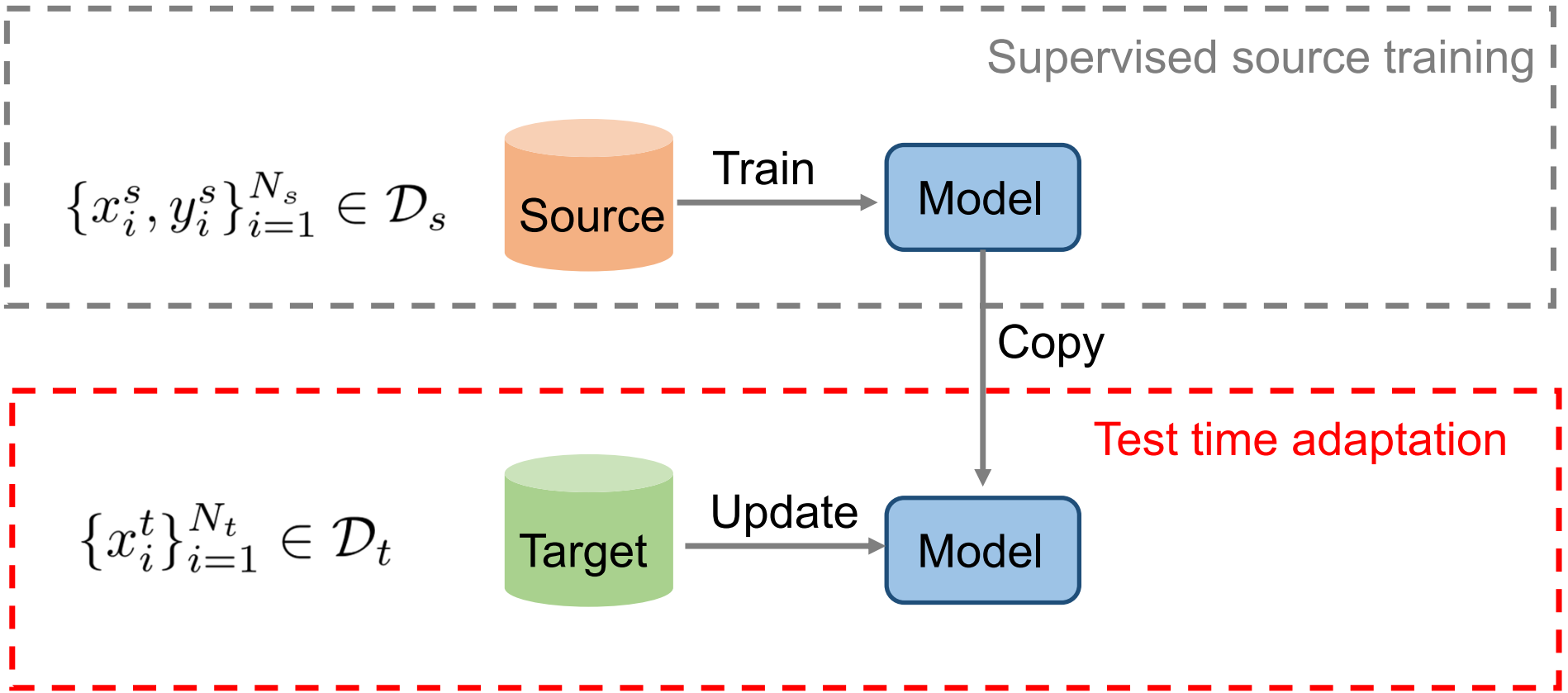


PACS [1]

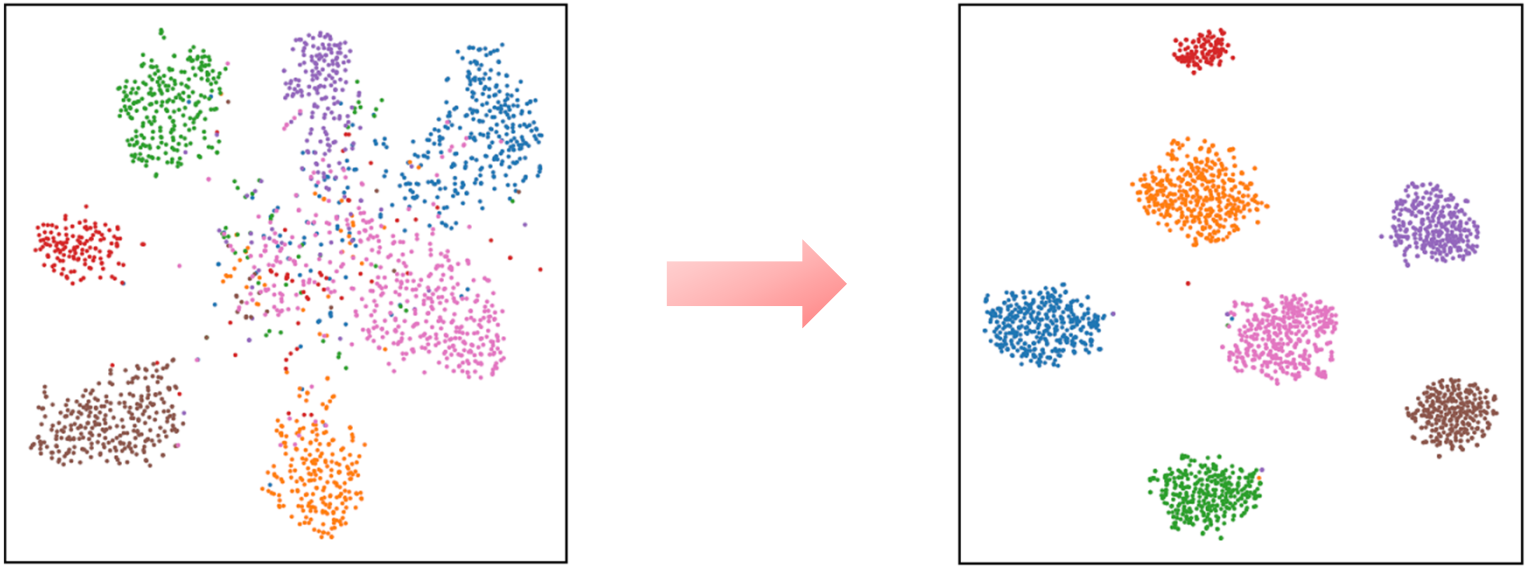
DomainNet [2]

[1] Yao et al. CVPR, 2022. [2] Peng et al. ICCV, 2019.

Test Time Adaptation



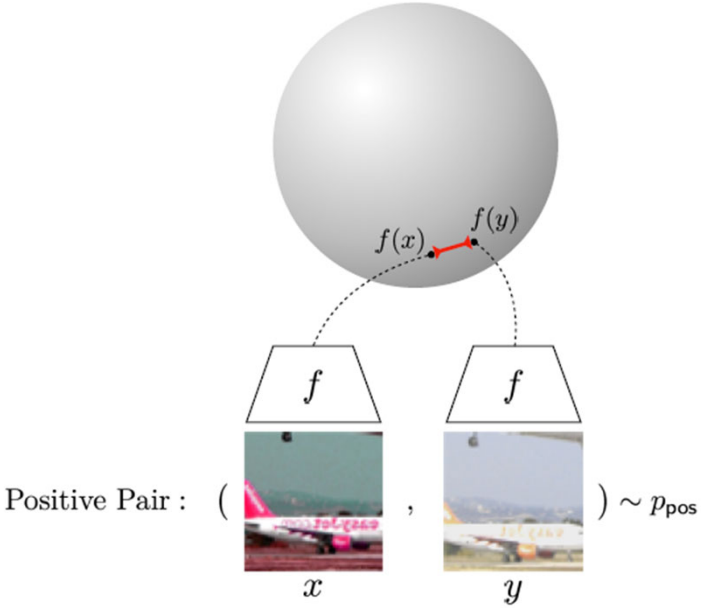
Revise Target Feature



ERM

Ours

Feature Alignment and Uniformity

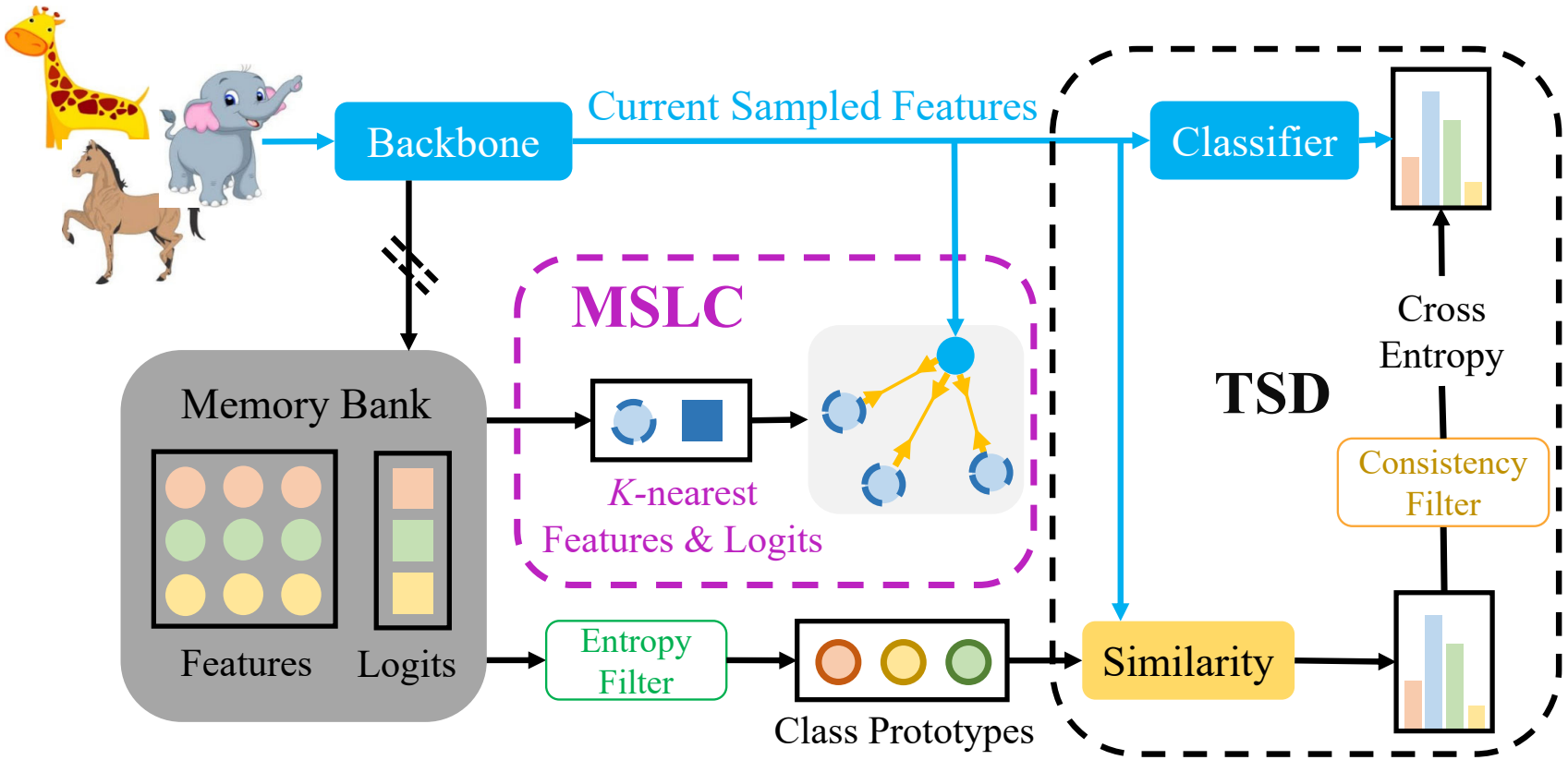


Alignment: Similar samples have similar features.

Uniformity: Preserve maximal information.

Wang et al. ICML, 2020.

Overview of Proposed Method



Test Time **S**elf-**D**istillation (TSD) for feature uniformity
Memorized **S**patial **L**ocal **C**lustering (MSLC) for feature alignment

Main Results

ResNet18

Method	PACS	OfficeHome	VLCS	DomainNet	Avg.
ERM [63]	82.07	63.12	72.75	38.95	64.22
BN [53]	82.82	62.30	64.31	37.80	61.81
Tent [66]	84.92	63.75	67.36	38.95	63.75
PL [30]	84.64	60.22	68.93	35.23	62.26
SHOT-IM [36]	82.55	63.42	64.90	39.50	62.59
T3A [22]	83.50	64.25	73.03	39.61	65.10
ETA [45]	82.70	62.46	64.35	39.43	62.24
LAME [5]	84.58	62.20	72.88	37.49	64.29
Ours	**87.32**	**64.83**	**73.61**	**40.19**	**66.49**

ResNet50

Method	PACS	OfficeHome	VLCS	DomainNet	Avg.
ERM [63]	84.59	67.37	74.01	45.20	67.74
BN [53]	85.03	66.10	64.78	43.38	64.82
Tent [66]	87.48	67.96	69.20	44.71	67.34
PL [30]	85.23	67.13	68.52	41.18	65.52
SHOT-IM [36]	85.50	67.39	65.23	46.30	66.11
T3A [22]	86.04	68.29	73.98	46.16	68.62
ETA [45]	85.04	66.21	64.79	46.13	65.54
LAME [5]	86.62	66.19	73.94	43.20	67.49
Ours	**89.41**	**68.67**	**74.52**	**47.73**	**70.08**

Results on different networks

Backbones	PACS	OfficeHome	VLCS
ResNet18 [17]	82.07	63.12	72.75
+Ours	**87.32**	**64.83**	**73.61**
ResNet50 [17]	84.59	67.37	74.01
+Ours	**89.41**	**68.67**	**74.52**
ResNeXt-50 [69]	86.67	72.66	78.50
+Ours	**91.33**	**74.18**	**79.38**
ViT-B/16 [11]	87.13	79.06	78.70
+Ours	**90.20**	**81.80**	**79.90**
EfficientNet-B4 [58]	85.11	74.65	77.14
+Ours	**85.41**	72.24	**79.42**
Mixer-L16 [59]	84.59	71.36	76.53
+Ours	**88.47**	**74.82**	**79.75**

Thanks for your attention

ArXiv

Code