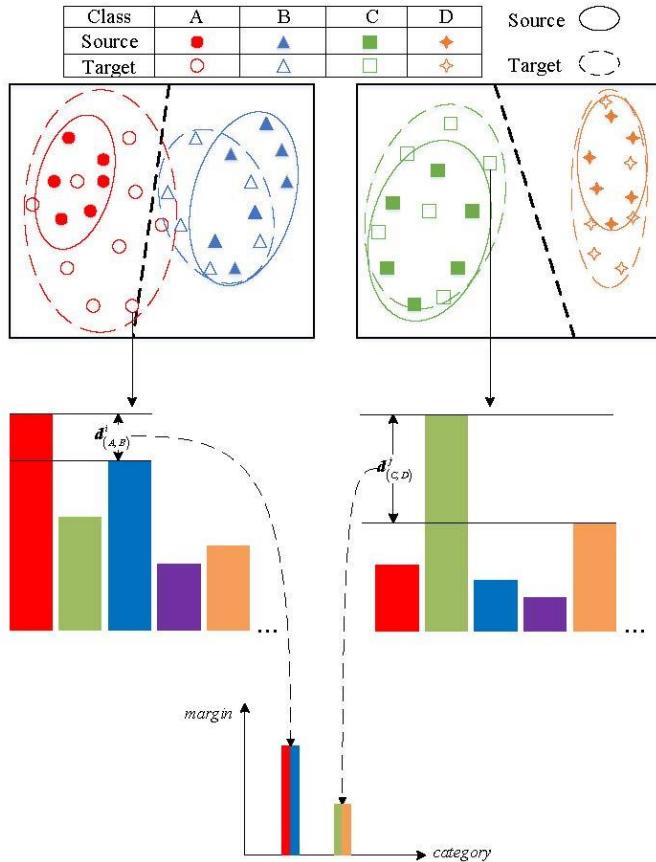


Metric Learning for Domain Adversarial Network

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Problems & Ideas



- Problems of the existing domain adaptation methods:

- to perform domain alignment between the source and target domain to alleviate the problem of domain shift.
- the effect of alignment does not ensure the discriminability, especially when the target data is relatively large compared with the source data.

- Ideas: entropy theory is used to identify the easy-confused classes in the target domain, and dynamically adjusting margin and domain alignment is combined to enhance the improvement.

• figure shows that the easily-confused classes A and B are scattered around the decision boundary while the classes C and D are farther away from the boundary. The gap of the multi-binary classifiers for classes A and B is less than the gap for classes C and D. Therefore, the higher margin should be allocated to the easily-confused classes A and B to further separate them.

Main Contributions

- Contributions:
 - In the scenario of unsupervised domain adaptation, the classification gap and associated boundary threshold for the multi-binary classifiers are proposed to identify the critical samples and easily-confused classes in the target domain;
 - metric learning for domain adversarial network (MLDAN) is proposed to dynamically adjust the margin between the positive pairs and negative pairs of the triplet loss in the source domain according to the boundary threshold. Finally, the easily-confused classes in the target domain can be separated indirectly via domain adversarial training.

Table 4. Accuracy (%) on Office-31 for unsupervised domain adaptation (ResNet-50).

Method	A→W	D→W	W→D	A→D	D→A	W→A	Avg
Resnet50	68.4	96.7	99.3	68.9	62.5	62.7	76.4
DAN	80.5	97.1	99.6	78.6	63.6	62.8	80.4
DANN	82	96.9	99.1	79.7	68.2	67.4	82.2
ADDA	86.2	96.2	98.4	77.8	69.5	68.9	82.8
JAN	85.4	97.4	99.8	84.7	68.6	70	84.3
MADA	90	97.4	99.6	87.8	70.3	66.4	85.2
MCD	89.6	98.5	100	91.3	69.6	70.8	86.6
CDAN	93.1	98.2	100	89.8	70.1	68	86.6
ML-DAN	93.64	99.05	100	94.56	72.18	71.19	88.44

Table 6. Accuracy (%) on ImageCLEF-DA for unsupervised domain adaptation (ResNet-50).

Method	I→P	P→I	I→C	C→I	C→P	P→C	Avg
Resnet50	74.8	83.9	91.5	78	65.5	91.2	80.8
DAN	74.5	82.2	92.8	86.3	69.2	89.8	82.5
DANN	75	86	96.2	87	74.3	91.5	85
JAN	76.8	88	94.7	89.5	74.2	91.7	85.8
MADA	75	87.9	96	88.8	75.2	92.2	85.9
CDAN	76.7	90.6	97	90.5	74.5	93.5	87.1
ML-DAN	79.17	92	96	91.33	76.67	94.33	88.25