Appendix for "Universal Semi-Supervised Domain Adaptation by Mitigating Common-Class Bias"

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Appendix

1. Experiment Details

We provide additional details on datasets used, experimental results and analysis.

1.1. Datasets

We pre-process the datasets according to the adaptation setting. For Office-Home and DomainNet-126 in the closed-set setting with no label distribution shift, we construct the dataset such that sample size per class is the same across domains. We sample the dataset by setting the class size as the minimum size of that class across all domains. For each domain, we randomly split the samples into 50% training, 20% validation and 30% testing. For the label distribution shift setting, we maintain the sample size of each split, but sample the datasets according to the original class distribution for each domain. For the label space shift settings, we remove classes from the source and/or target domains according to Table 1 in main manuscript. For DomainNet-345 and VisDA in the label shift settings, we directly use the data in [1] and split it into training, validation and testing sets.

1.2. Results

1.2.1 Method Effectiveness

We report detailed results of adaptation accuracy for each of the 12 source-target domain pairs in Office-Home and DomainNet-126 in Table 4 and 5, DomainNet-345 adapted with DINOv2 encoder in Table 6, and DomainNet-345 adapted with CLIP encoder in Table 7. With our prior-guided pseudo-labeling refinement strategy, the proposed method achieves the best performance on the vast majority of domain pairs across the adaptation settings tested. On the remaining domain pairs, it achieves the second-best performance in most cases.

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Method	Open-set (Common / Pvt)	Open-partial (Common / Pvt)	Open-set (Common / Pvt)	Open-partial (Common / Pvt)
	Office-Home		**DomainNet-126**	
S + T	72.6 / 43.7	75.0 / 52.6	66.2 / 40.4	69.8 / 47.0
CDAC	74.3 / 31.3	67.4 / 44.6	69.9 / 32.0	61.8 / 35.1
PAC	75.2 / 30.4	**80.6** / 40.8	69.4 / 31.4	73.2 / 40.8
AdaMatch	76.3 / 35.5	**80.6** / 46.5	70.4 / 33.5	**74.8** / 43.7
Proposed	**76.7** / **46.7**	79.2 / **54.8**	**72.4** / **48.5**	74.7 / **56.7**

Table 1. Average target accuracy on common and target private (Ptv) classes, trained with ResNet-34 backbone.

1.2.2 Private and Common Class Accuracy

The proposed method improves private class accuracy without having to sacrifice common class accuracy. We study adaptation accuracy on samples in common and target private classes separately in open-set and open-partial settings. In Table 1, while SSDA methods CDAC, PAC and AdaMatch can achieve performance gains over S+T on common classes, they suffer drastic performance degradation on private classes. For AdaMatch, accuracy on private classes can be lower than that on common classes by approximately 40% in open-set setting and 30% in open-partial setting. With the proposed method, although the performance gap between the two class groups still exists, it generally improves private class accuracy without sacrifing common class accuracy. In Table 2, we observe that the UniDA method UniOT achieves the highest common class accuracy in 5 out of 8 cases, but at the expense of private class accuracy. Comparing methods with similar common class accuracy, the proposed method improves private class accuracy in most cases.

1.2.3 Transductive Performance

In Table 3, we provide results on the transductive performance of the proposed method on Office-Home and DomainNet-126. Classification accuracy is measured on the unlabeled target samples used in training instead of the test set. The proposed method achieves the best overall trans-

Method	Open-set (Common / Pvt)	Open-partial (Common / Pvt)	Open-set (Common / Pvt)	Open-partial (Common / Pvt)
	DomainNet-345 (DINOv2)		**VisDA (DINOv2)**	
S + T	77.1 / 62.0	**77.8** / 63.8	85.6 / 60.8	87.8 / **64.2**
DANCE	77.2 / 60.0	77.6 / 62.1	80.9 / 53.1	87.1 / 62.5
UniOT	**78.6** / 50.8	77.4 / 52.8	**89.9** / 47.6	88.7 / 57.8
Proposed	76.4 / **63.8**	**77.8** / **66.1**	87.9 / **65.1**	**92.0** / 63.9
	DomainNet-345 (CLIP)		**VisDA (CLIP)**	
S + T	81.5 / 60.0	81.9 / 61.4	92.7 / 65.0	92.7 / **67.2**
DANCE	81.1 / 57.8	81.2 / 59.0	91.0 / 58.4	92.7 / 62.2
UniOT	**83.0** / 46.7	**82.3** / 48.7	**94.9** / 64.5	93.5 / 66.1
Proposed	81.2 / **64.0**	**82.3** / **66.0**	94.1 / **72.4**	**93.9** / 65.8

Table 2. Average target accuracy on common and target private (Ptv) classes, trained with frozen foundation model encoder and learnable classifier.

Method	Covariate Shift	Covariate + Label Shift				Overall
	Closed-set	Closed-set	Open-set	Partial-set	Open-partial	
			Office-Home			
CDAC	68.8 ±0.5	67.1 ±1.0	59.5 ±0.3	68.2 ±1.3	52.8 ±1.5	63.3
PAC	67.4 ±0.6	65.7 ±0.6	59.9 ±0.6	70.0 ±1.2	60.6 ±0.7	64.7
AdaMatch	67.3 ±1.0	66.2 ±0.6	62.2 ±0.3	72.4 ±0.7	63.7 ±0.5	66.4
Proposed	**71.6 ±1.0**	**70.1 ±1.0**	**65.0 ±1.0**	**76.5 ±2.0**	**66.1 ±1.4**	**69.9**
			DomainNet-126			
CDAC	70.8 ±0.2	66.1 ±0.1	52.8 ±0.9	73.4 ±0.4	44.3 ±1.3	61.5
PAC	69.7 ±0.3	64.9 ±0.4	52.0 ±0.2	78.0 ±0.1	51.6 ±0.3	63.2
AdaMatch	66.5 ±0.3	61.2 ±0.2	53.0 ±0.6	75.4 ±0.9	53.7 ±0.7	61.9
Proposed	**72.3 ±0.5**	**67.5 ±0.5**	**60.1 ±0.7**	**80.1 ±1.0**	**61.0 ±1.0**	**68.2**

Table 3. Transductive target accuracy averaged across 12 domain pairs for each dataset, trained with ResNet-34 backbone. Note S+T is excluded as it does not train with unlabeled target data.

ductive performance on both datasets. Interestingly, transductive accuracy is lower than inductive accuracy in some cases, e.g. all methods in Office-Home, as the models overfit wrong pseudo-labels to specific training examples.

References

[1] Bin Deng and Kui Jia. Universal domain adaptation from foundation models. *arXiv*, 2023. 1

S → T	Closed-set w/o Label Distribution Shift					Closed-set w/ Label Distribution Shift				
	S + T	CDAC	PAC	AdaMatch	Proposed	S + T	CDAC	PAC	AdaMatch	Proposed
A → C	60.3 ±0.7	62.2 ±1.0	64.0 ±2.4	62.8 ±1.0	**66.7 ±1.8**	55.6 ±1.2	**60.8 ±1.1**	57.9 ±1.0	59.4 ±1.1	60.3 ±0.6
A → P	73.2 ±0.8	76.3 ±1.6	75.0 ±0.5	76.3 ±0.5	**77.7 ±1.9**	72.9 ±1.1	74.1 ±0.2	71.9 ±0.8	75.4 ±0.6	**77.0 ±1.3**
A → R	74.4 ±1.2	75.1 ±1.0	73.0 ±0.5	75.2 ±0.3	**75.9 ±1.0**	74.9 ±0.7	74.3 ±0.6	71.3 ±2.1	74.4 ±0.7	**75.4 ±0.5**
C → A	58.4 ±0.7	62.0 ±0.7	58.1 ±1.4	61.4 ±1.9	**64.1 ±2.1**	56.5 ±0.5	59.4 ±3.2	54.7 ±1.8	59.0 ±0.9	**62.0 ±0.2**
C → P	71.6 ±2.1	72.6 ±1.8	70.4 ±1.6	72.9 ±1.1	**77.5 ±2.4**	70.7 ±1.3	73.9 ±1.5	71.3 ±0.5	71.6 ±1.3	**76.4 ±0.8**
C → R	72.7 ±1.8	73.8 ±0.9	67.2 ±1.3	71.5 ±1.8	**74.7 ±0.4**	69.5 ±0.4	70.7 ±1.0	64.9 ±1.9	70.6 ±1.1	**72.1 ±0.3**
P → A	61.9 ±1.6	63.3 ±1.9	57.2 ±1.4	63.3 ±1.4	**67.9 ±1.2**	56.8 ±0.7	56.7 ±4.1	58.0 ±0.2	57.7 ±1.1	**62.0 ±0.8**
P → C	57.6 ±1.6	61.3 ±0.3	61.9 ±2.2	62.2 ±1.1	**65.8 ±2.1**	53.6 ±0.4	56.4 ±1.6	58.0 ±0.5	56.3 ±2.8	**60.2 ±1.2**
P → R	**77.4 ±0.3**	77.3 ±0.6	73.9 ±0.6	77.3 ±0.2	**77.4 ±1.0**	75.9 ±2.3	75.0 ±1.8	71.9 ±1.1	75.7 ±0.1	**76.1 ±0.8**
R → A	68.2 ±0.7	69.3 ±1.2	65.7 ±0.5	69.5 ±0.1	**71.1 ±0.4**	63.0 ±0.8	64.0 ±3.7	64.1 ±0.4	62.9 ±2.2	**68.6 ±1.4**
R → C	59.9 ±0.7	63.3 ±1.2	63.5 ±0.9	64.4 ±0.5	**66.6 ±0.6**	56.6 ±0.8	61.5 ±2.0	60.7 ±1.7	59.2 ±1.1	**63.5 ±0.6**
R → P	79.7 ±1.4	79.5 ±1.8	78.1 ±1.1	79.1 ±0.9	**82.0 ±1.3**	75.9 ±1.2	78.2 ±1.7	76.9 ±0.8	76.9 ±0.5	**79.4 ±0.8**
Average	67.9	69.7	67.3	69.7	**72.3**	65.1	67.1	65.1	66.6	**69.4**

(a) Closed set and class distribution shift settings

S → T	Open-set					Partial-set				
	S + T	CDAC	PAC	AdaMatch	Proposed	S + T	CDAC	PAC	AdaMatch	Proposed
A → C	54.6 ±1.9	55.3 ±2.0	57.3 ±1.2	57.8 ±1.6	**60.0 ±0.7**	61.7 ±3.1	56.9 ±2.4	60.0 ±2.5	69.5 ±3.0	**71.5 ±1.5**
A → P	70.1 ±2.1	68.1 ±2.1	68.2 ±2.0	72.2 ±1.8	**76.4 ±0.8**	81.4 ±2.6	79.4 ±4.3	79.4 ±1.6	81.9 ±1.2	**84.3 ±1.0**
A → R	70.0 ±0.6	64.1 ±2.0	64.2 ±1.9	67.6 ±1.4	**71.0 ±0.9**	78.4 ±1.9	74.6 ±1.6	76.7 ±2.8	80.2 ±2.4	**82.6 ±1.4**
C → A	54.5 ±1.0	52.4 ±1.4	49.5 ±2.9	53.4 ±1.9	**59.3 ±2.3**	68.2 ±1.0	63.3 ±3.0	62.2 ±1.5	69.6 ±1.9	**70.2 ±2.0**
C → P	69.8 ±0.7	67.1 ±0.6	66.6 ±1.0	70.4 ±2.3	**75.0 ±1.9**	80.2 ±1.9	75.8 ±1.2	76.1 ±1.2	78.9 ±1.2	**82.0 ±1.1**
C → R	66.3 ±1.5	63.6 ±1.8	60.7 ±1.1	65.8 ±0.8	**70.3 ±0.8**	73.0 ±1.4	71.0 ±3.6	67.6 ±1.9	76.9 ±3.0	**80.3 ±1.6**
P → A	57.9 ±0.5	51.2 ±1.9	50.6 ±1.4	55.9 ±0.5	**59.6 ±1.0**	71.5 ±2.6	64.5 ±4.0	65.6 ±2.1	69.1 ±0.5	**74.3 ±1.9**
P → C	54.0 ±2.1	52.2 ±4.3	57.9 ±0.8	56.1 ±3.5	**59.2 ±0.4**	59.1 ±2.8	56.3 ±4.4	63.1 ±1.9	63.7 ±0.9	**69.3 ±2.5**
P → R	69.6 ±1.3	65.9 ±1.9	66.0 ±0.1	68.5 ±0.0	**72.9 ±0.3**	81.2 ±1.5	76.4 ±0.7	75.8 ±3.3	80.2 ±2.6	**84.3 ±1.5**
R → A	61.3 ±0.9	56.7 ±1.4	55.0 ±1.2	57.6 ±1.0	**63.5 ±2.2**	73.0 ±1.2	69.0 ±4.3	68.8 ±2.1	73.0 ±2.9	**75.5 ±2.2**
R → C	56.4 ±0.9	57.0 ±2.3	**59.1 ±2.7**	57.5 ±1.1	59.0 ±2.4	62.9 ±2.6	56.7 ±6.3	61.4 ±2.5	66.8 ±3.3	**71.5 ±3.5**
R → P	74.3 ±1.4	70.0 ±1.0	72.5 ±1.4	73.9 ±1.3	**76.9 ±0.4**	**84.0 ±1.4**	81.1 ±0.7	79.5 ±0.5	83.3 ±0.8	83.3 ±1.4
Average	63.2	60.3	60.6	63.1	**66.9**	72.9	68.7	69.7	74.4	**77.4**

(b) Open-set and partial-set settings

S → T	Open-partial				
	S + T	CDAC	PAC	AdaMatch	Proposed
A → C	54.6 ±2.9	43.9 ±9.8	**58.5 ±1.9**	55.2 ±1.0	55.5 ±1.1
A → P	70.3 ±0.5	60.3 ±8.8	68.3 ±1.2	73.3 ±0.9	**75.9 ±1.4**
A → R	73.9 ±1.5	62.2 ±1.3	67.0 ±2.3	71.4 ±1.6	**76.0 ±0.9**
C → A	58.7 ±3.1	50.1 ±2.4	51.5 ±2.0	54.6 ±3.0	**61.6 ±0.9**
C → P	70.4 ±1.0	66.4 ±0.9	68.4 ±2.7	72.2 ±0.8	**75.1 ±2.2**
C → R	69.1 ±1.0	57.6 ±1.4	62.0 ±1.0	67.9 ±1.3	**73.7 ±1.0**
P → A	60.0 ±2.5	53.7 ±2.9	54.4 ±1.6	58.8 ±1.5	**64.0 ±1.2**
P → C	52.1 ±1.3	49.4 ±1.9	**55.7 ±3.1**	54.4 ±1.0	53.6 ±2.3
P → R	70.4 ±0.7	63.3 ±4.2	65.8 ±0.3	70.6 ±1.3	**74.8 ±0.7**
R → A	61.9 ±3.7	52.6 ±0.2	55.5 ±1.8	59.4 ±1.1	**63.7 ±2.6**
R → C	54.3 ±0.3	48.8 ±7.0	**58.6 ±2.6**	56.0 ±2.3	56.6 ±0.9
R → P	74.3 ±1.3	67.6 ±2.2	70.1 ±2.0	74.9 ±0.7	**78.0 ±3.3**
Average	64.2	56.3	61.3	64.1	**67.4**

(c) Open-partial settings

Table 4. Office-Home: Target domain accuracy for each source (S) to target (T) pair, trained on ResNet-34 backbone.

S → T	Closed-set w/o Label Distribution Shift					Closed-set w/ Label Distribution Shift				
	S + T	CDAC	PAC	AdaMatch	Proposed	S + T	CDAC	PAC	AdaMatch	Proposed
C → P	61.9 ±1.0	66.9 ±0.1	64.7 ±0.4	62.9 ±0.9	**67.0 ±1.4**	55.3 ±0.0	61.5 ±0.2	60.3 ±0.7	57.2 ±1.4	**63.7 ±0.5**
C → R	72.3 ±0.5	75.5 ±0.5	75.2 ±1.1	75.3 ±0.5	**78.4 ±0.6**	69.0 ±0.9	73.4 ±1.3	71.5 ±0.3	71.7 ±1.1	**75.4 ±0.7**
C → S	59.4 ±0.3	65.8 ±1.8	66.9 ±0.7	63.4 ±0.7	**67.9 ±1.2**	52.2 ±0.5	59.4 ±1.1	58.1 ±0.6	54.1 ±0.9	**61.6 ±0.8**
P → C	62.4 ±0.6	70.7 ±1.0	70.7 ±0.3	65.0 ±0.5	**73.3 ±0.2**	54.9 ±0.4	62.0 ±1.8	65.5 ±1.3	58.5 ±1.1	**66.6 ±0.4**
P → R	76.6 ±0.4	77.8 ±0.2	77.8 ±0.5	76.7 ±0.3	**79.0 ±0.2**	73.0 ±1.0	75.3 ±0.6	73.3 ±1.0	73.6 ±0.6	**76.1 ±0.3**
P → S	56.3 ±1.3	64.9 ±0.6	64.9 ±1.2	60.7 ±0.8	**67.2 ±1.5**	49.5 ±0.5	60.2 ±1.0	59.3 ±1.6	55.3 ±0.3	**61.5 ±1.0**
R → C	58.3 ±0.2	67.7 ±0.4	66.2 ±2.9	63.6 ±1.1	**71.1 ±0.4**	54.6 ±1.0	63.6 ±0.9	64.5 ±0.5	58.3 ±1.3	**66.7 ±1.1**
R → P	63.8 ±0.4	66.9 ±1.1	66.6 ±0.1	64.3 ±0.4	**68.5 ±0.7**	60.8 ±0.3	67.1 ±0.5	65.4 ±0.8	61.9 ±1.6	**67.6 ±0.4**
R → S	52.4 ±1.6	62.5 ±0.4	63.1 ±0.8	58.5 ±0.5	**66.0 ±0.3**	47.9 ±0.3	58.2 ±0.5	58.2 ±1.3	52.3 ±1.7	**60.1 ±0.0**
S → C	66.9 ±0.7	72.7 ±0.9	73.0 ±0.2	69.0 ±0.6	**75.1 ±1.5**	61.3 ±0.3	66.8 ±0.5	67.4 ±0.8	62.4 ±1.1	**69.5 ±0.8**
S → P	63.6 ±0.4	67.6 ±0.3	66.2 ±0.8	65.3 ±0.5	**69.3 ±0.2**	59.4 ±0.3	64.3 ±0.7	62.6 ±0.1	59.9 ±0.9	**64.6 ±1.0**
S → R	73.3 ±0.6	77.0 ±0.3	74.2 ±1.0	75.7 ±0.5	**78.4 ±0.5**	68.1 ±0.9	72.2 ±0.5	68.6 ±0.5	71.0 ±0.8	**74.0 ±0.4**
Average	63.9	69.7	69.1	66.7	**71.8**	58.8	65.3	64.6	61.3	**67.3**

(a) Closed set and class distribution shift settings

S → T	Open-set					Partial-set				
	S + T	CDAC	PAC	AdaMatch	Proposed	S + T	CDAC	PAC	AdaMatch	Proposed
C → P	52.2 ±0.4	50.0 ±0.5	46.8 ±1.6	50.2 ±1.1	**57.4 ±0.7**	72.6 ±1.3	74.8 ±0.8	75.2 ±1.5	73.9 ±0.7	**78.5 ±1.0**
C → R	68.0 ±1.1	65.7 ±1.7	62.1 ±1.1	65.4 ±1.9	**72.6 ±0.9**	81.8 ±0.3	82.3 ±1.2	83.7 ±1.8	83.1 ±1.3	**85.9 ±1.1**
C → S	46.4 ±1.6	44.8 ±1.9	46.8 ±0.4	47.4 ±0.6	**53.8 ±0.4**	68.5 ±0.9	70.3 ±2.0	73.7 ±0.3	72.4 ±0.4	**76.0 ±0.3**
P → C	50.1 ±1.5	49.0 ±2.2	48.0 ±1.5	50.5 ±0.5	**60.9 ±0.1**	68.7 ±0.1	73.2 ±2.8	78.6 ±1.5	75.9 ±1.1	**81.6 ±0.1**
P → R	69.4 ±1.2	67.2 ±1.1	63.7 ±0.7	64.9 ±1.5	**72.9 ±1.5**	83.6 ±0.5	82.6 ±1.1	84.6 ±0.5	83.6 ±2.0	**86.1 ±0.9**
P → S	45.5 ±0.5	43.7 ±1.7	47.2 ±0.8	46.8 ±1.1	**54.2 ±0.8**	64.0 ±1.2	69.6 ±0.1	72.9 ±0.3	70.6 ±0.6	**74.7 ±0.7**
R → C	47.7 ±1.4	47.3 ±2.7	47.4 ±0.7	48.8 ±2.1	**58.7 ±1.0**	64.9 ±2.5	74.6 ±0.7	78.0 ±0.7	74.7 ±1.7	**79.9 ±3.8**
R → P	53.5 ±0.9	48.6 ±4.8	48.7 ±0.5	49.6 ±2.0	**57.2 ±0.9**	75.2 ±0.6	76.4 ±0.4	76.9 ±0.8	75.3 ±1.0	**79.4 ±0.5**
R → S	41.9 ±0.5	41.7 ±0.8	46.6 ±0.9	45.7 ±1.6	**52.4 ±1.0**	60.3 ±1.5	65.8 ±1.5	71.9 ±0.6	67.2 ±1.0	**72.4 ±2.6**
S → C	53.2 ±0.8	50.0 ±2.0	50.9 ±1.1	51.3 ±2.1	**62.0 ±1.1**	73.9 ±0.4	76.0 ±0.7	80.4 ±0.9	79.1 ±0.8	**83.8 ±0.8**
S → P	52.5 ±0.4	49.5 ±3.6	47.8 ±1.1	51.0 ±1.1	**58.3 ±0.6**	75.3 ±0.5	75.6 ±0.9	76.6 ±1.1	75.0 ±0.7	**78.5 ±1.7**
S → R	68.4 ±1.1	67.7 ±1.6	62.6 ±0.7	65.5 ±1.7	**73.6 ±0.9**	82.2 ±0.3	81.9 ±1.8	82.3 ±1.5	84.8 ±1.5	**87.2 ±1.3**
Average	54.1	52.1	51.6	53.1	**61.2**	72.6	75.3	77.9	76.3	**80.3**

(b) Open-set and partial-set settings

S → T	Open-partial				
	S + T	CDAC	PAC	AdaMatch	Proposed
C → P	52.4 ±0.2	47.2 ±4.3	46.9 ±1.3	51.9 ±0.9	**60.8 ±1.2**
C → R	69.7 ±0.5	53.4 ±17.8	63.1 ±3.2	67.7 ±0.7	**74.7 ±0.3**
C → S	44.2 ±2.1	42.3 ±1.9	47.0 ±3.7	46.3 ±2.4	**53.3 ±2.9**
P → C	51.3 ±1.6	47.4 ±1.1	47.5 ±2.1	50.0 ±1.0	**59.4 ±2.9**
P → R	70.7 ±0.3	44.9 ±19.2	65.0 ±1.6	67.0 ±1.2	**76.4 ±0.5**
P → S	45.1 ±2.3	42.1 ±2.6	45.9 ±1.7	46.6 ±3.1	**54.4 ±2.0**
R → C	50.7 ±1.6	48.7 ±1.4	47.6 ±3.5	50.2 ±1.8	**59.9 ±2.0**
R → P	53.6 ±0.4	26.0 ±11.3	49.9 ±1.0	51.2 ±1.6	**61.5 ±0.2**
R → S	42.4 ±1.9	23.3 ±9.7	45.4 ±3.0	44.4 ±3.0	**52.2 ±1.7**
S → C	53.0 ±1.9	49.9 ±0.4	48.8 ±1.2	51.1 ±1.3	**61.3 ±1.4**
S → P	51.2 ±0.4	48.8 ±1.8	46.8 ±1.9	50.1 ±0.9	**60.8 ±0.4**
S → R	67.8 ±0.5	49.7 ±15.8	61.1 ±3.3	67.4 ±0.2	**74.9 ±0.6**
Average	54.4	43.7	51.2	53.7	**62.5**

(c) Open-partial settings

Table 5. DomainNet-126: Target domain accuracy for each source (S) to target (T) pair, trained on ResNet-34 backbone.

S → T	**Closed-set w/ Label Distribution Shift**				**Open-set**			
	S + T	DANCE	UniOT	Proposed	S + T	DANCE	UniOT	Proposed
C → P	69.0 ±0.3	68.6 ±0.4	67.4 ±0.2	**69.7 ±0.6**	64.6 ±0.3	63.3 ±0.4	59.2 ±0.2	**65.8 ±0.2**
C → R	79.8 ±0.4	79.6 ±0.3	78.3 ±0.1	**80.3 ±0.3**	76.0 ±0.5	74.9 ±0.6	70.7 ±0.6	**78.5 ±0.3**
C → S	69.3 ±0.1	69.6 ±0.1	69.1 ±0.1	**70.0 ±0.2**	**61.3 ±0.2**	60.1 ±0.5	55.2 ±0.4	61.2 ±0.1
P → C	75.4 ±0.1	75.5 ±0.2	73.9 ±0.6	**76.2 ±0.3**	**71.0 ±0.4**	70.0 ±0.4	65.5 ±0.8	70.9 ±0.5
P → R	80.1 ±0.1	79.7 ±0.4	78.3 ±0.2	**80.5 ±0.2**	75.8 ±0.8	75.0 ±1.1	70.1 ±0.9	**78.2 ±0.6**
P → S	68.1 ±0.3	68.7 ±0.4	67.6 ±0.1	**69.3 ±0.4**	**61.6 ±0.3**	60.3 ±0.5	54.9 ±0.3	**61.6 ±0.4**
R → C	75.4 ±0.2	**76.2 ±0.2**	75.9 ±0.2	**76.2 ±0.2**	**71.3 ±0.3**	70.1 ±0.2	65.7 ±0.7	71.1 ±0.3
R → P	70.3 ±0.2	70.9 ±0.1	70.1 ±0.2	**71.3 ±0.2**	64.6 ±0.2	63.3 ±0.2	57.8 ±0.5	**65.2 ±0.3**
R → S	67.8 ±0.3	68.6 ±0.5	68.1 ±0.1	**69.0 ±0.3**	**61.3 ±0.3**	60.2 ±0.9	55.2 ±0.2	60.4 ±0.3
S → C	77.6 ±0.1	77.9 ±0.2	76.9 ±0.5	**78.0 ±0.6**	71.1 ±0.5	69.9 ±0.3	64.3 ±0.3	**71.7 ±0.7**
S → P	70.0 ±0.2	70.2 ±0.1	68.7 ±0.5	**71.1 ±0.1**	64.1 ±0.3	63.2 ±0.3	58.3 ±0.4	**65.1 ±0.0**
S → R	80.7 ±0.2	80.0 ±0.3	79.1 ±0.2	**81.0 ±0.2**	76.1 ±0.7	75.1 ±0.7	70.7 ±0.7	**78.3 ±0.5**
Average	73.6	73.8	72.8	**74.4**	68.2	67.1	62.3	**69.0**

(a) Label distribution shift and open-set settings

S → T	**Partial-set**				**Open-partial**			
	S + T	DANCE	UniOT	Proposed	S + T	DANCE	UniOT	Proposed
C → P	75.8 ±0.7	75.7 ±0.7	70.8 ±0.6	**78.0 ±0.6**	68.3 ±0.9	67.5 ±0.9	64.2 ±0.9	**69.7 ±0.8**
C → R	84.3 ±0.4	84.0 ±0.1	79.8 ±0.3	**85.1 ±0.2**	78.2 ±0.3	77.3 ±0.3	73.4 ±0.1	**80.5 ±0.4**
C → S	78.3 ±0.2	79.1 ±0.4	74.0 ±0.3	**79.4 ±0.2**	61.0 ±0.1	59.3 ±0.5	54.9 ±0.5	**61.3 ±0.1**
P → C	84.1 ±0.8	84.9 ±1.0	79.7 ±0.3	**85.6 ±0.7**	73.0 ±0.6	72.0 ±0.6	66.8 ±0.4	**74.0 ±0.4**
P → R	84.1 ±0.1	84.1 ±0.2	79.0 ±0.3	**85.0 ±0.2**	78.1 ±0.7	77.5 ±0.4	71.8 ±0.3	**80.0 ±0.5**
P → S	77.8 ±0.5	78.8 ±0.5	72.8 ±0.8	**79.1 ±0.4**	61.1 ±0.1	59.9 ±0.4	54.2 ±0.2	**61.5 ±0.6**
R → C	85.1 ±0.3	86.1 ±0.5	81.3 ±0.9	**86.8 ±0.1**	73.3 ±0.5	72.4 ±0.7	66.7 ±0.5	**74.2 ±0.6**
R → P	76.8 ±0.1	77.3 ±0.4	71.8 ±0.3	**78.4 ±0.3**	69.1 ±0.5	68.0 ±0.7	64.0 ±0.4	**70.0 ±0.7**
R → S	77.8 ±0.4	78.9 ±0.5	75.2 ±0.3	**79.4 ±0.3**	**61.0 ±0.1**	60.2 ±0.2	54.7 ±0.5	60.9 ±0.8
S → C	85.5 ±0.1	86.5 ±0.7	80.0 ±0.7	**86.9 ±0.2**	73.5 ±0.6	72.4 ±0.4	65.5 ±0.9	**75.1 ±0.4**
S → P	76.3 ±0.7	77.1 ±0.6	71.1 ±0.7	**78.6 ±0.3**	68.3 ±0.7	67.3 ±1.1	63.4 ±0.4	**69.8 ±0.8**
S → R	84.7 ±0.2	84.2 ±0.1	78.8 ±0.2	**85.4 ±0.2**	78.2 ±0.5	77.5 ±0.3	72.9 ±0.1	**80.6 ±0.3**
Average	80.9	81.4	76.2	**82.3**	70.3	69.3	64.3	**71.5**

(b) Partial-set and open-partial settings

Table 6. DomainNet-345: Target domain accuracy for each source (S) to target (T) pair. Traing is performed with frozen DINOv2 encoder dino2_vitl14 and learnable classifier.

S → T	Closed-set w/ Label Distribution Shift				Open-set			
	S + T	DANCE	UniOT	Proposed	S + T	DANCE	UniOT	Proposed
C → P	**73.1 ±0.4**	72.6 ±0.5	72.7 ±0.4	72.8 ±0.6	64.0 ±0.3	62.8 ±0.7	57.5 ±0.7	**66.4 ±0.4**
C → R	84.9 ±0.4	84.7 ±0.3	84.0 ±0.2	**85.0 ±0.4**	78.1 ±0.3	76.6 ±0.4	70.8 ±0.8	**81.4 ±0.6**
C → S	72.7 ±0.2	72.3 ±0.7	**73.3 ±0.2**	73.0 ±0.4	61.2 ±0.5	59.5 ±0.5	53.9 ±0.6	**62.1 ±0.7**
P → C	78.3 ±0.3	77.7 ±0.3	77.8 ±0.2	**78.6 ±0.5**	72.1 ±0.8	71.1 ±0.6	66.3 ±1.1	**74.9 ±0.8**
P → R	83.8 ±0.2	83.5 ±0.3	82.8 ±0.1	**84.0 ±0.2**	77.6 ±0.4	76.1 ±0.6	69.6 ±0.9	**81.0 ±0.2**
P → S	70.9 ±0.7	70.6 ±0.4	**71.3 ±0.6**	71.2 ±0.4	60.9 ±1.0	59.6 ±1.2	53.3 ±0.7	**62.2 ±0.8**
R → C	79.6 ±0.4	79.4 ±0.2	**80.7 ±0.1**	79.9 ±0.2	72.9 ±0.6	71.1 ±0.8	66.4 ±0.9	**75.4 ±0.8**
R → P	73.9 ±0.1	73.3 ±0.2	**74.7 ±0.2**	73.9 ±0.2	63.7 ±0.5	62.4 ±0.3	56.1 ±0.4	**65.8 ±0.4**
R → S	71.6 ±0.8	71.5 ±0.2	**73.0 ±0.2**	72.1 ±0.4	61.5 ±0.8	60.3 ±1.1	54.1 ±0.2	**61.8 ±1.1**
S → C	80.2 ±0.2	80.0 ±0.5	**80.9 ±0.2**	80.8 ±0.2	73.0 ±0.5	71.5 ±0.7	65.8 ±1.0	**75.2 ±0.6**
S → P	73.9 ±0.2	73.4 ±0.3	73.6 ±0.4	**74.0 ±0.3**	63.8 ±0.3	62.2 ±0.4	57.0 ±0.4	**66.0 ±0.5**
S → R	85.1 ±0.3	85.1 ±0.2	84.0 ±0.2	**85.4 ±0.2**	77.9 ±0.4	76.4 ±0.5	70.7 ±0.9	**81.2 ±0.7**
Average	77.3	77.0	77.4	**77.5**	68.9	67.5	61.8	**71.1**

(a) Label distribution shift and open-set settings

S → T	Partial-set				Open-partial			
	S + T	DANCE	UniOT	Proposed	S + T	DANCE	UniOT	Proposed
C → P	81.2 ±0.3	80.1 ±0.2	79.2 ±0.6	**81.5 ±0.3**	68.7 ±0.7	66.6 ±0.9	64.4 ±0.4	**71.2 ±0.9**
C → R	89.1 ±0.2	89.1 ±0.3	86.7 ±0.1	**89.2 ±0.1**	80.3 ±0.4	78.4 ±0.3	74.3 ±0.5	**83.3 ±0.3**
C → S	80.5 ±0.5	**80.7 ±0.3**	78.0 ±0.5	80.3 ±0.0	61.4 ±0.4	60.0 ±0.3	54.6 ±0.2	**63.3 ±0.4**
P → C	86.1 ±0.2	86.0 ±0.3	83.5 ±0.7	**86.2 ±0.5**	74.5 ±0.8	72.8 ±0.8	68.3 ±0.3	**76.9 ±0.6**
P → R	88.0 ±0.4	88.2 ±0.4	85.0 ±0.4	**88.5 ±0.5**	79.5 ±0.3	77.9 ±0.3	72.0 ±0.6	**82.7 ±0.1**
P → S	78.6 ±1.1	79.4 ±0.2	76.5 ±0.3	**79.9 ±0.1**	61.2 ±0.5	59.9 ±0.3	53.6 ±0.8	**63.2 ±0.4**
R → C	87.0 ±0.2	87.3 ±0.2	84.9 ±0.3	**87.6 ±0.5**	75.1 ±0.7	73.5 ±0.4	67.8 ±0.7	**77.0 ±1.1**
R → P	**80.8 ±0.3**	80.1 ±0.4	77.7 ±0.7	80.5 ±0.7	68.7 ±0.5	67.3 ±0.8	62.3 ±0.4	**71.1 ±1.0**
R → S	**80.4 ±0.5**	80.2 ±0.4	78.8 ±0.3	**80.4 ±0.1**	61.4 ±0.8	60.1 ±0.2	54.7 ±0.6	**63.2 ±0.8**
S → C	87.4 ±0.2	**87.6 ±0.1**	83.9 ±0.5	87.5 ±0.6	74.7 ±1.2	73.4 ±0.9	67.3 ±0.4	**76.9 ±0.8**
S → P	81.8 ±0.4	81.5 ±0.7	78.7 ±0.4	**82.3 ±0.3**	68.2 ±0.8	66.4 ±0.5	63.5 ±0.5	**71.3 ±0.5**
S → R	88.7 ±0.1	89.0 ±0.2	86.3 ±0.1	**89.3 ±0.3**	80.0 ±0.4	78.6 ±0.3	74.0 ±0.6	**83.5 ±0.2**
Average	84.1	84.1	81.6	**84.4**	71.1	69.6	64.7	**73.7**

(b) Partial-set and open-partial settings

Table 7. DomainNet-345: Target domain accuracy for each source (S) to target (T) pair. Traing is performed with frozen CLIP encoder ViT-L/14@336px and learnable classifier.