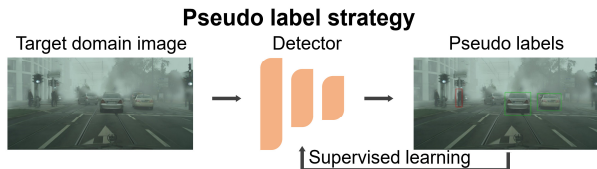


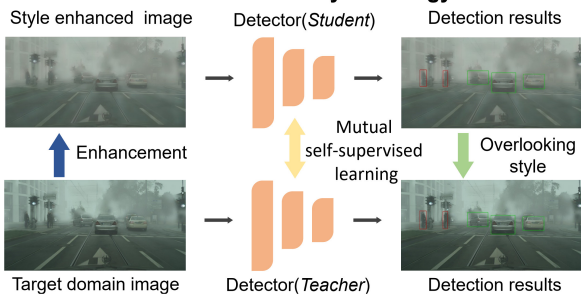
## Traditional pseudo label strategy



## Overlook domain style strategy

- Enhance** the target domain style for each target image
- Overlook** the enhanced style by directional alignments from student to teacher

### Overlook domain style strategy



## Our contributions:

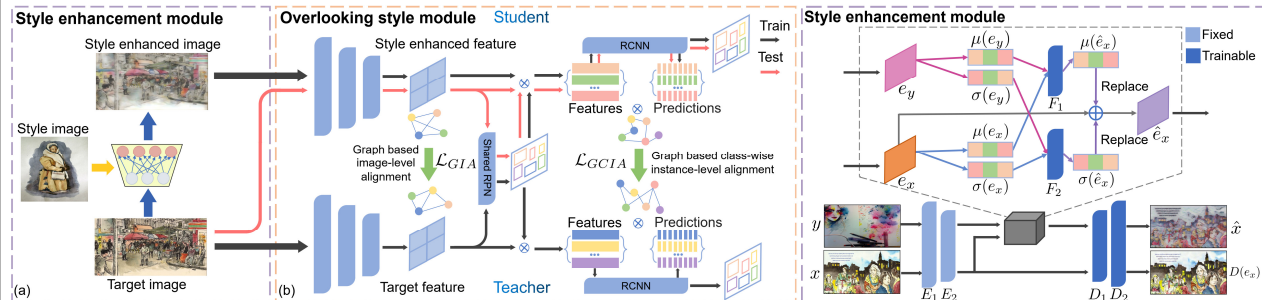
- Propose a novel learning to overlook domain style strategy.
- Propose a style enhancement method.
- Propose a new Mean-Teacher framework variant which achieves a two-way knowledge distillation.

## Paper and code are available:

<https://github.com/Flashkong/Source-Free-Object-Detection-by-Learning-to-Overlook-Domain-Style>

## Learning to overlook domain style method

- Style enhancement module** adds the style of the style image (a random target image) onto another target image
- Overlooking style module** forces both detectors to overlook target domain style by two directional alignments



## State-of-the-art performance on Pascal to Clipart and Pascal to Watercolor

Methods	aero	bicycle	bird	boat	bottle	bus	car	cat	chair	cow	table	dog	hrs	bike	prsn	plnt	sheep	sofa	train	tv	mAP
Source Only	24.4	38.8	24.9	21.4	32.0	38.5	33.7	12.8	27.9	21.0	16.3	12.3	25.1	42.3	31.6	27.8	10.5	20.8	40.0	29.8	26.6
SWDA [28]	26.2	48.5	32.6	33.7	38.5	54.3	37.1	18.6	34.8	58.3	17.0	12.5	33.8	65.5	61.6	52.0	9.3	24.9	54.1	49.1	38.1
HTCN [4]	33.6	58.9	34.0	23.4	45.6	57.0	39.8	12.0	39.7	51.3	21.1	20.1	39.1	72.8	63.0	43.1	19.3	30.1	50.2	51.8	40.3
DBGL [3]	28.5	52.3	34.3	32.8	38.6	66.4	38.2	25.3	39.9	47.4	23.9	17.9	38.9	78.3	61.2	51.7	26.2	28.9	56.8	44.5	41.6
PD [33]	41.5	52.7	34.5	28.1	43.7	58.5	41.8	15.3	40.1	54.4	26.7	28.5	37.7	75.4	63.7	48.7	16.5	30.8	54.5	48.7	42.1
UMT [7]	39.6	59.1	32.4	35.0	45.1	61.9	48.4	7.5	46.0	67.6	21.4	29.5	48.2	75.9	70.5	56.7	25.9	28.9	39.4	43.6	44.1
SOAP [36]	34.6	46.7	26.8	23.2	34.9	33.5	39.3	16.5	29.1	33.6	17.9	12.0	26.9	41.2	37.1	34.5	14.3	23.4	36.3	35.7	29.9
Our method	<b>43.1</b>	61.4	<b>40.1</b>	36.8	<b>48.2</b>	45.8	48.3	20.4	44.8	53.3	<b>32.5</b>	26.1	40.6	<b>86.3</b>	68.5	48.9	25.4	33.2	44.0	<b>56.5</b>	<b>45.2</b>

Methods	Bike	Bird	Car	Cat	Dog	Person	mAP
Source Only	85.6	46.8	43.1	24.5	21.9	54.8	46.1
SWDA [28]	82.3	55.9	46.5	32.7	35.5	66.7	53.3
DBGL [3]	83.1	49.3	50.6	39.8	38.7	61.3	53.8
ATF [10]	78.8	<b>59.9</b>	47.9	41.0	34.8	66.9	54.9
SAPNet [20]	81.1	51.1	<b>53.6</b>	34.3	39.8	<b>71.3</b>	55.2
VDD [34]	90.0	56.6	49.2	39.5	38.8	65.3	56.6
SOAP [36]	79.3	44.3	41.4	<b>45.7</b>	39.3	55.9	51.0
Our method	95.2	53.1	46.9	37.2	<b>47.6</b>	69.3	<b>58.2</b>

## Validate the overlooking domain style ability



## Ablation study

Methods	Enhancement			Removal		mAP	
	ENH	TRA	RAN	GIA	GCIA	Water	Clipart
Source Only	×	×	×	×	×	46.1	26.6
LODS	✓	✓	✓	✓	✓	53.1	33.2
	✓	✓	✓	✓	✓	55.4	39.8
	✓	✓	✓	✓	✓	56.6	44.5
	✓	✓	✓	✓	✓	<b>58.2</b>	<b>45.2</b>