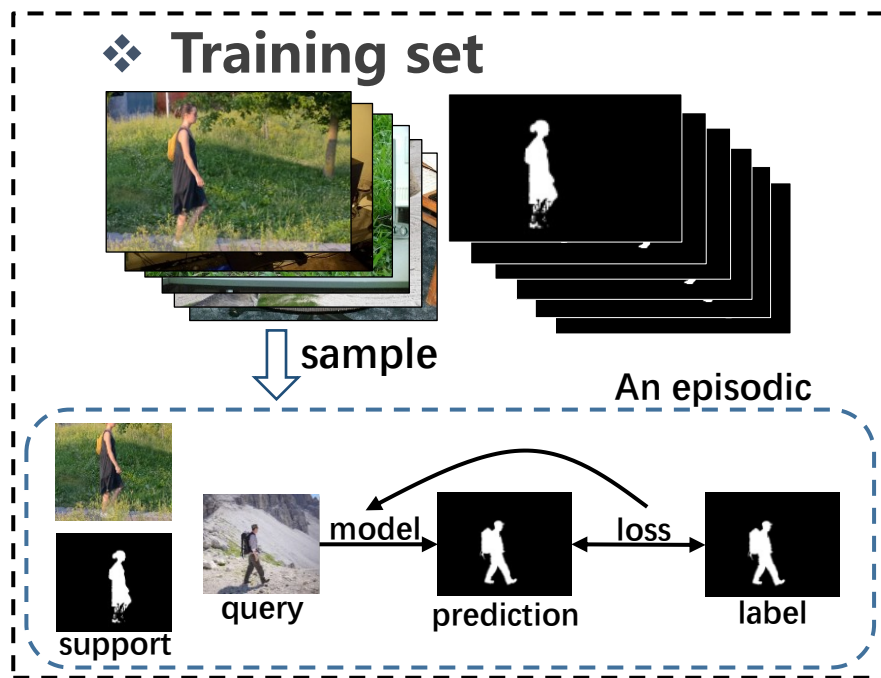# Rethinking the Correlation in Few-Shot Segmentation: A Buoys View

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Paper tag: TUE-PM-292

Rethinking the Correlation in Few-Shot Segmentation: A Buoys View

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➢ **Task -- Few-shot Segmentation**

- Segment objects of unseen class with only a few labelled support images.

➢ **General Paradigm -- Episodic Meta-training**
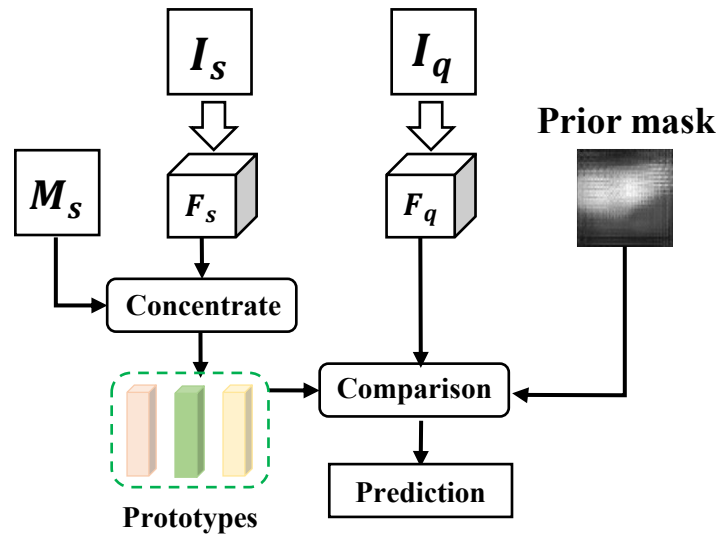
➢ **Challenge**

- Extremely limited support information
- Large intra-class variations
- Cluttered background
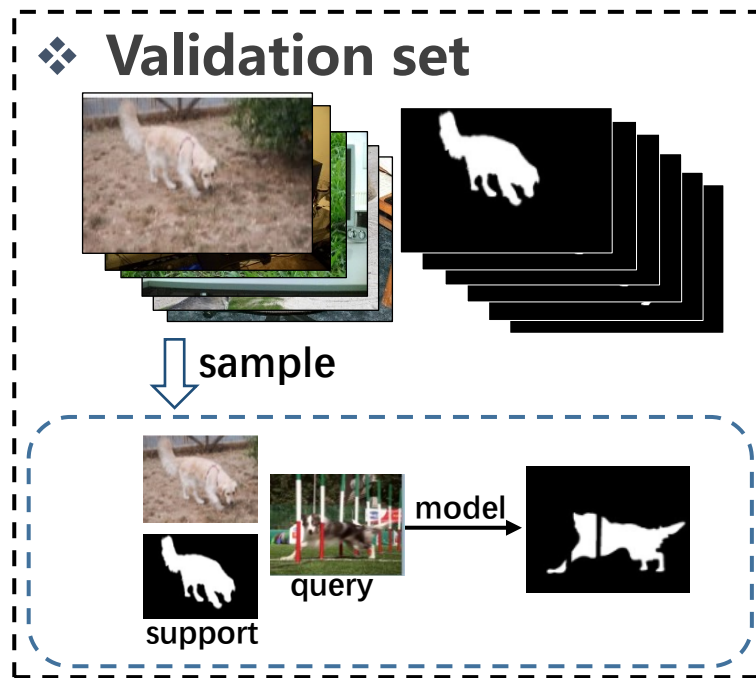
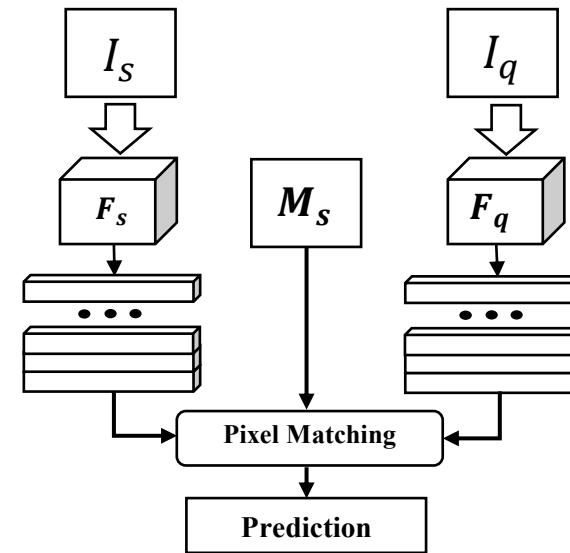# Rethinking the Correlation in Few-Shot Segmentation: A Buoys View

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➤ **Pixel-level Correlation in Mainstream Works**

- Prototype learning methods
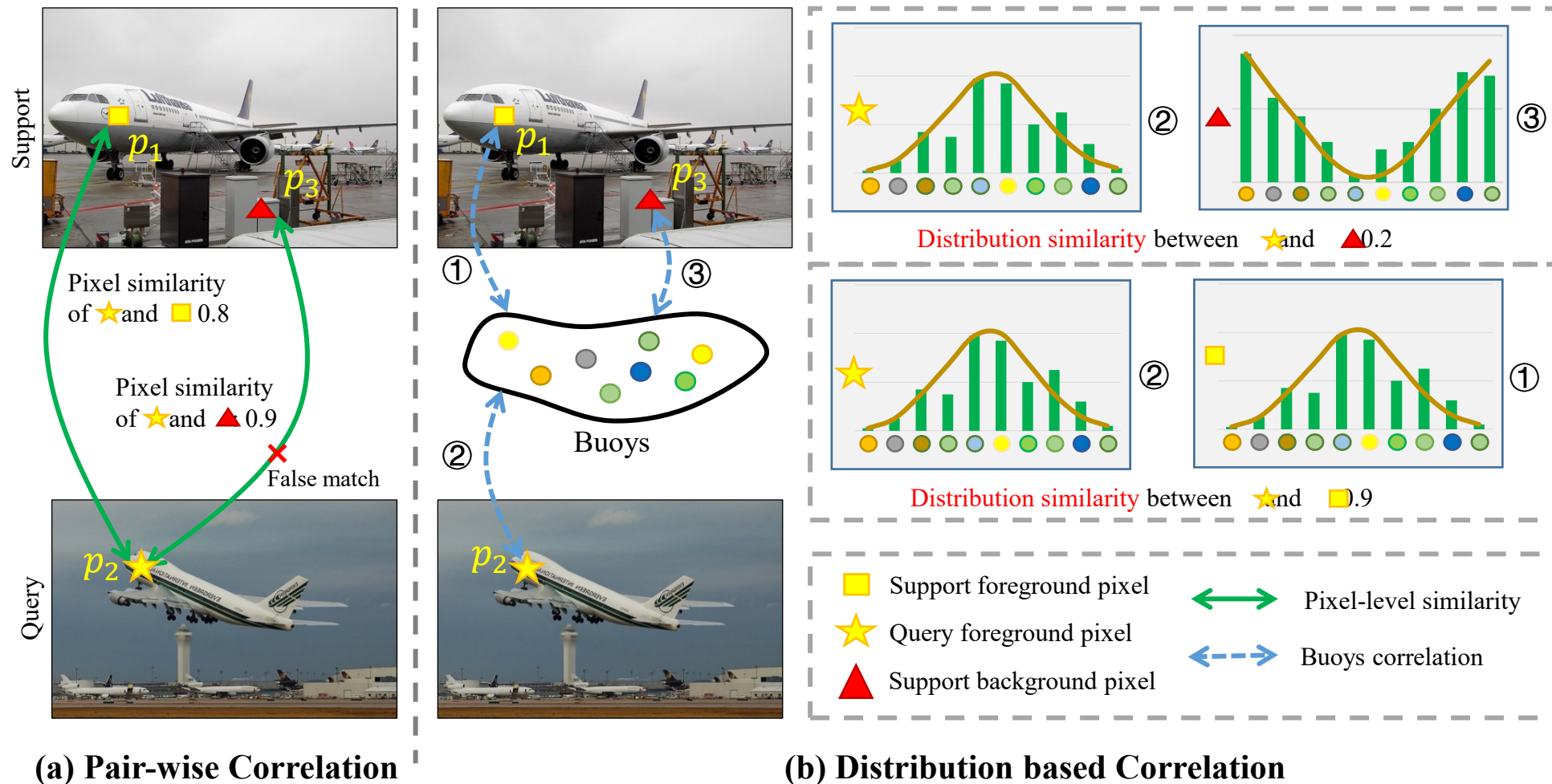
  ☐ Prior mask

- Affinity learning methods

  ☐ Matching weights

False Matches

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➢ **Motivation**

Pixel similarity of ⭐ and ◻ 0.8

Pixel similarity of ⭐ and 🔺 0.9

✗ False match

① ② ③

Buoys

Distribution similarity between ⭐ and 🔺 0.2

Distribution similarity between ⭐ and ◻ 0.9

◻ Support foreground pixel

⭐ Query foreground pixel

🔺 Support background pixel

⟷ Pixel-level similarity

⇠⇢ Buoys correlation

(a) Pair-wise Correlation

(b) Distribution based Correlation

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> ## Adaptive Buoys Correlation Network

- Can be used as a plug-in in many FSS models

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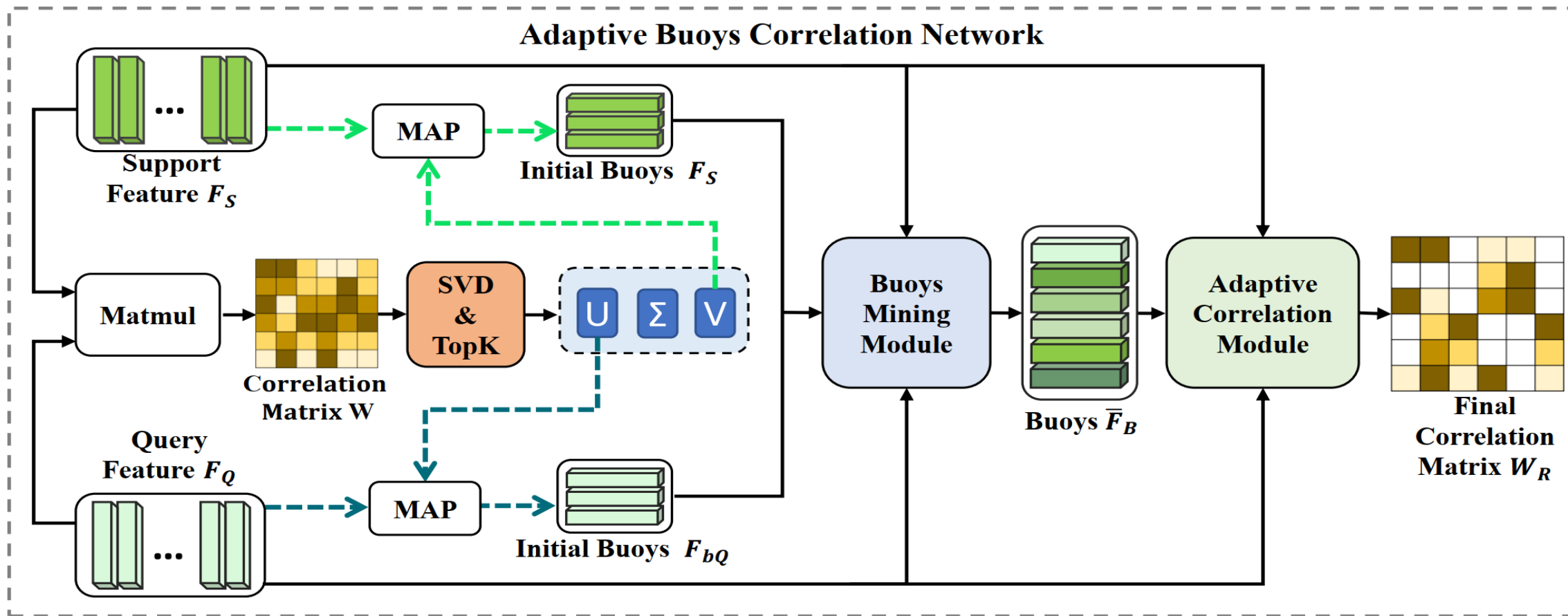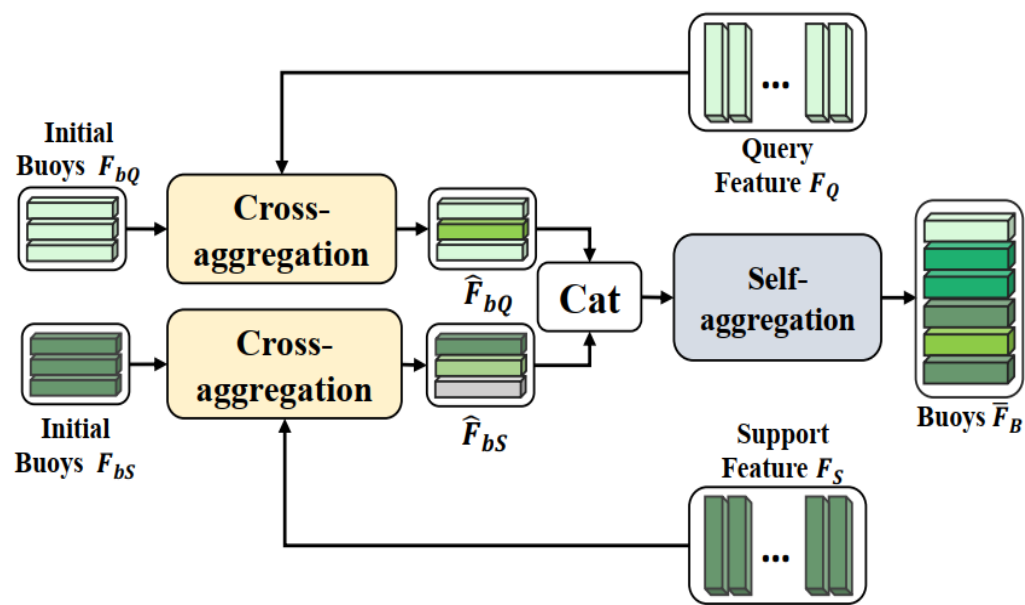University of Science and Technology of China (USTC)

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➤ **Detailed Network Architecture**

Buoys Mining Module

Adaptive Correlation Module

Representativeness, Task awareness, Resilience

Distribution Similarity

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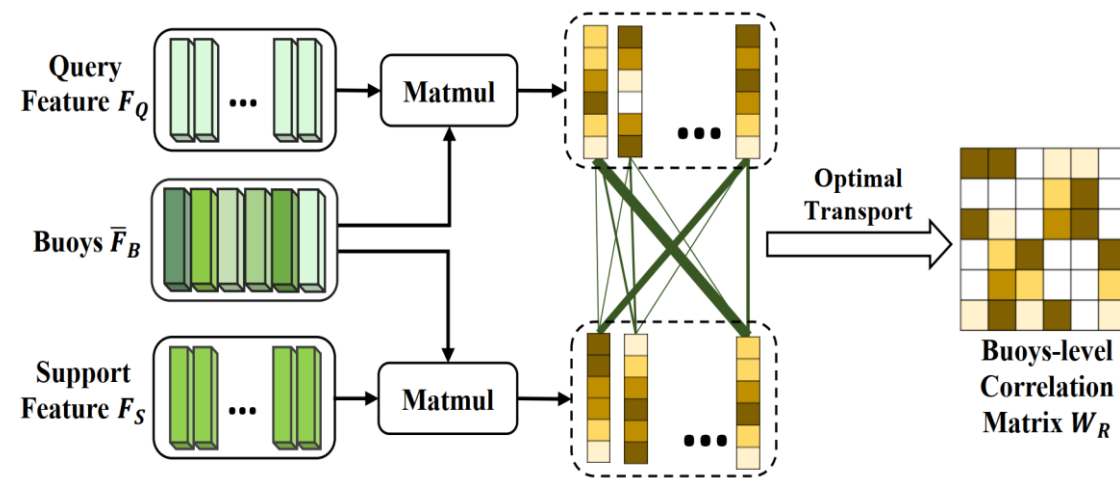University of Science and Technology of China (USTC)

➤ Quantitative Results

● Pascal-5i

Method	backbone	1-shot						5-shot					
		Fold-0	Fold-1	Fold-2	Fold-3	mIoU	FBIoU	Fold-0	Fold-1	Fold-2	Fold-3	mIoU	FBIoU
PFENet[TPAMI2020] [28]	ResNet50	61.7	69.5	55.4	56.3	60.7	73.3	63.1	70.7	55.8	57.9	61.9	73.9
PFENet w/ ABCNet		62.5	70.8	57.2	58.1	62.2(↑1.5)	74.1(↑0.8)	64.7	73.0	57.1	59.5	63.6(↑1.7)	74.2(↑0.3)
CyCTR[NIPS2021] [40]		67.8	72.8	58.0	58.0	64.2	–	71.1	73.2	60.5	57.5	65.6	–
CyCTR w/ ABCNet		67.8	74.3	59.2	59.4	65.2(↑1.0)	73.8(↑--)	72.6	74.4	61.3	59.0	66.8(↑1.2)	76.2(↑--)
DCAMA[ECCV2022] [26]		67.5	72.3	59.6	59.0	64.6	75.7	70.5	73.9	63.7	65.8	68.5	79.5
DCAMA w/ ABCNet		68.8	73.4	62.3	59.5	66.0(↑1.4)	76.0(↑0.3)	71.7	74.2	65.4	67	69.6(↑1.1)	80.0(↑0.5)
PFENet[TPAMI2020] [28]	ResNet101	60.5	69.4	54.4	55.9	60.1	72.9	62.8	70.4	54.9	57.6	61.4	73.5
PFENet w/ ABCNet		62.7	70.0	55.1	57.5	61.3(↑1.2)	73.7(↑0.8)	63.4	71.8	56.4	57.7	62.3(↑0.9)	74.0(↑0.5)
CyCTR[NIPS2021] [40]		69.3	72.7	56.5	58.6	64.3	72.9	73.5	74.0	58.6	60.2	66.6	75.0
CyCTR w/ ABCNet		71.2	73.0	57.9	60.2	65.6(↑1.3)	74.6(↑1.7)	74.2	73.0	60.2	62.1	67.4(↑0.8)	76.6(↑1.6)
DCAMA[ECCV2022] [26]		65.4	71.4	63.2	58.3	64.6	77.6	70.7	73.7	66.8	61.9	68.3	80.8
DCAMA w/ ABCNet		65.3	72.9	65.0	59.3	65.6(↑1.0)	78.5(↑0.9)	71.4	75.0	68.2	63.1	69.4(↑1.1)	80.8(↑0.0)

● COCO-20i

| Method	backbone	1-shot						5-shot					
		Fold-0	Fold-1	Fold-2	Fold-3	mIoU	FBIoU	Fold-0	Fold-1	Fold-2	Fold-3	mIoU	FBIoU
PFENet[TPAMI2020] [28]	ResNet101	34.3	33.0	32.3	30.1	32.4	58.6	38.5	38.6	38.2	34.3	37.4	61.9
PFENet w/ ABCNet		36.5	35.7	34.7	31.4	34.6(↑2.2)	59.2(↑0.6)	40.1	40.1	39.0	35.9	38.8(↑1.4)	62.8(↑0.9)
CyCTR[NIPS2021] [40]	ResNet50	38.9	43.0	39.6	40.3	40.5	–	41.1	48.9	45.2	47.0	45.6	–
CyCTR w/ ABCNet		40.7	45.9	41.6	40.6	42.2(↑1.8)	66.7(↑--)	43.2	50.8	45.8	47.1	46.7(↑1.1)	62.8(↑--)
DCAMA[ECCV2022] [26]		41.9	45.1	44.4	41.7	43.3	69.5	45.9	50.5	50.7	46.0	48.3	71.7
DCAMA w/ ABCNet		42.3	46.2	46.0	42.0	44.1(↑0.8)	69.9(↑0.4)	45.5	51.7	52.6	46.4	49.1(↑0.8)	72.7(↑1.0)

➤ Qualitative Results
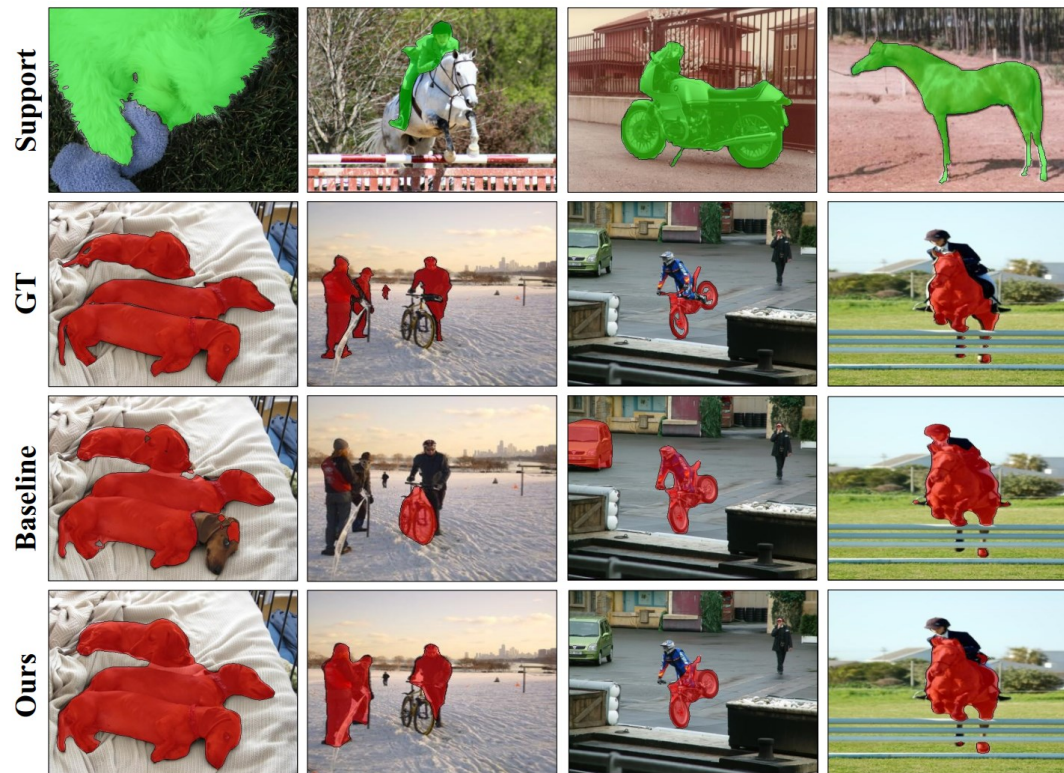
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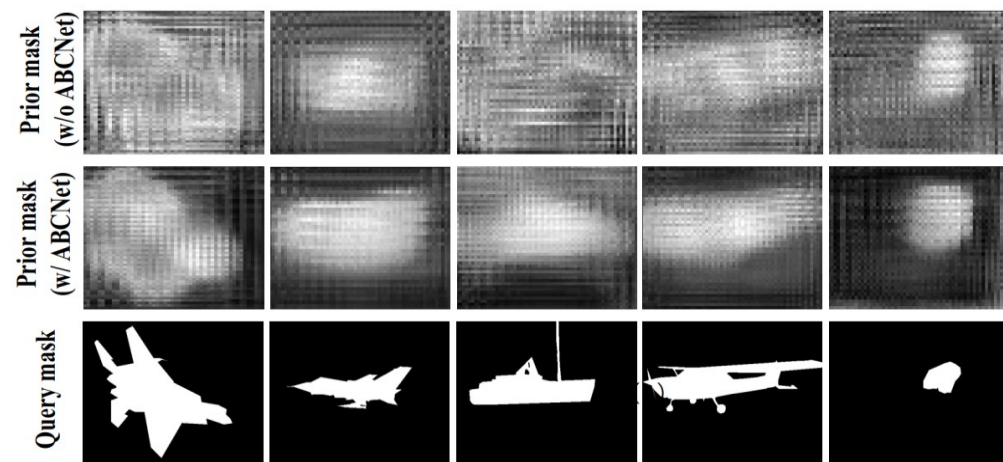VANCOUVER, CANADA

➤ **More Visualization Results**
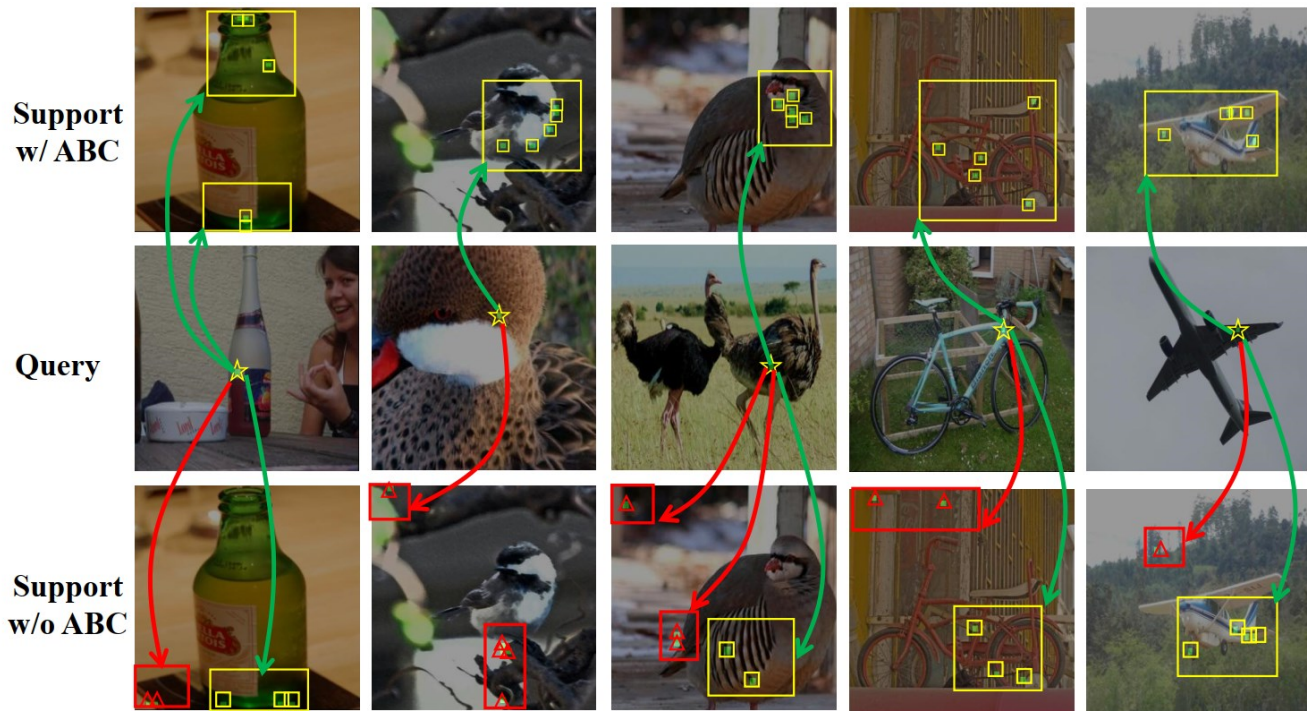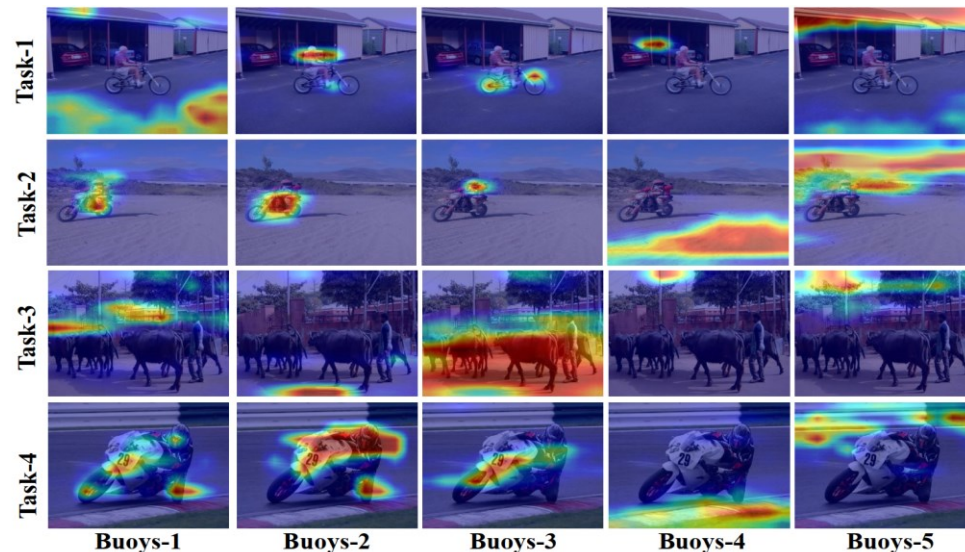
① False matches suppression

② Buoys activation maps

③ Prior masks

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Thanks