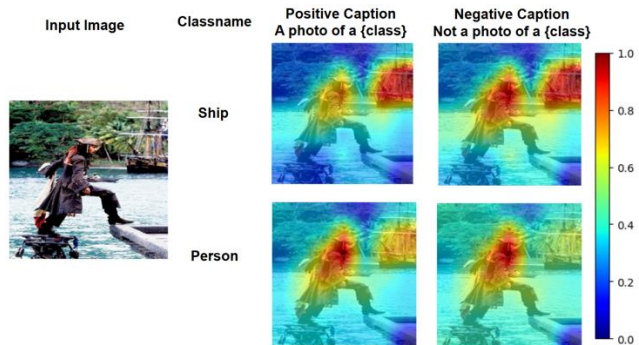


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Motivation

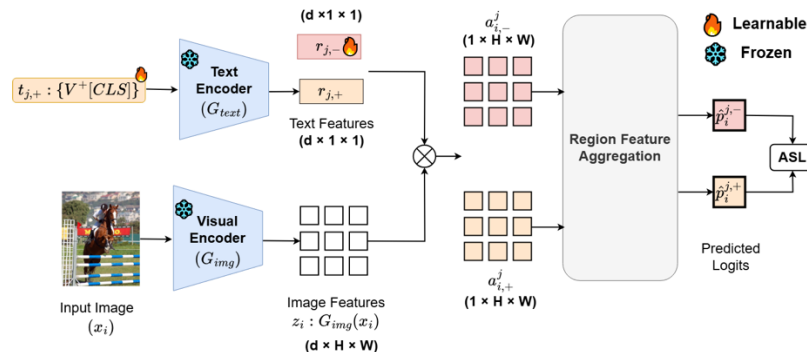
Are Negative Prompts Truly Analyzing Features Related to Class Absence ?



Negative prompts activate same image regions as positive prompts, corresponding to object presence

Contributions

- We show negative prompting hurts MLR performance
- We propose PositiveCoOp, that improves MLR by replacing negative prompts with learned negative embeddings
- We propose a vision-only baseline to isolate the impact of positive and negative prompting
- Result(mAP): Only Positive Prompt Learning (PositiveCoOp) > Dual Prompt Learning (DualCoOp) ≈ Baseline > Only Negative Prompt Learning (NegativeCoOp)



PositiveCoOp

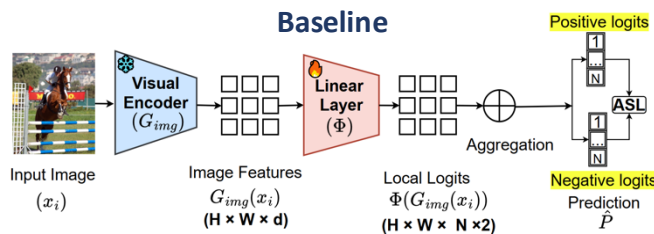
Class presence features: Learn positive prompt

Class absence features: Learn negative embeddings in feature space

NegativeCoOp

Class presence features: Learn positive embeddings in feature space

Class absence features: Learn negative prompt



Baseline relies solely on CLIP visual features and helps estimate the impact of different prompting strategies

Performance (mAP) on partial Labels

Dataset	Methods	#Params	10%	30%	50%	70%	Avg.
COCO	DualCoOp	1.3M	78.7	81.7	82.5	82.8	81.9
	Baseline	80k	78.9	81.3	82.7	82.9	82.0
	Negative CoOp	730k	77.8	81.0	82.2	82.7	81.6
	Positive CoOp	730k	79.8	83.0	83.7	84.0	83.2
VOC	DualCoOp	0.3M	90.3	92.8	93.6	94.0	93.2
	Baseline	20k	90.5	92.8	93.3	93.9	93.1
	Negative CoOp	170k	88.9	89.6	90.7	91.8	90.8
	Positive CoOp	170k	91.4	93.4	93.8	94.2	93.6

PositiveCoOp outperforms DualCoOp while requiring fewer parameters and less training time

Why is Negative Prompt Learning Ineffective?

Cosine Similarity (80cls-85prompt)	P1-N1 Pairs	P1-P2 Pairs
Mean ± Std (Min, Max)	0.56 ± 0.06 (0.37, 0.67)	0.61 ± 0.01 (0.55, 0.63)

CLIP does not learn to associate negative prompts to class absence because of the scarcity of such data in LAION (0.47% of 400 million)

- Negative prompts are also associated with class presence
- Positive & negative prompts of a class project as closely as different positive prompts for it

Scan To know more

