



TECHNISCHE
UNIVERSITÄT
DRESDEN

JUNE 18-22, 2023
CVPR 
VANCOUVER, CANADA

Normalizing Flow based Feature Synthesis for Outlier-aware Object Detection

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CVPR 2023 Highlight



Computer Graphics
and Visualization



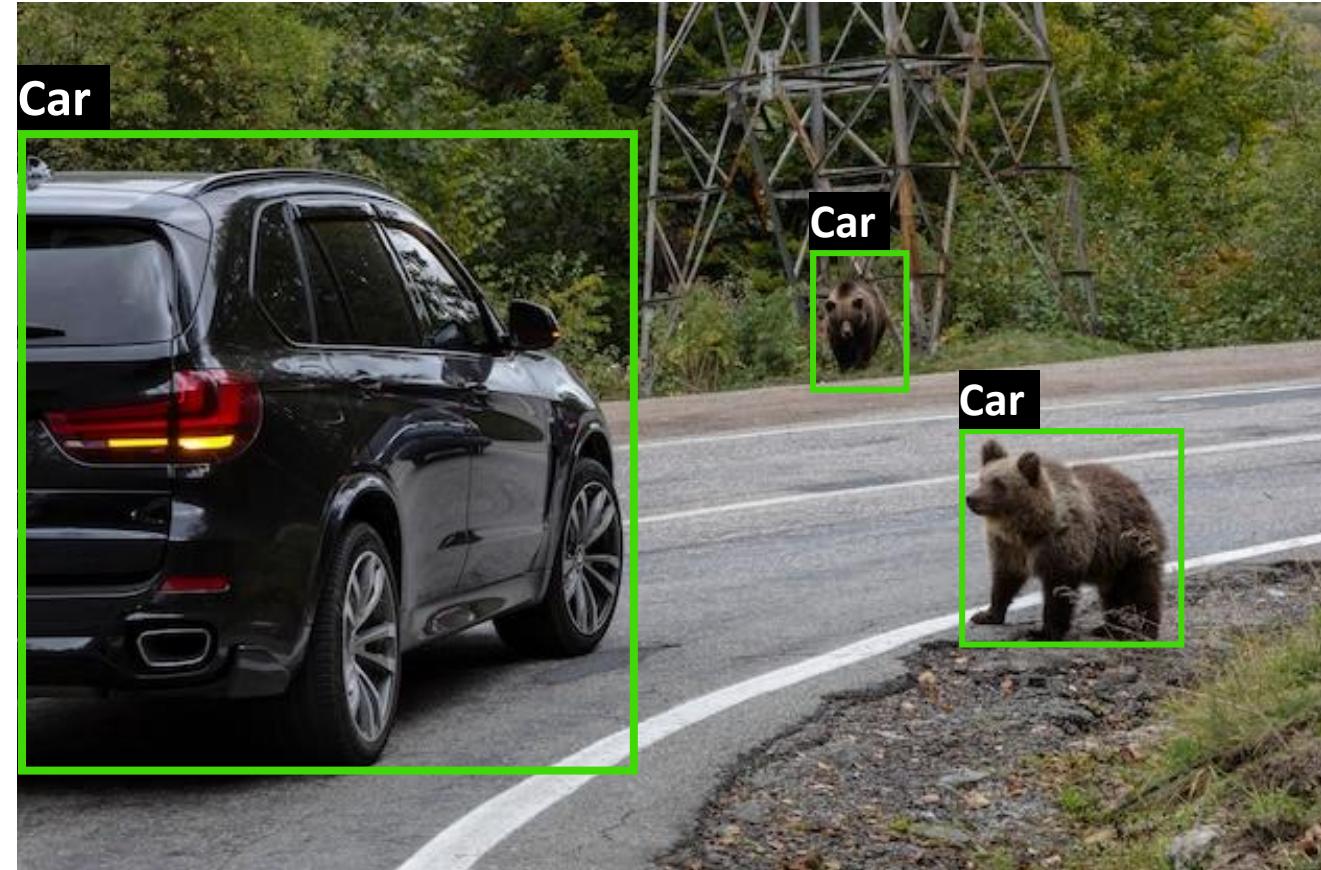
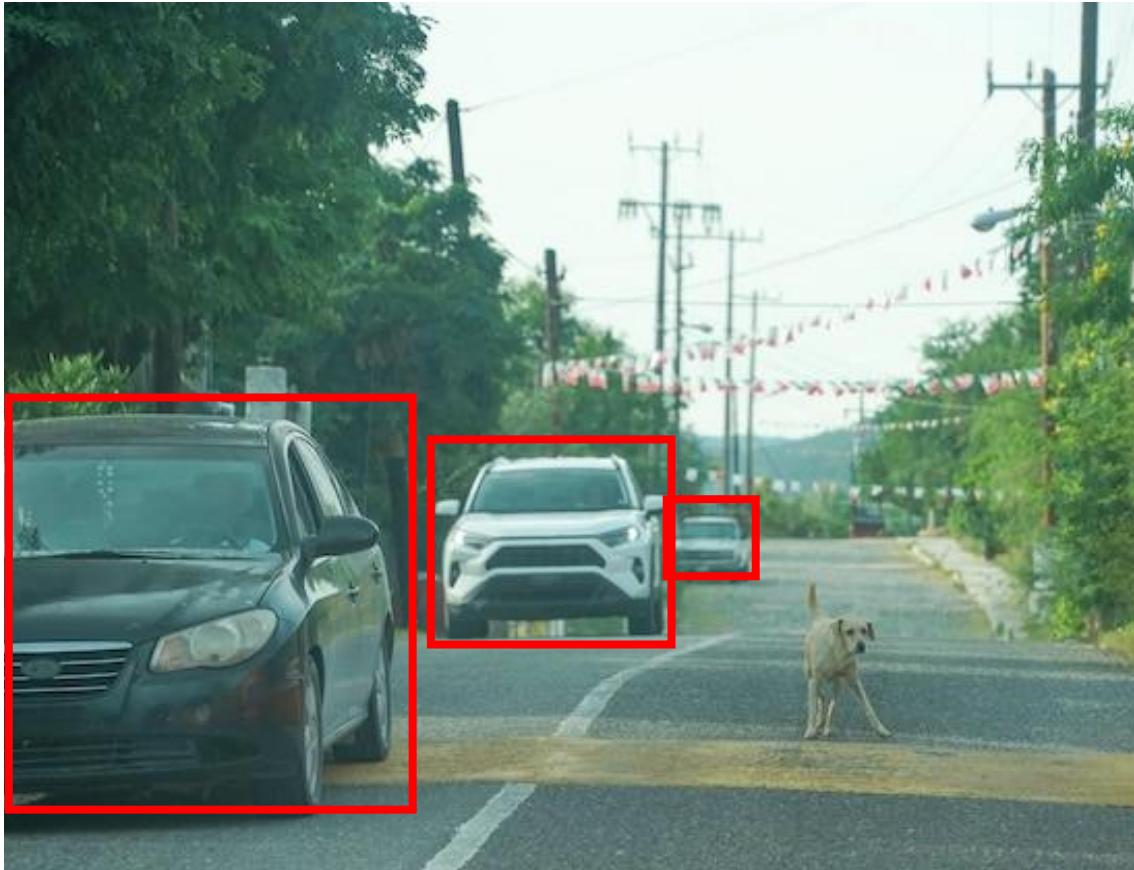
GEFÖRDERT VOM



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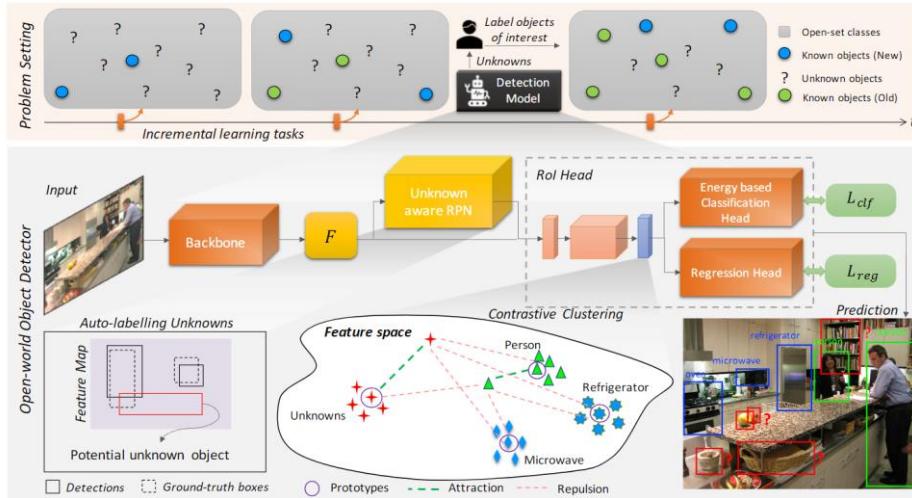


Vanilla Object Detection

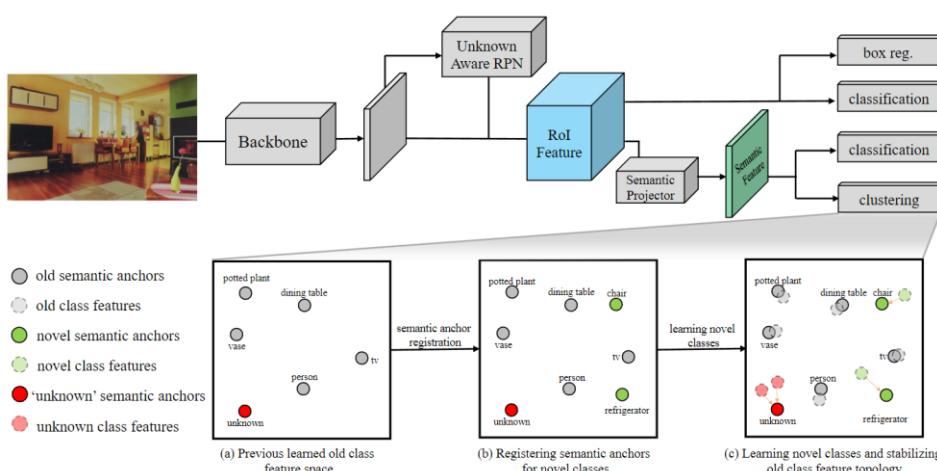


Related Work

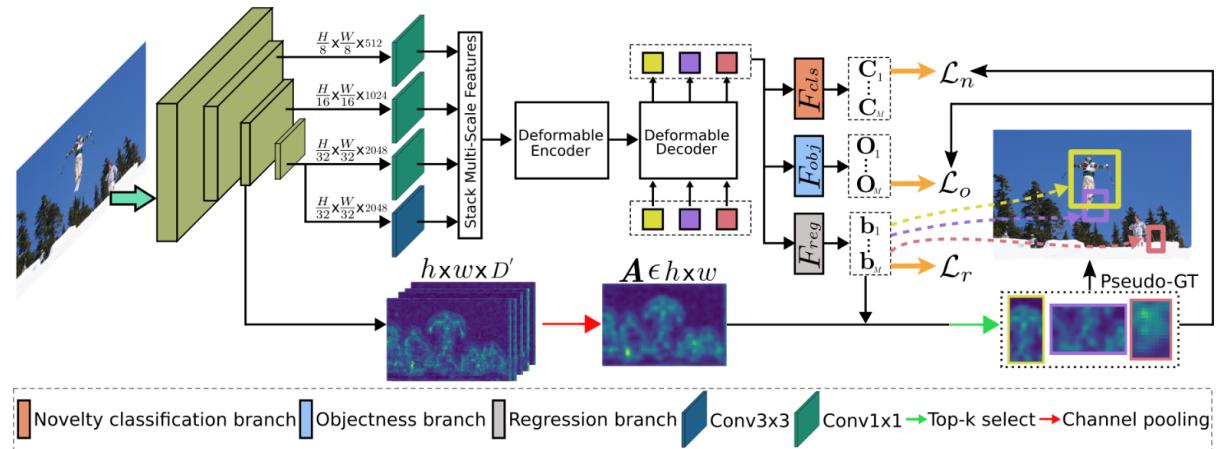
[1] Towards open world object detection [CVPR 2021]



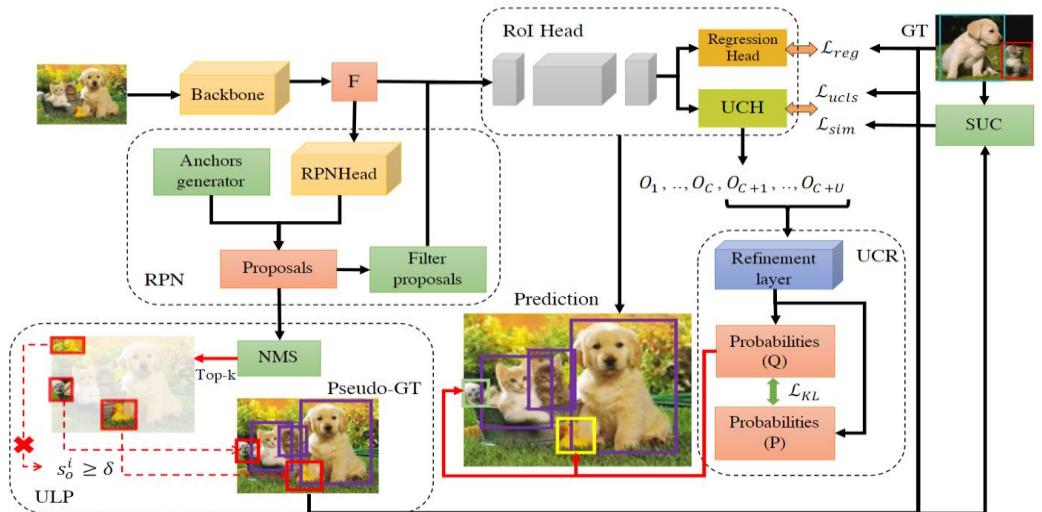
[3] Objects in Semantic Topology [ICLR 2022]



[2] OW-DETR: Open-World Detection Transformer [CVPR 2022]

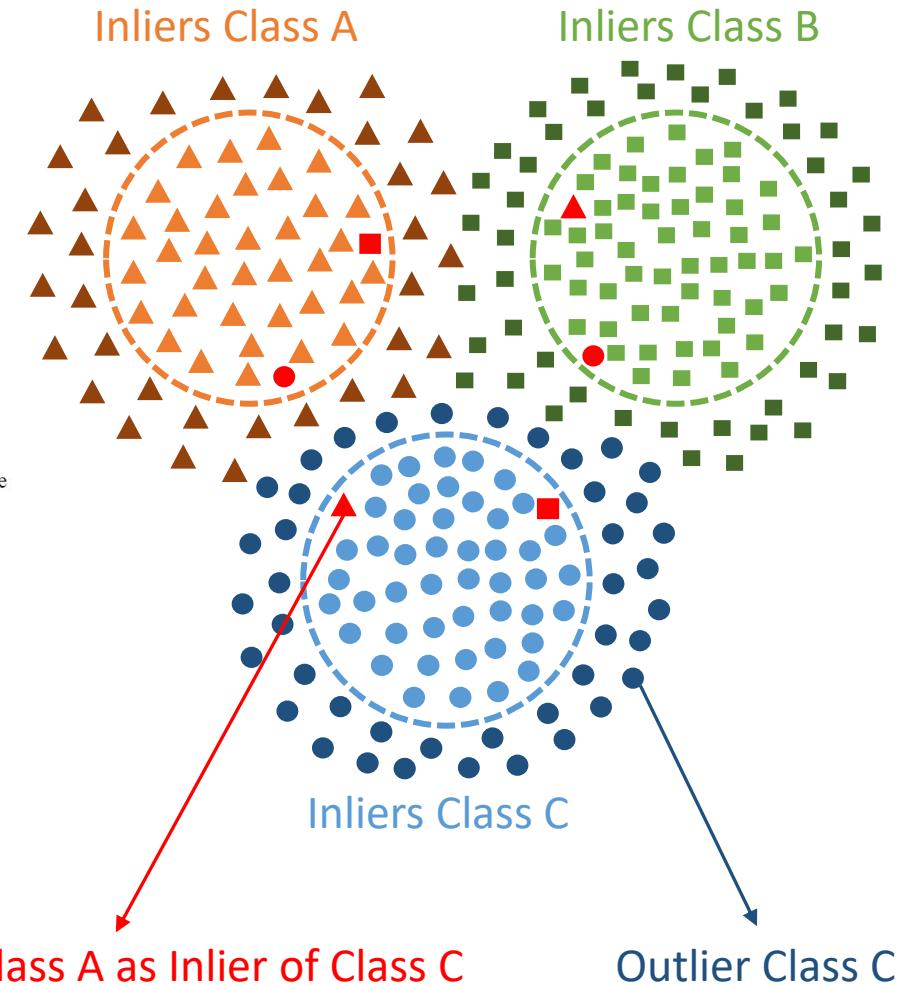
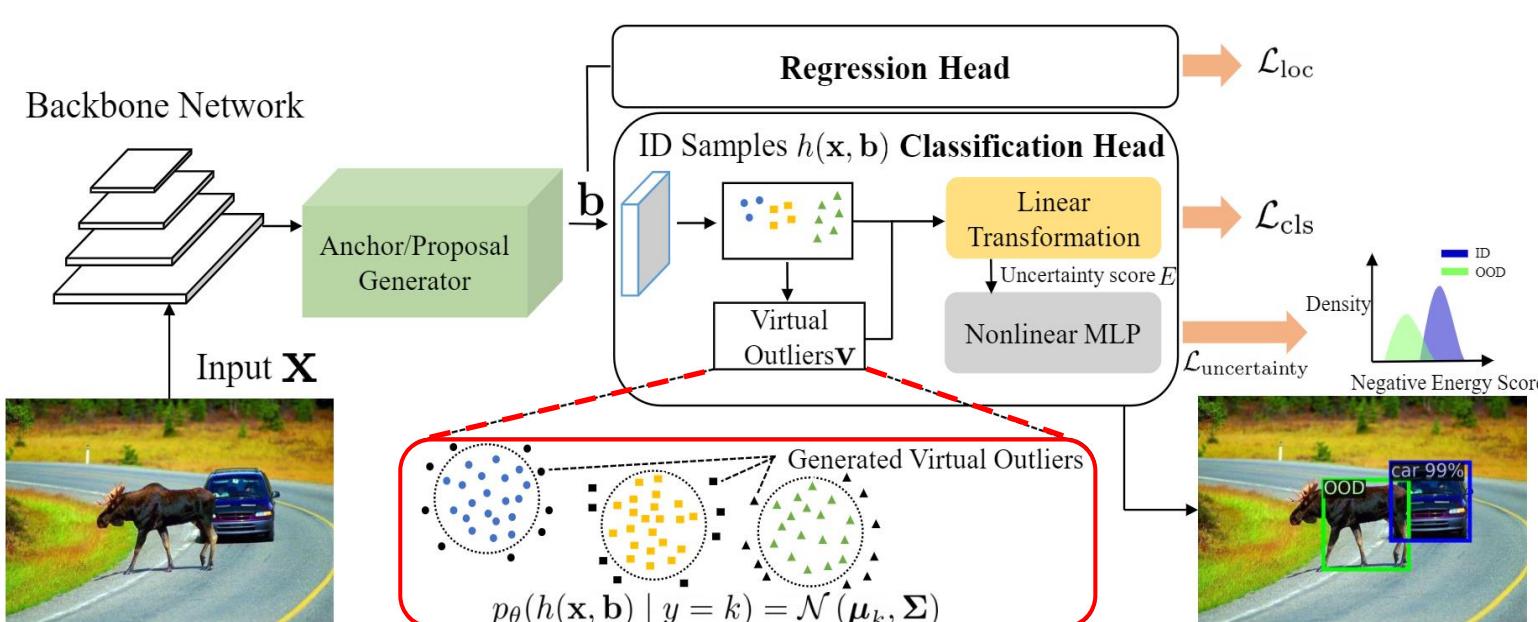


[4] Unknown-Classified Open World Object Detection [ECCV 2022]



Related Work

[5] VOS: Learning What You Don't Know by Virtual Outlier Synthesis [ICLR 2022]

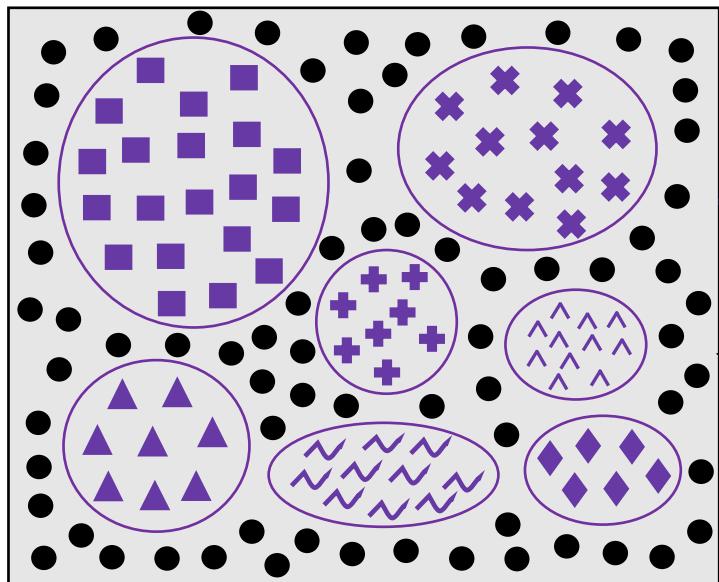


Outlier from Class A as Inlier of Class C

Outlier Class C

Flow Feature Synthesis (Ours)

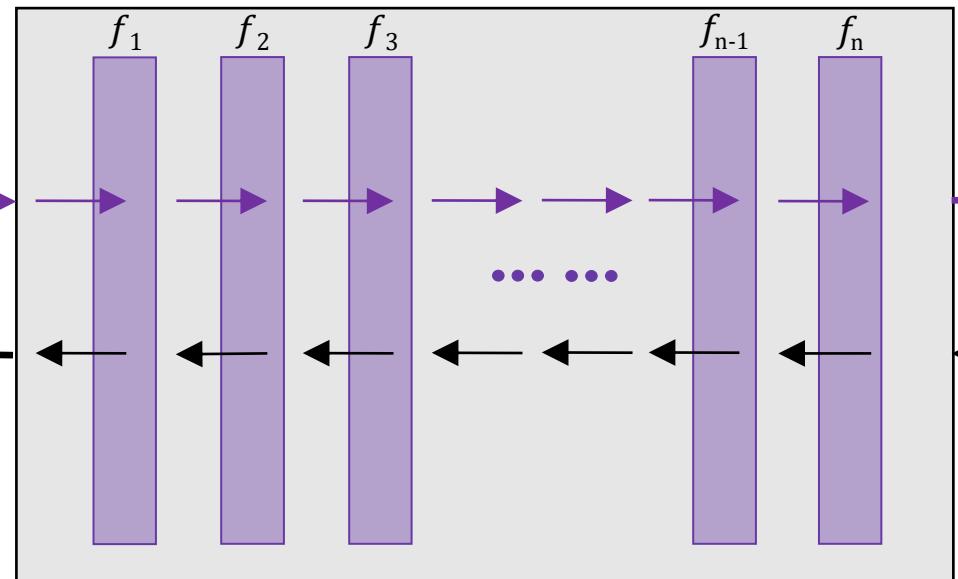
Feature Space



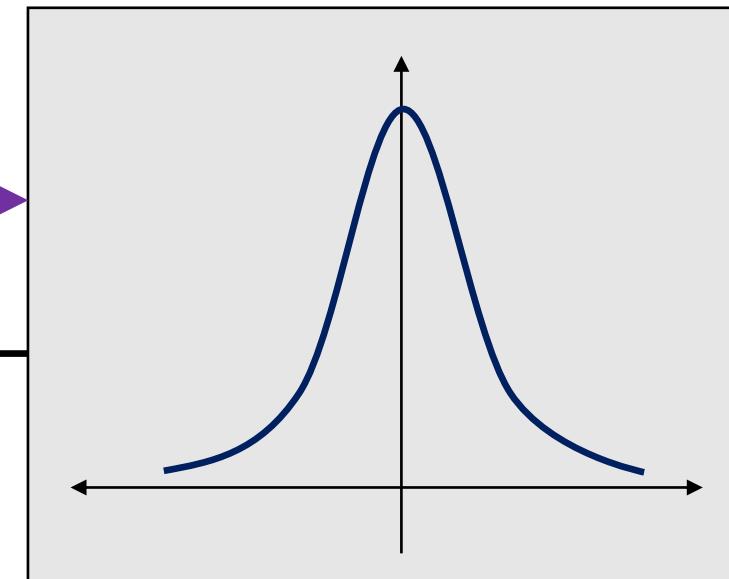
$$p(x)$$

Unknown distribution

Normalizing Flow Network



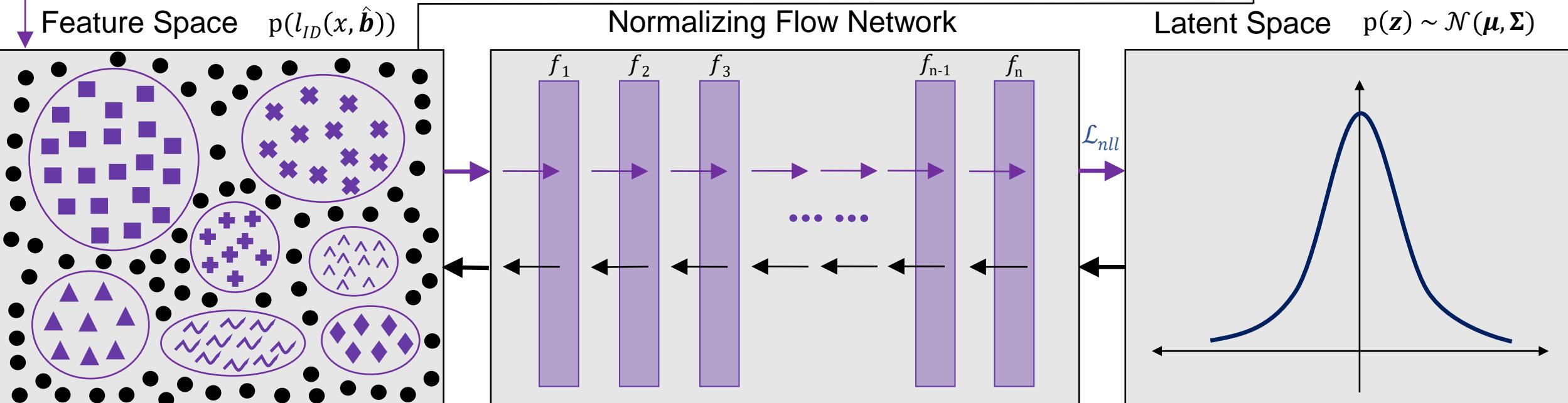
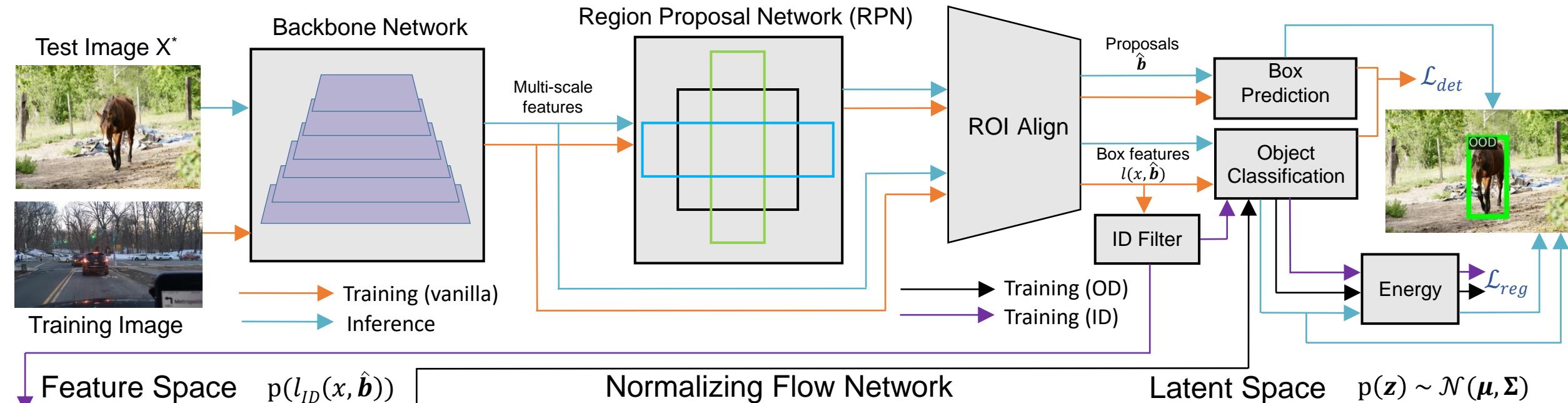
Latent Space



$$p(z) \sim \mathcal{N}(\mu, \Sigma)$$

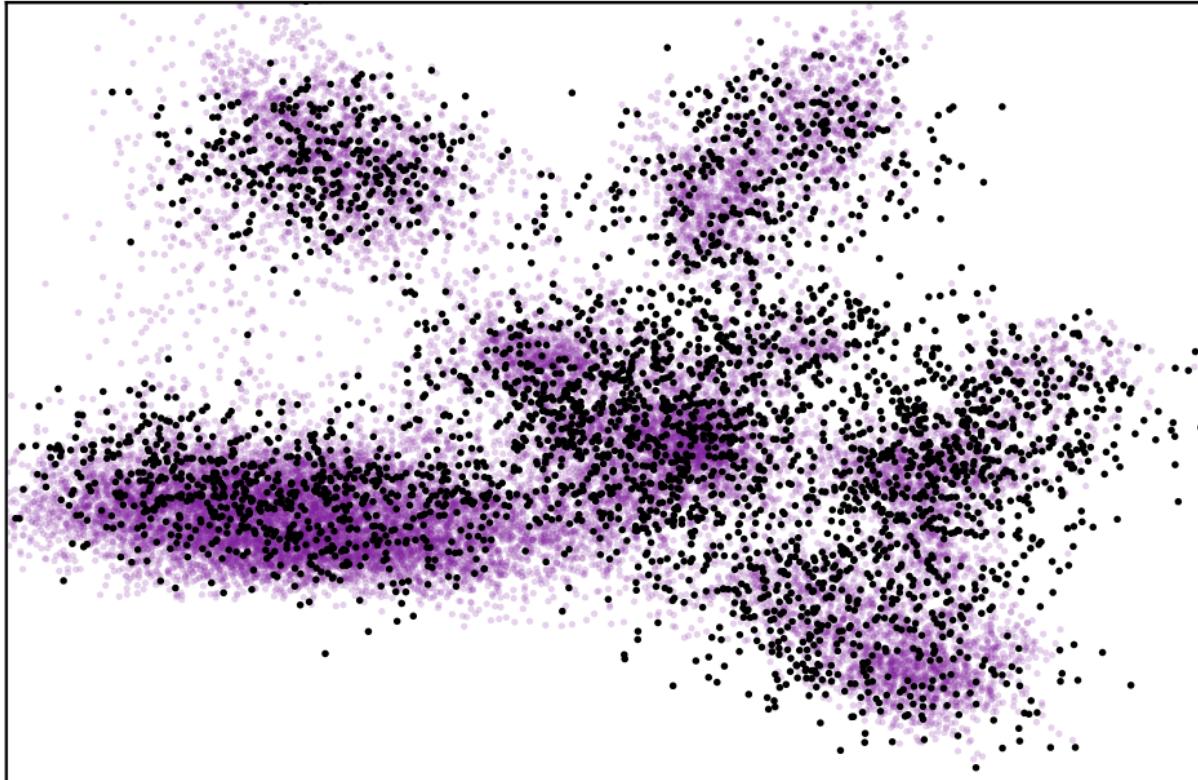
Multivariate Normal Distribution

Flow Feature Synthesis (Ours)

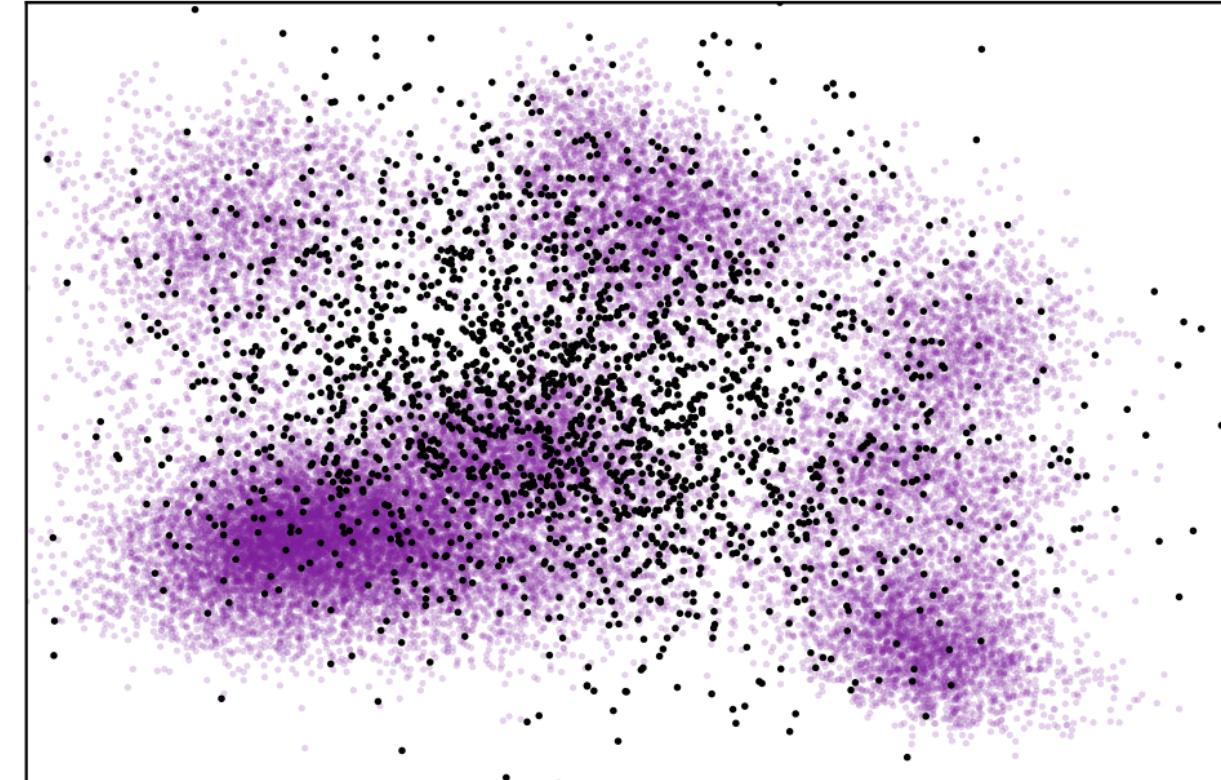


Flow Feature Synthesis (Ours)

VOS



FFS (ours)



Results

ID (Images)	OD	Method	FPR95 (\uparrow)	AUROC (\downarrow)	mAP (\uparrow)
PASCAL-VOC	MS-COCO	VOS [1]	47.77	89.00	51.5
		FFS (Ours)	44.15	89.71	51.8
	OpenImages	VOS [1]	48.33	87.59	51.5
		FFS (Ours)	45.08	88.29	51.8

ID (Videos)	OD	Method	FPR95 (\uparrow)	AUROC (\downarrow)	mAP (\uparrow)
BDD100K	nulImages	STUD [2]	79.75	76.55	32.3
		FFS (Ours)	76.68	77.53	36.2
Youtube-VIS	MS-COCO	STUD [2]	81.14	74.82	27.2
		FFS (Ours)	83.06	76.37	27.6

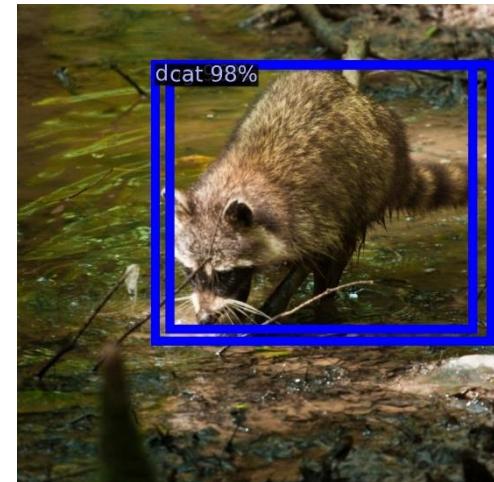
Sources:

[1] Du et. al. VOS: *Learning What You Don't Know by Virtual Outlier Synthesis* [ICLR 2022]

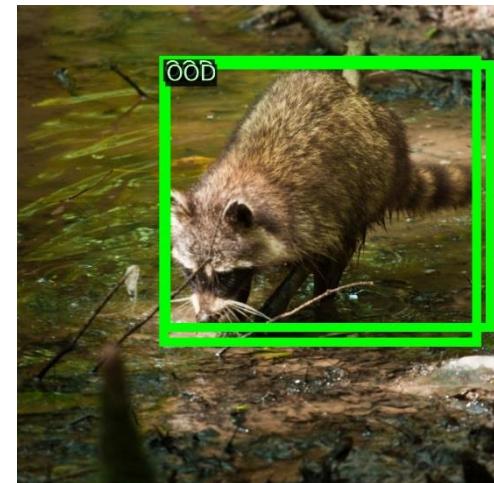
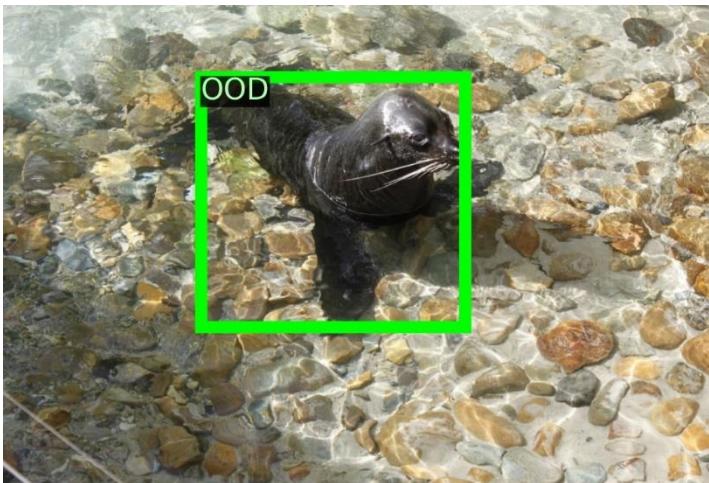
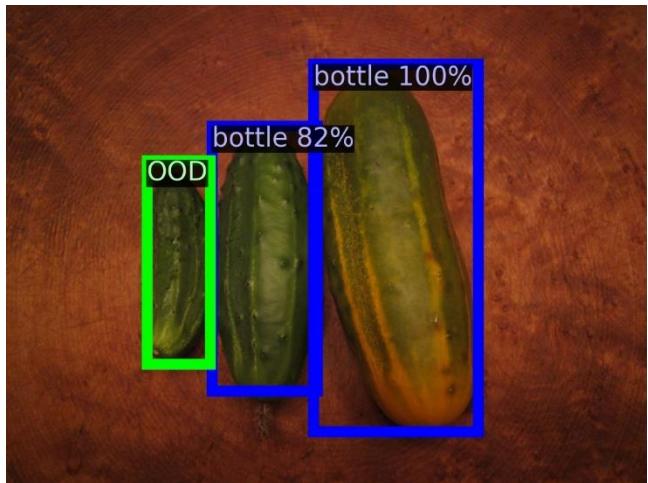
[2] Du et. al. *Unknown-Aware Object Detection: Learning What You Don't Know from Videos in the Wild* [CVPR 2022]

Results

VOS

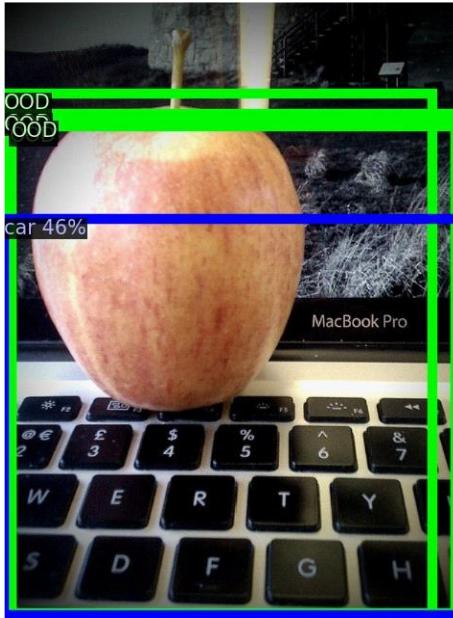


FFS

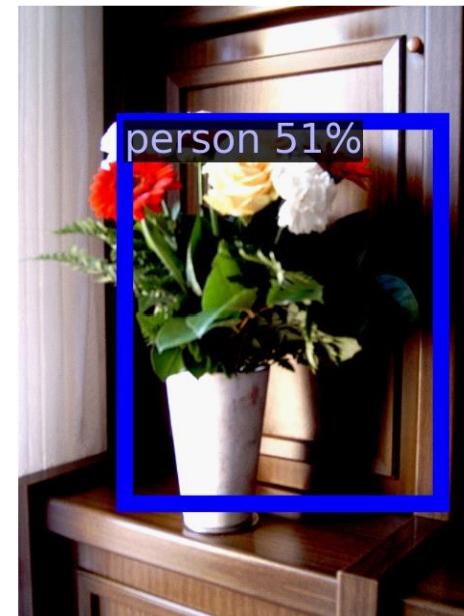
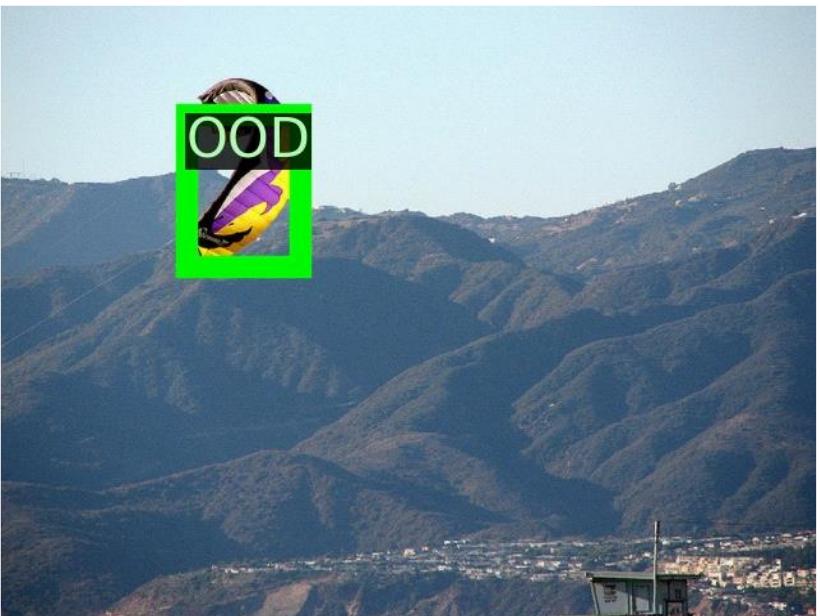


Results

STUD



FFS





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Thanks for listening



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software
campus



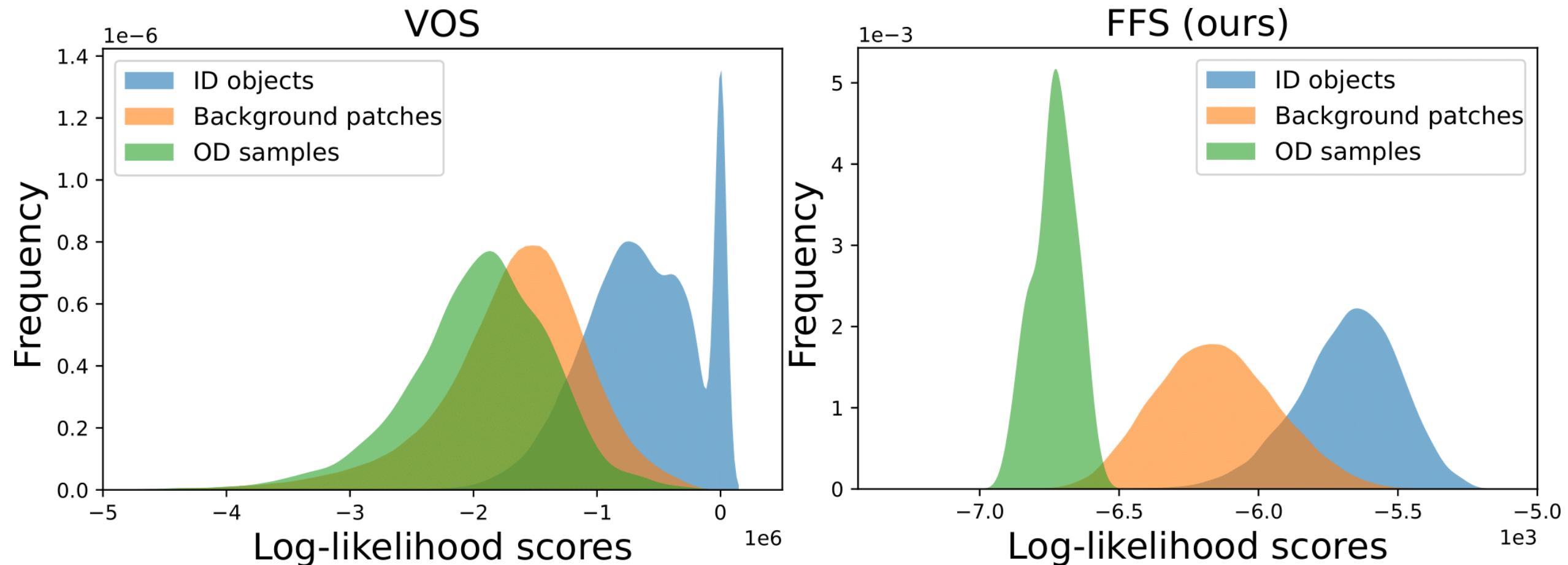
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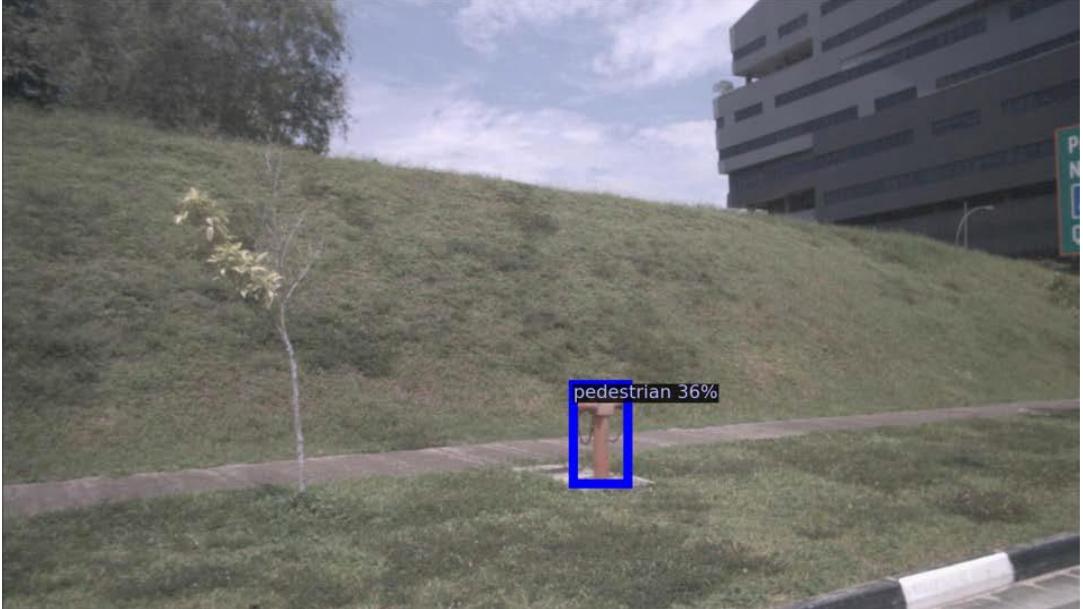


Appendix: Results



Appendix: Results

STUD



FFS

