PCF-Lift:

Panoptic Lifting by Probabilistic Contrastive Fusion

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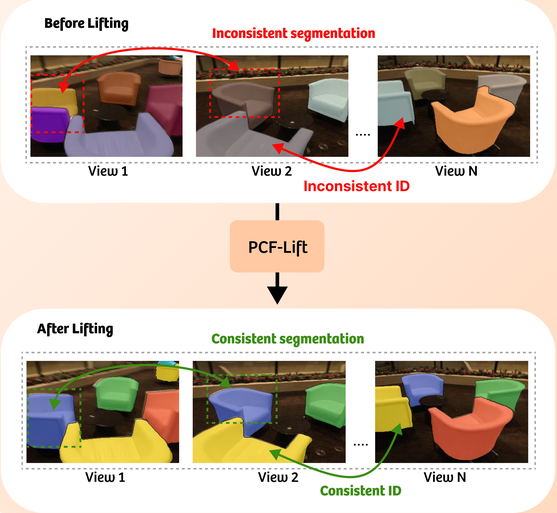
Motivation

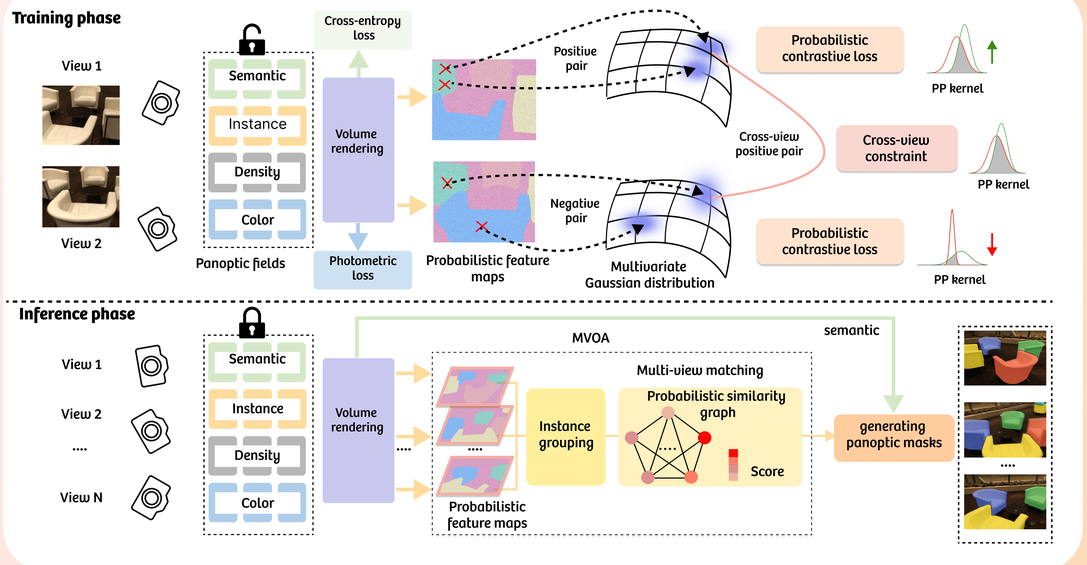
- Panoptic lifting is an effective technique to address the 3D panoptic segmentation task by unprojecting 2D panoptic segmentations from multi-views to 3D scene.
- However, the quality of its result largely depends on the 2D segmentations, which could be noisy and error-prone, so its performance often drops significantly for complex scenes.

We design a new pipeline coined PCF-Lift based on our Probabilistic Contrastive Fusion (PCF) to learn and embed probabilistic features throughout our pipeline to actively consider inaccurate segmentations and inconsistent instance IDs.

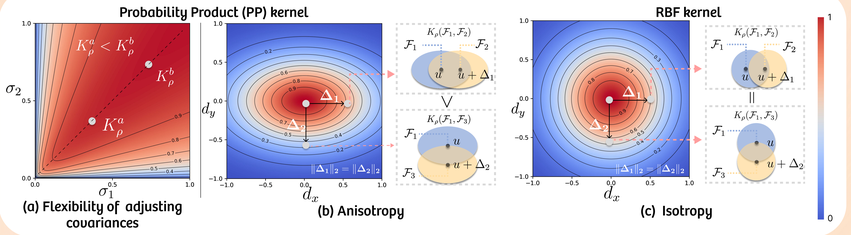
Task



PCF-Lift Framework



Kernel analysis



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Experimental Results

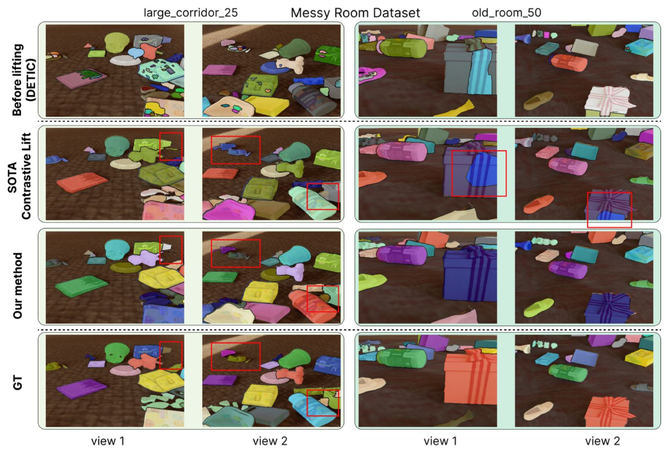
Table 1. Results on the ScanNet dataset.

Method	Venue	Type	SQ^{scene}(%)	RQ^{scene}(%)	PQ^{scene}(%)
DM-NeRF [41]	ICLR'23	3D panoptic segmentation	53.3	46.1	41.7
PNF [24]	CVPR'22	3D panoptic segmentation	63.0	50.7	48.3
PNF [24] + GT BBoxes	CVPR'22	3D panoptic segmentation	70.0	55.9	54.3
Panoptic Lifting [37]	CVPR'23	2D panoptic Lifting	73.5	65.0	58.9
Contrastive Lift [3]	NeurIPS'23	2D panoptic Lifting	75.7	63.6	62.0
Ours	-	2D panoptic Lifting	78.5	65.4	63.5

Table 2. Results on the MOS dataset.

Method/ Number	Old Room Environment (%)				Large Corridor Environment(%)				Mean(%)
	25	50	100	500	25	50	100	500	
Panoptic Lifting [37]	73.2	69.9	64.3	51.0	65.5	71.0	61.8	49.0	63.2
Contrastive Lift [3]	78.9	75.8	69.1	55.0	76.5	75.5	68.7	52.5	69.0
Ours	80.9	78.3	74.8	60.3	81.0	79.4	74.0	58.8	73.4

Qualitative comparison with other methods



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