

3D Focusing-and-Matching Network for Multi-Instance Point Cloud Registration

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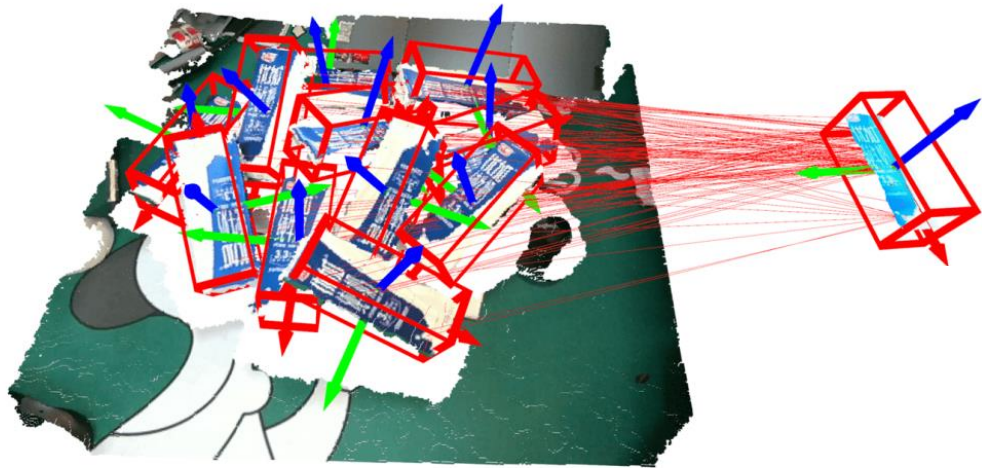
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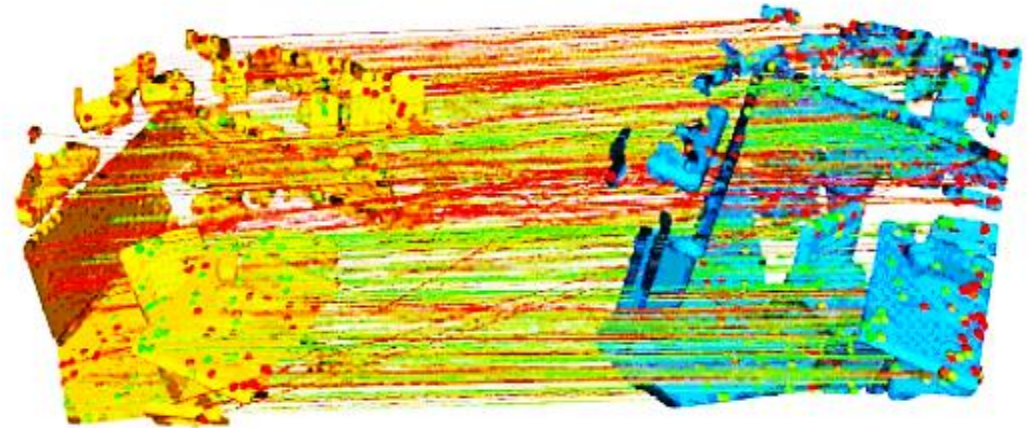
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Multi-Instance Point Cloud Registration



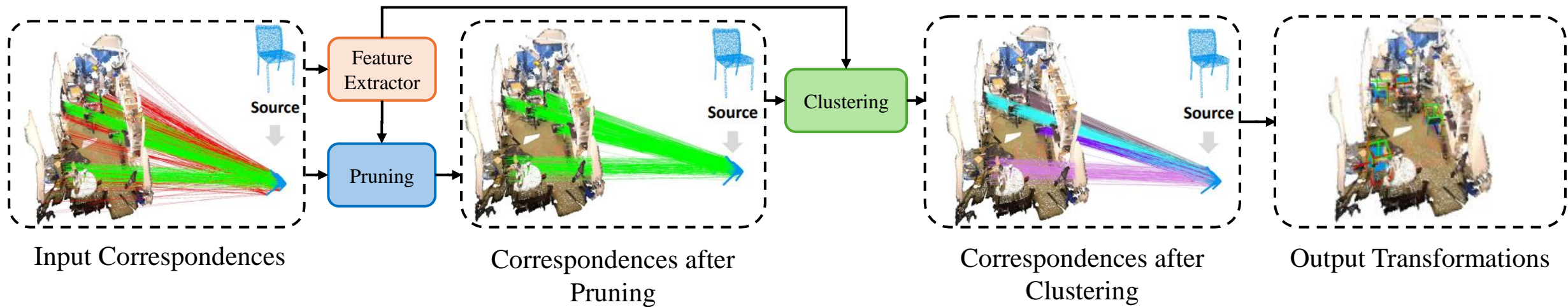
Multi-instance point cloud registration



Pair-wise point cloud registration

Motivation

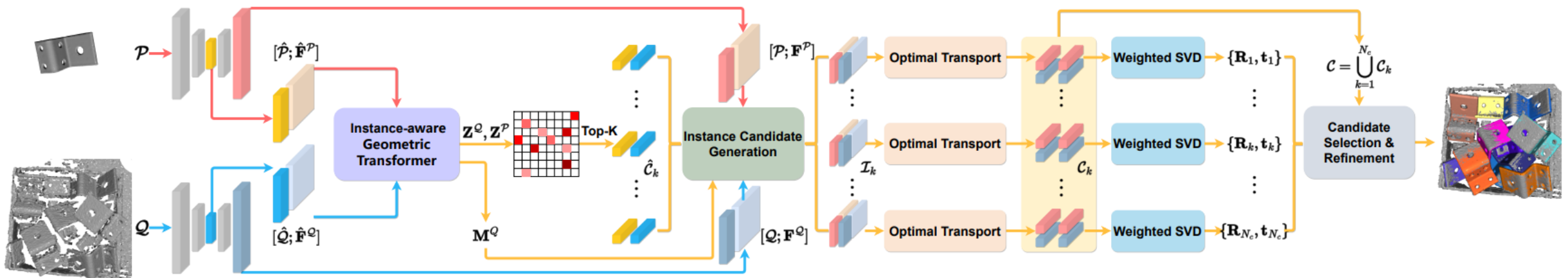
- Early two-stage largely depends on the quality of the correspondences



PointCLM [1]

Motivation

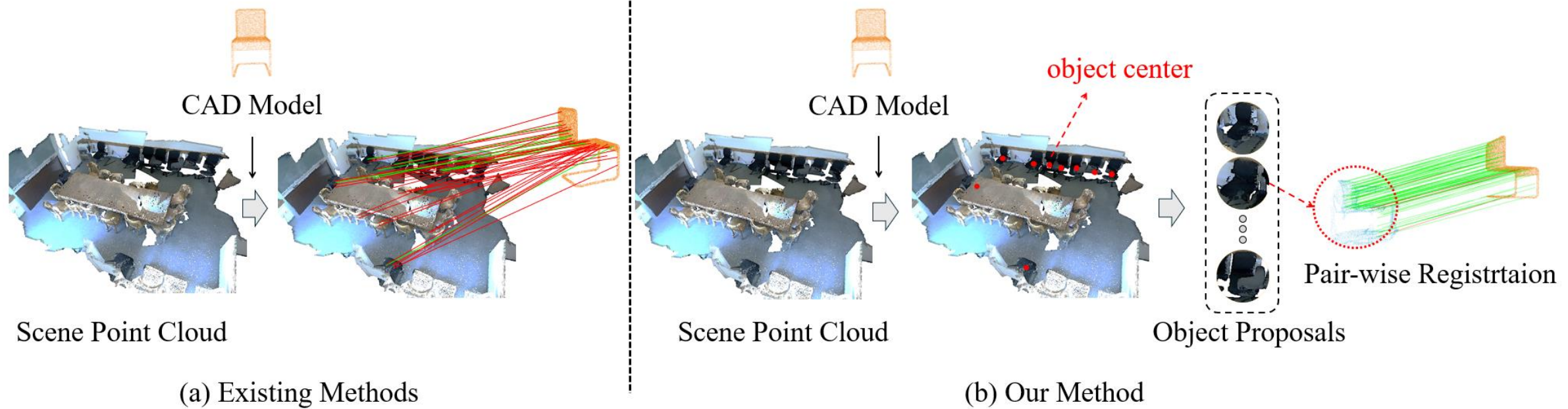
- It is challenging to achieve accurate instance-level correspondence in scenes with multiple objects.



MIRETR [2]

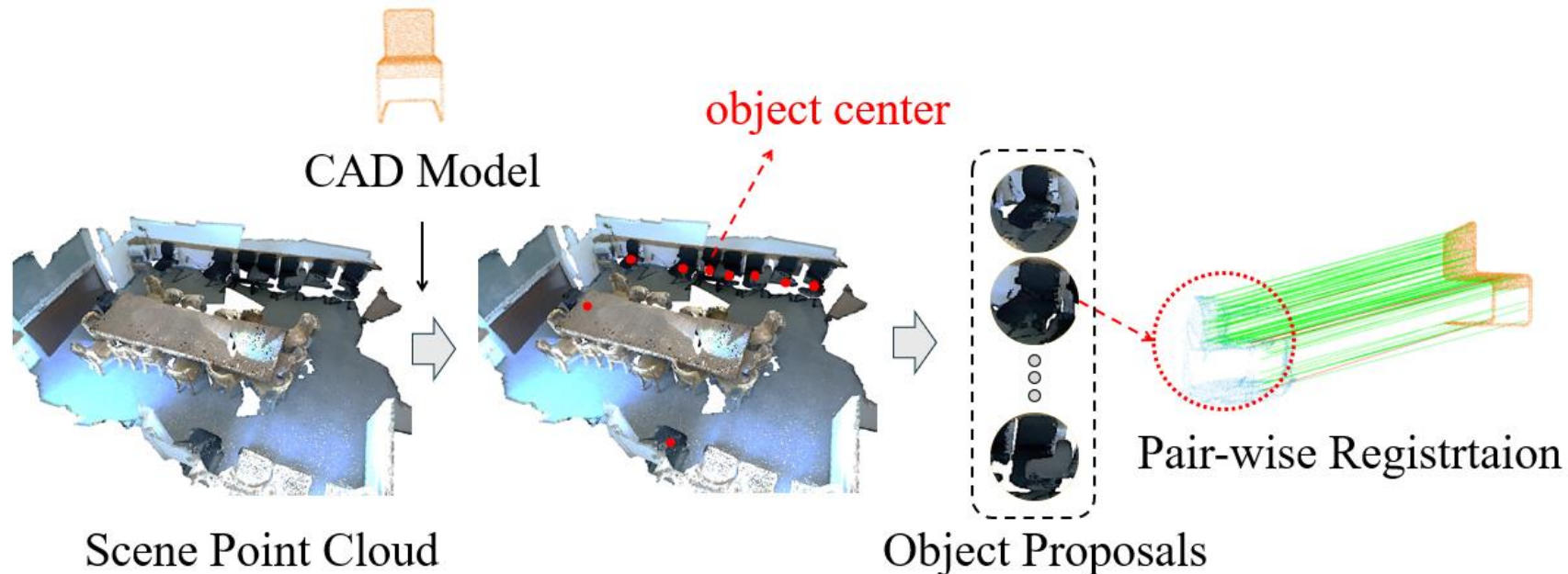
Motivation

- Unlike early methods, we transform the one-to-many paradigm into multiple one-to-one paradigm.



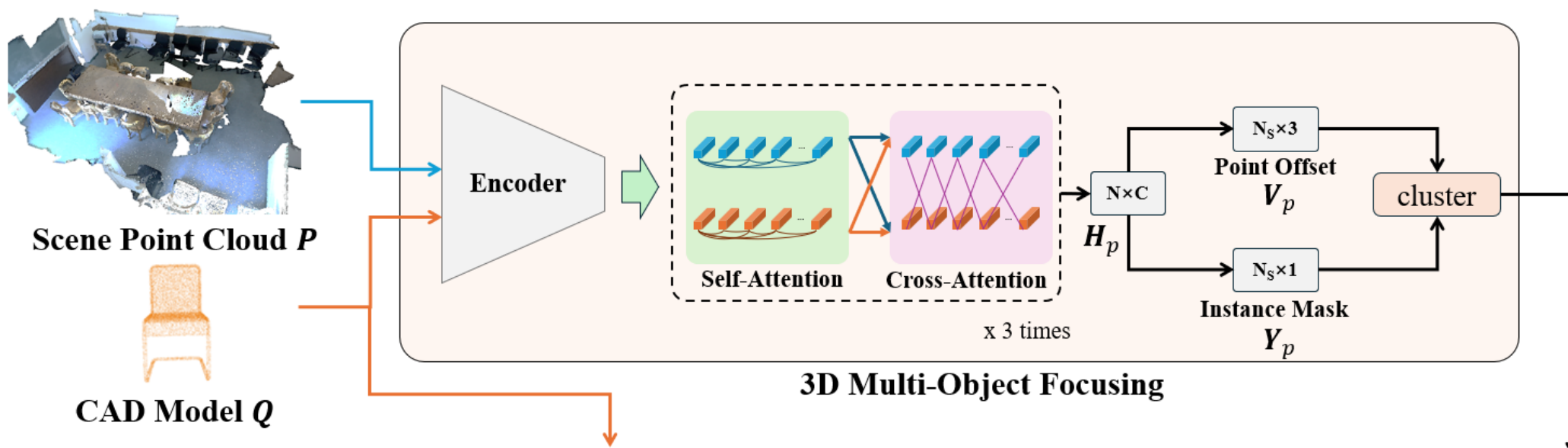
Methods

- Our method mainly consists of two core components, a **3D multi-object focusing module** is used to localize each object firstly, and then the **3D dual-masking instance matching module** is used to perform pair-wise correspondence.



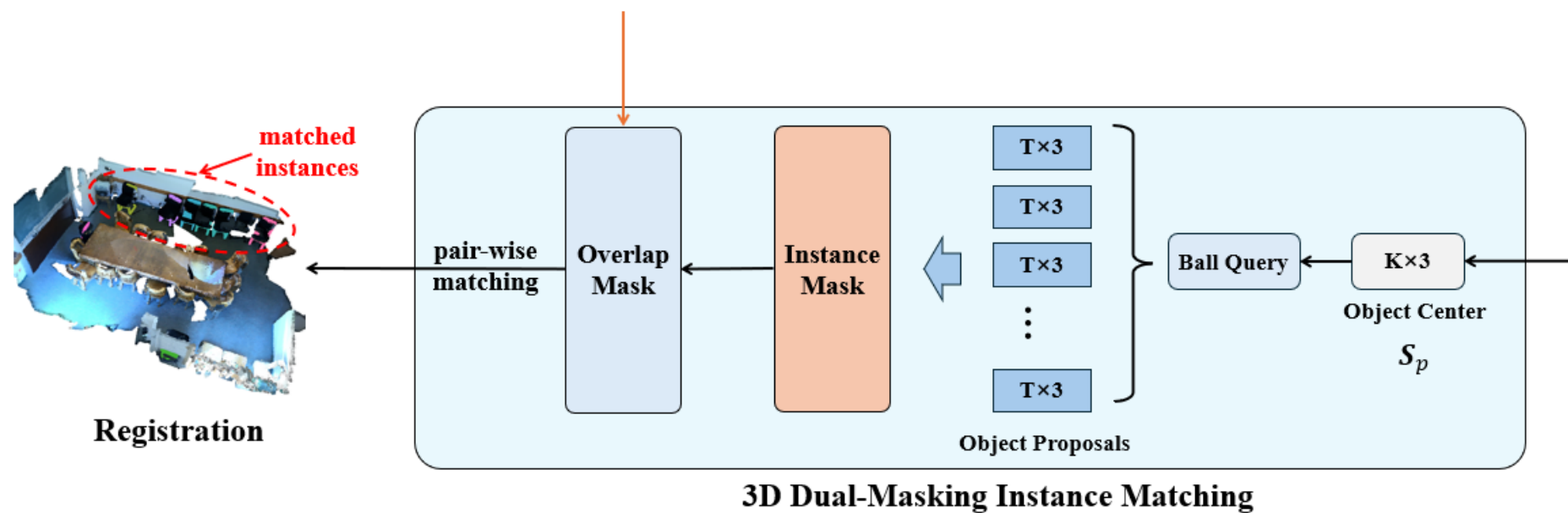
Methods

1. 3D multi-object focusing module



Methods

2. 3D dual-masking instance matching module



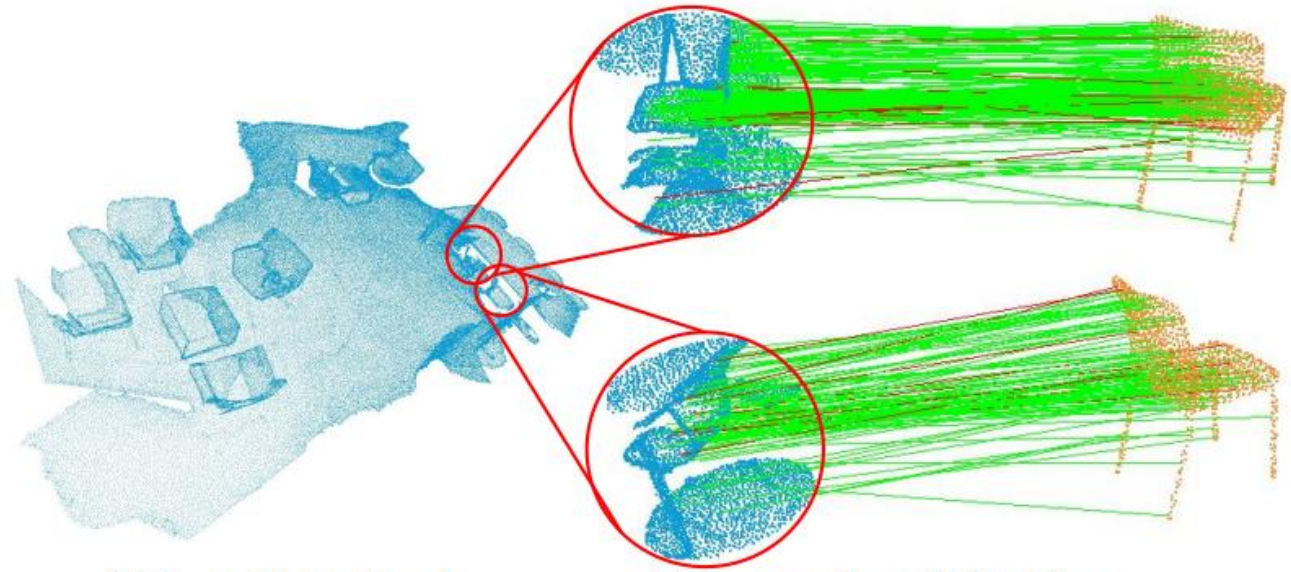
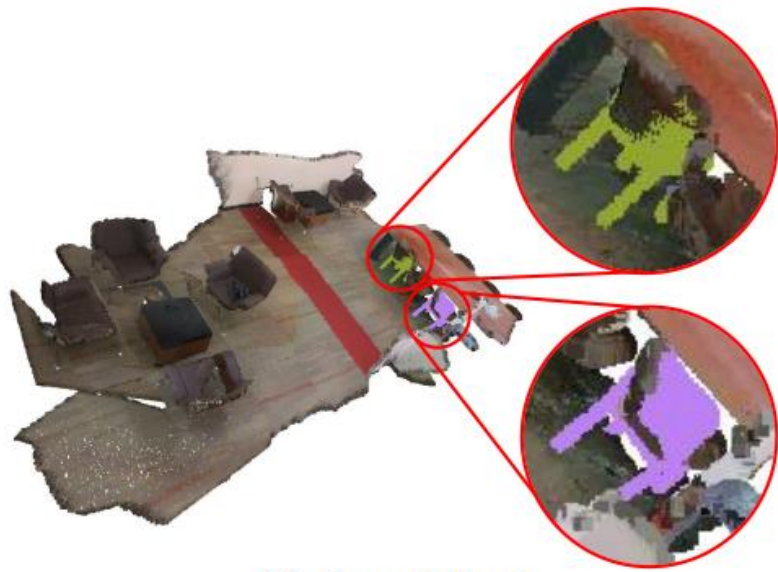
Results

- Quantitative evaluation

Methods	Scan2CAD			ROBI		
	MR (%)	MP (%)	MF (%)	MR (%)	MP (%)	MF (%)
T-Linkage [26]	77.12	46.04	57.65	12.04	10.47	11.20
RansaCov [27]	84.78	71.34	77.48	14.14	26.29	18.38
PointCLM [48]	91.85	91.08	91.46	18.68	40.11	25.48
ECC [36]	96.52	89.03	92.62	24.65	34.85	28.91
MIRETR [46]	95.70	91.21	93.40	38.51	41.19	39.80
3DFMNet (ours)	95.44	94.15	94.79	46.81	50.61	48.63
3DFMNet* (ours)	97.68	94.63	96.14	52.59	63.13	57.38

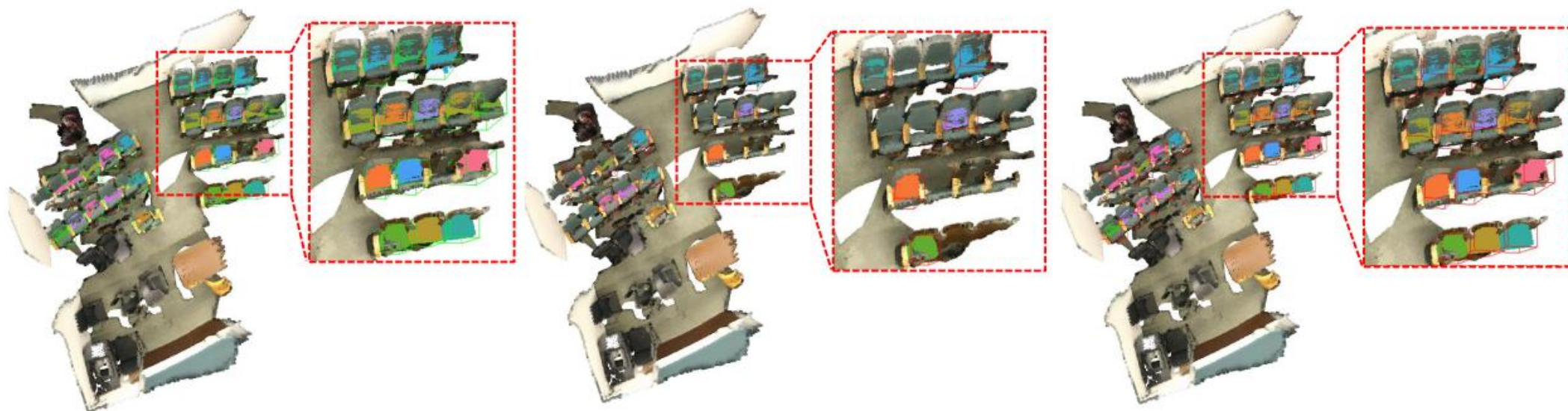
Results

- Results of pair-wise correspondences



Results

- Visualization on Scan2CAD



Inst: 26

(a) Ground Truth

Inst: 12

(b) MIRETR

Inst: 25

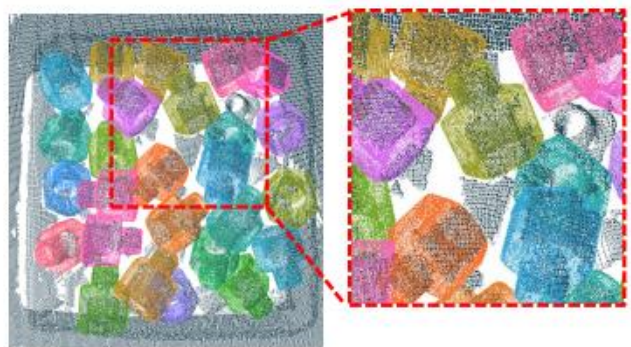
(c) 3DFMNet (ours)

Results

- Visualization on ROBI

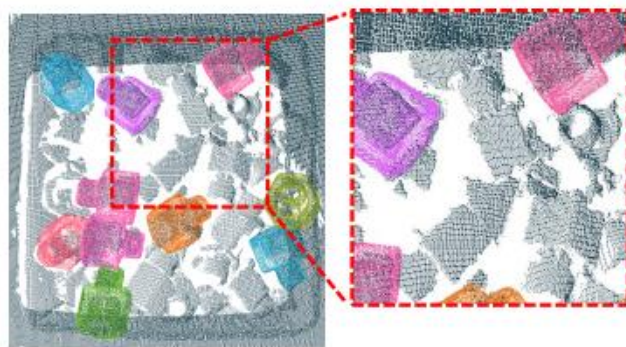


(a) Input



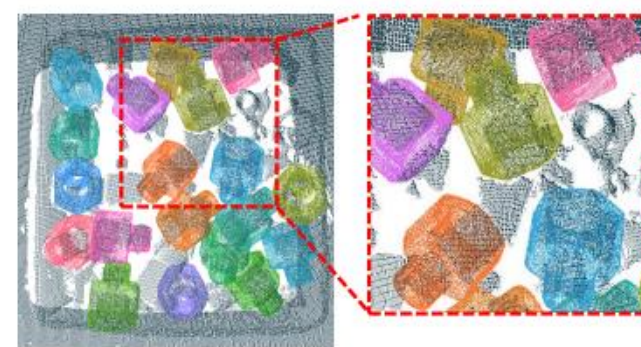
Inst:26

(b) Ground Truth



Inst:10

(c) MIRETR



Inst:19

(d) 3DFMNet (ours)

Thanks for watching!



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