

Supplementary: Weakly Supervised Semantic Point Cloud Segmentation: Towards 10× Fewer Labels

1. Compatibility with Alternative Encoder Networks

We further evaluate an additional the state-of-the-art encoder network with the proposed weakly supervised strategy. Specifically, PointNet++ is evaluated on the ShapeNet dataset. The fully supervised setting (FullSup), 1 point per category labelling (1pt WeakSup) and 10% labelling (10% WeakSup) with our final model are compared. The results in Tab. 1 clearly demonstrate that with very few annotations, shape segmentation is still very robust with different encoder networks.

2. Additional Details on Datasets

We present more details on the weakly supervised segmentation experiments on PartNet in Tab. 2.

3. Additional Qualitative Examples

More qualitative examples on S3DIS and ShapeNet are presented here. We show the following for S3DIS in Fig. 1: RGB view, ground-truth segmentation (GT View), fully supervised segmentation (FullSup. Seg.), baseline weakly supervised method with 10% labelled points (10% Baseline WeakSup. Seg.), our final multi-task weakly supervised method with 10% points labelled (10% OurWeakSup. Seg.), and our final multi-task weakly supervised method with 1 labelled point per category (1pt Our WeakSup. Seg.). Fig.1 shows 9 selected rooms in Area 5 of the S3DIS dataset. In these results, we observe consistent improvement of our method over baseline method. Moreover, the 10% weak supervision results are even comparable to the fully supervised one and the 1pt weak supervision results is also surprisingly good. We further visualize additional segmentation results on the ShapeNet dataset with both 1pt and 10% weak supervision. The gap between weak supervision and full supervision is even smaller on the shape segmentation task.

Table 1: Evaluation of alternative encoder network on ShapeNet dataset.

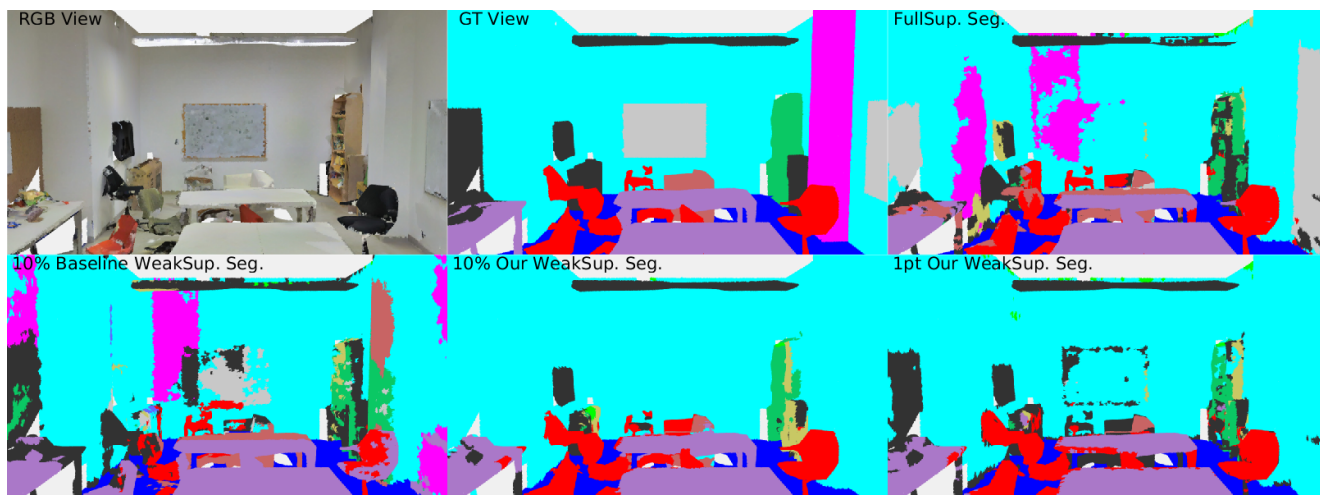
Encoder Net	Setting	ShapeNet																	
		CatAvg	SampAvg	Air.	Bag	Cap	Car	Chair	Ear.	Guitar	Knife	Lamp	Lap.	Motor.	Mug	Pistol	Rocket	Skate.	Table
PointNet++	FullSup	81.87	84.89	82.74	81.19	87.84	78.11	90.71	73.40	90.93	86.04	83.36	95.07	72.38	94.96	80.03	55.13	76.05	81.98
	1pt WeakSup	80.82	84.19	80.86	76.90	86.94	75.57	90.35	74.00	90.34	86.05	83.66	95.12	66.97	93.22	79.20	57.93	74.30	81.68
	10% WeakSup	81.27	84.70	82.36	76.55	86.82	77.48	90.52	73.01	91.16	85.35	83.07	95.34	69.97	94.88	80.04	57.03	74.59	82.14

Table 2: Detailed results on PartNet dataset.

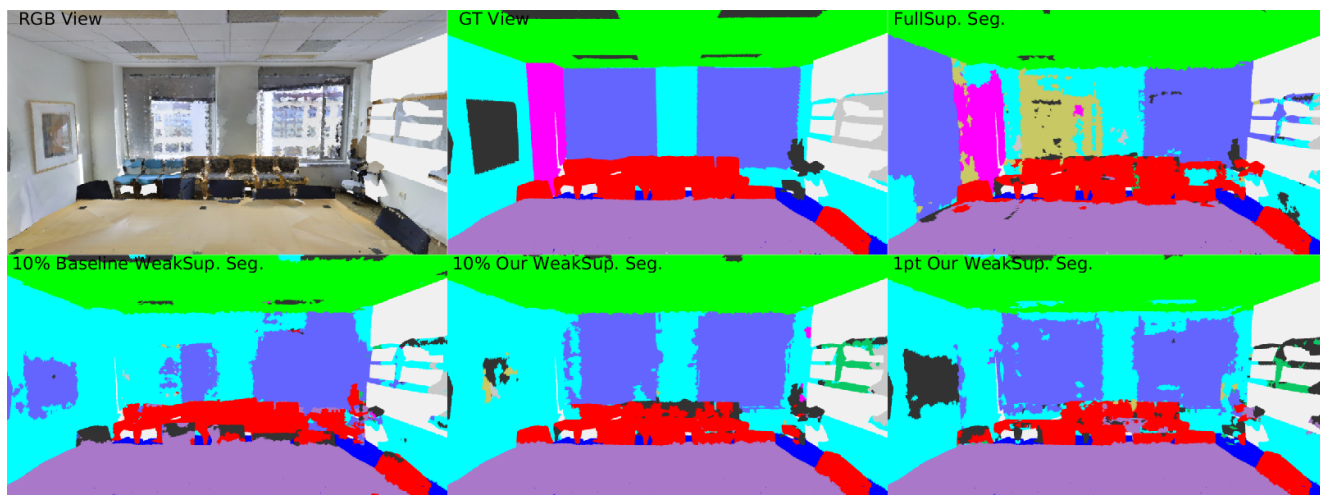
Setting	Model	CatAvg	Bag	Bed	Bott.	Bowl	Chair	Clock	Dish.	Disp.	Door	Ear.	Fauc.	Hat	Key	Knife	Lamp	Lap.	Micro.	Mug	Frid.	Scis.	Stora.	Table	Trash.	Vase
Full Sup.	PointNet	57.9	42.5	32.0	33.8	58.0	64.6	33.2	76.0	86.8	64.4	53.2	58.6	55.9	65.6	62.2	29.7	96.5	49.4	80.0	49.6	86.4	51.9	50.5	55.2	54.7
	PointNet++	65.5	59.7	51.8	53.2	67.3	68.0	48.0	80.6	89.7	59.3	68.5	64.7	62.4	62.2	64.9	39.0	96.6	55.7	83.9	51.8	87.4	58.0	69.5	64.3	64.4
	DGCNN	65.6	53.3	58.6	48.9	66.9	69.1	35.8	75.2	91.2	68.5	59.3	62.6	63.7	69.5	71.8	38.5	95.7	57.6	83.3	53.7	89.7	62.6	65.3	67.8	66.8
Weak Sup. 1pt	Baseline	50.2	24.4	30.1	20.5	38.0	65.9	35.3	64.9	84.3	52.6	36.7	47.1	47.9	52.2	55.2	34.1	92.4	49.3	59.5	49.6	80.1	44.6	49.8	40.4	49.5
	Ours	54.6	28.4	30.8	26.0	54.3	66.4	37.7	66.3	81.0	51.7	44.4	51.2	55.2	56.2	63.1	37.6	93.5	49.7	73.5	50.6	83.6	46.8	61.1	44.1	56.8
Weak Sup. 10%	Baseline	63.2	54.4	56.8	44.1	57.6	67.2	41.3	70.0	91.3	61.8	65.8	57.2	64.2	64.2	66.7	37.9	94.9	49.1	80.2	49.6	84.1	59.3	69.7	66.7	63.0
	Ours	64.5	47.3	55.5	64.7	56.2	69.1	44.3	68.3	91.1	61.3	62.8	65.2	63.0	64.6	67.9	37.8	95.5	50.1	82.7	49.6	85.8	59.5	71.2	67.7	65.9

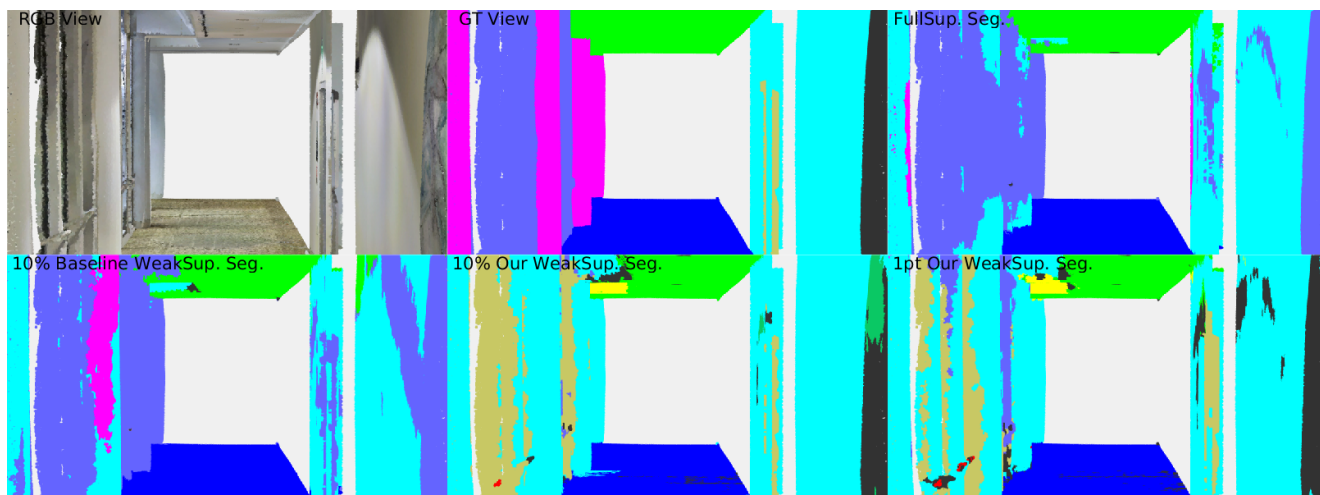
Figure 1: Additional examples comparing full supervision and weak supervision for S3DIS semantic segmentation.

(a) Area5_conferenceRoom_2

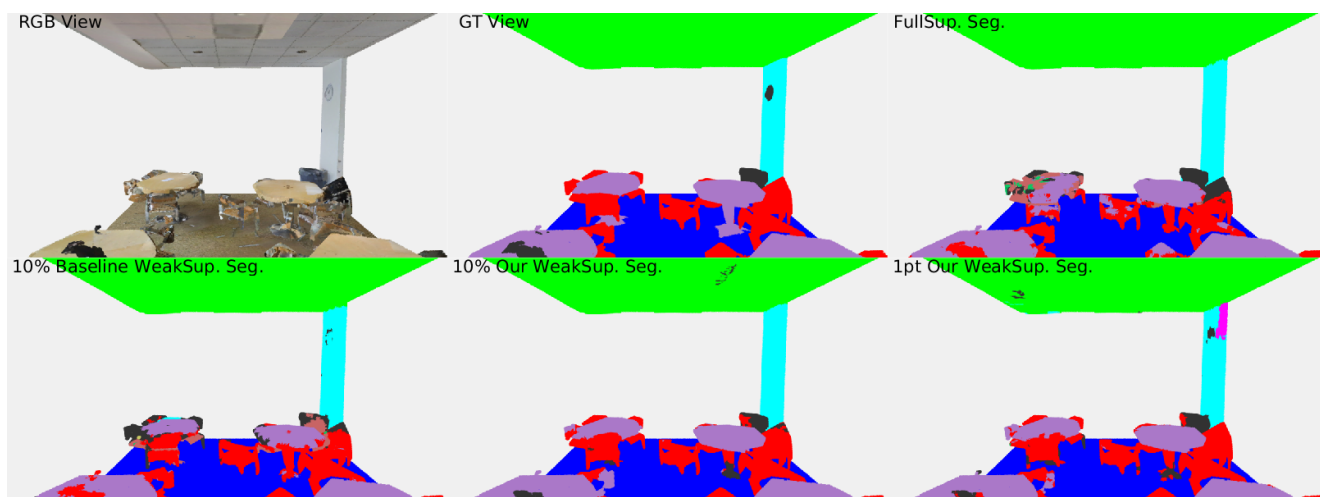


(b) Area5_conferenceRoom_3

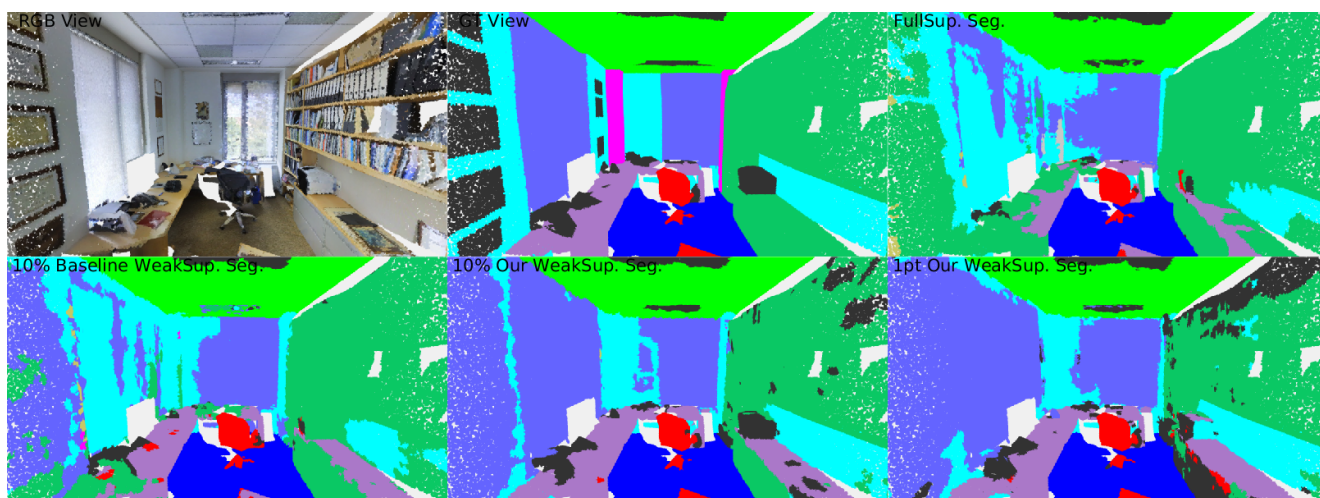




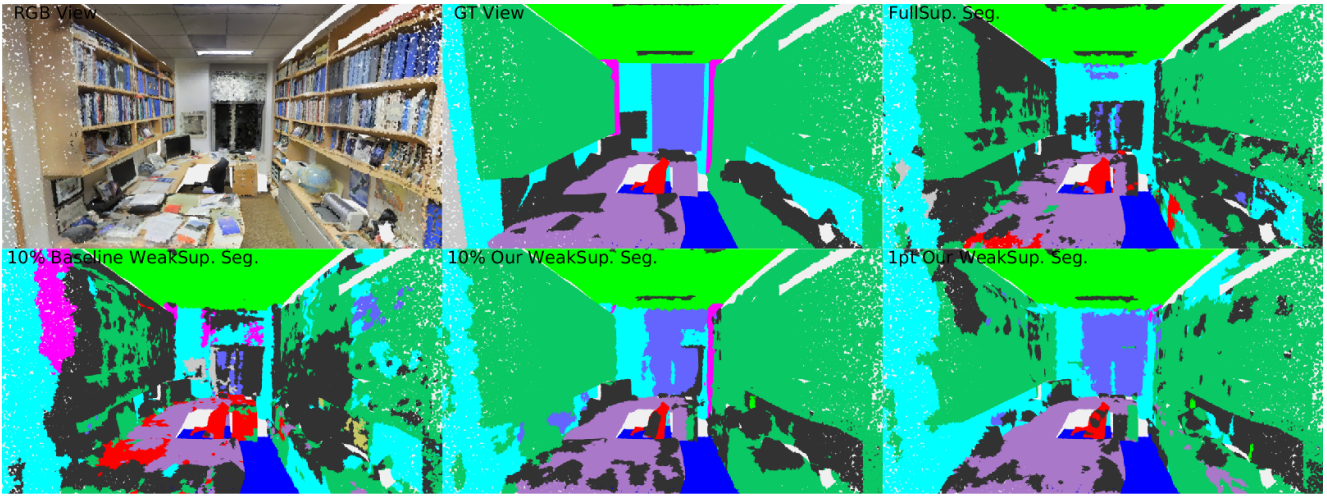
(c) Area5_hallway_1



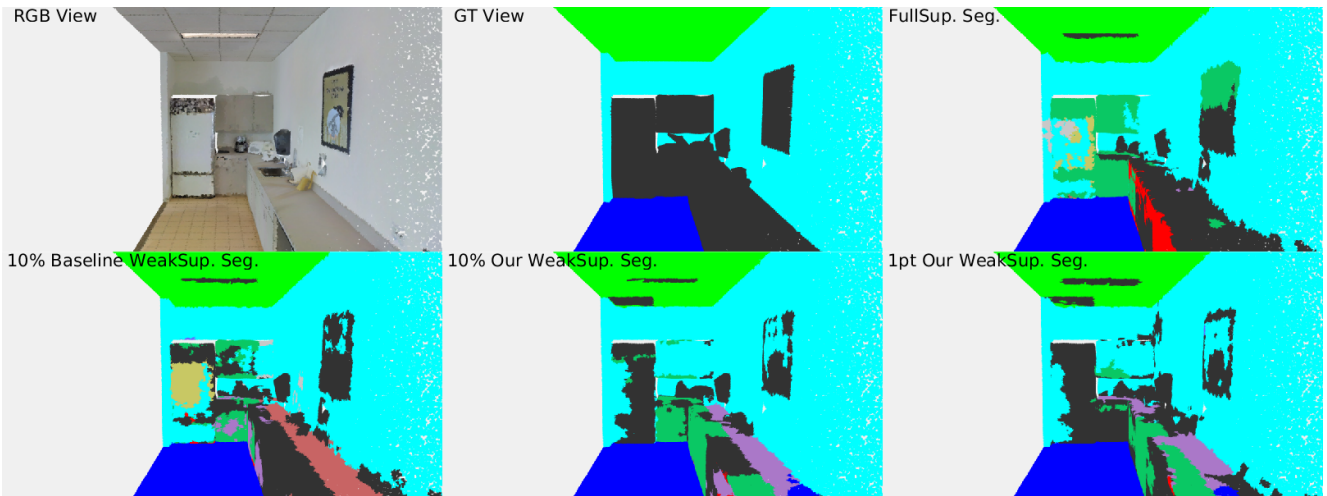
(d) Area5_lobby_1



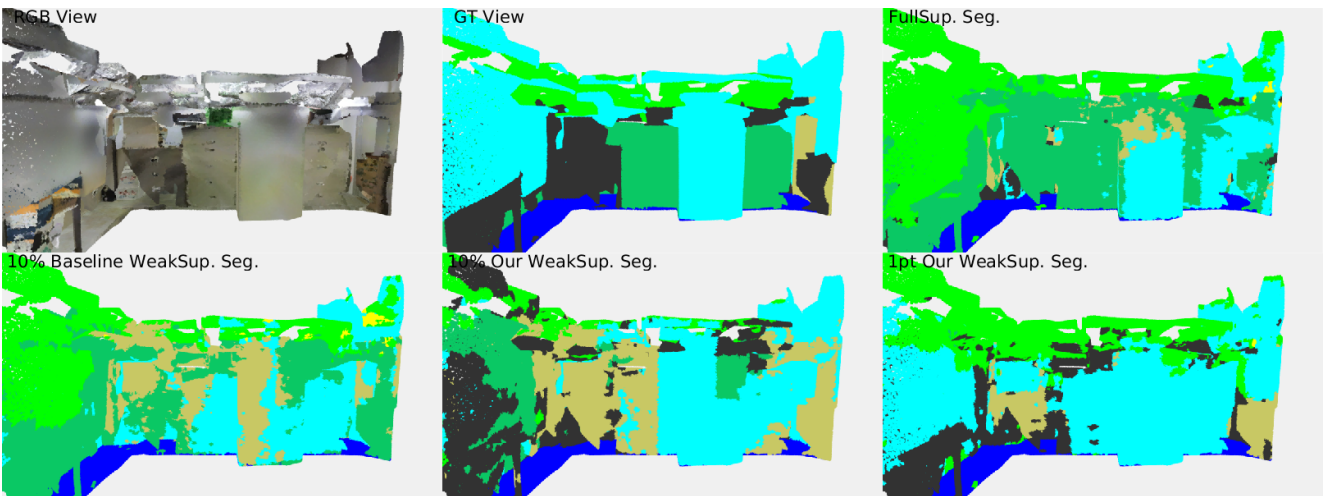
(e) Area5_office_1



(f) Area5_office_10



(g) Area5_pantry_1



(h) Area5_storage_2

