

Supplementary Material for DSPDet3D: 3D Small Object Detection with Dynamic Spatial Pruning

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This supplementary material is organized as follows:

- Section A provides illustrated examples of our theoretical analysis.
- Section B details the ScanNet-md40 and TO-SCENE-down benchmarks.
- Section C details the experimental results with per-category APs.

We also include a demo video and our source code in the supplementary material.

A Illustrated Examples

We provide detailed explanation of Equation (1), (2), (3) and (4) in this section. Our theoretical derivation is shown in Figure 1.

Eq1: Assuming we are pruning f_i , without loss of generality, we only need to consider one object c_j ($j < i$) to acquire $\mathcal{K}_i(c_j)$. Then we can summarize all $\mathcal{K}_i(c_j)$ to acquire the final pruning mask M_i .

Eq2: Figure 1 (a) shows the expansion of affecting field between level i and $i - 1$. Eq (2) can be detailed as:

$$aff(\{x_k\}, y, \{z_k\}) = [1 + \sum_{k=1}^m (x_k - 1)] \cdot 2 + 1 + y - 1 + \sum_{k=1}^n (z_k - 1) \quad (1)$$

Given $\{x_k\} = \emptyset$, $\{y\} = 3$ and $\{z_k\} = \{3, 3\}$, the affecting field $\mathcal{A}_{i,i-1}(v_i)$ is a cube of $9 \times 9 \times 9$ voxels in level $i - 1$.

Eq3: According to Figure 1 (b) and (c), to ensure $\mathcal{C}_j(c_j, P)$ unaffected, we only need to ensure $\mathcal{C}_{i-1}(c_j, P)$ unaffected, as we explained in Line 200-203, Page 7. With the help of (a), we can derive the range r of pruning mask $\mathcal{K}_i(c_j)$, as shown in Eq (3). **In this way, we can prune all voxels outside the $r \times r \times r$ pink box in level i without affecting $\mathcal{C}_{i-1}(c_j, P)$.**

Eq4: However, we need to further ensure pruning in level i has no cumulative affect on pruning in level $i - 1$. When we prune f_{i-1} , if $j < i - 1$, we still need to ensure

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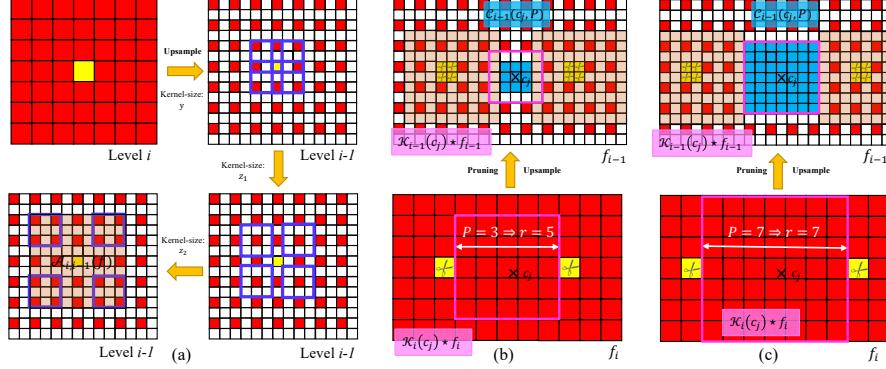


Fig. 1: Visual demonstration of our pruning strategy. (a) shows how a voxel in level i affects neighbor voxels in level $i - 1$ after several convolutional layers. The affecting field $\mathcal{A}_{i,i-1}(f)$ is shown in translucent mask. (b) and (c) show how the choice of P affects the pruning strategy, where the blue region is the unaffected $P \times P \times P$ voxels $\mathcal{C}_{i-1}(c_j, P)$, the black cross is object center c_j and the pink box is the pruning strategy $\mathcal{K}(c_j)$. All voxels outside the pink box will be pruned.

$\mathcal{C}_{i-2}(c_j, P)$ unaffected. Similarly, we can derive the pruning mask $\mathcal{K}_{i-1}(c_j)$, which is a cube with length $r \cdot S_{i-1}$. Note that the unpruned voxels should be unaffected in order for the recursion to be correct. In another word, the pink box in level $i - 1$ should be fully covered by the blue region. This is the meaning of Eq (4). When $P = 3$, then $r = 5$, so that some unpruned voxels are still affected. When $P = 7$, then $r = 7$, which exactly ensures the unpruned voxels to be unaffected.

B Details on Benchmarks

We demonstrate the detailed categories and the number of objects in each class for both benchmarks in Figure 2. We observe significant long tail effect in both benchmarks and find that the number of small objects in the real world dataset (i.e. ScanNet) is usually small, which poses great challenge to the 3D object detector.

In order to prove the necessity of downsampling for small objects in TO-SCENE-down, we further visualize the scenes in TO-SCENE before and after downsampling in Figure 3. It can be seen that the original dataset [1] contains densely and non-uniformly sampled small objects, whose density is obviously much larger than other objects and backgrounds. While after our downsampling, the overall scenes are closer to naturally sampled real scenes.

C Class-specific Results

We provide more detailed experimental results on ScanNet-md40 and TO-SCENE-down with class-specific APs. Table 1, 2, 3 and 4 refer to AP@0.25 on ScanNet-md40, AP@0.5 on ScanNet-md40, AP@0.25 on TO-SCENE-down and AP@0.5 on

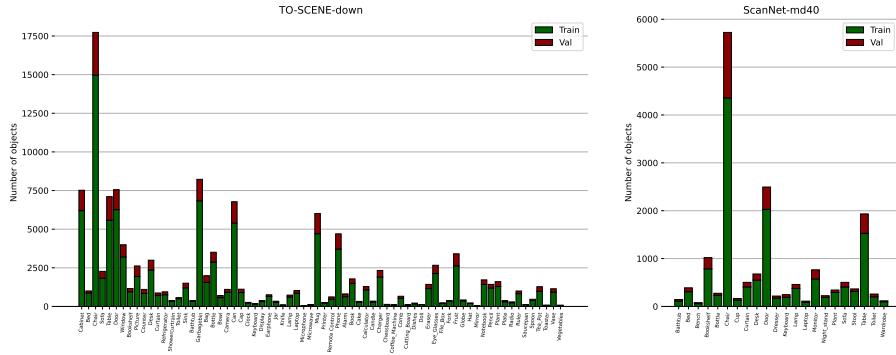


Fig. 2: Number of objects in each category for ScanNet-md40 and TO-SCENE-down. For each category, we report the total number of objects on training and validation sets and use red and blue bars to distinguish the numbers on each set.

TO-SCENE-down respectively. We highlight the categories of small objects in blue. It can be seen that DSPDet3D achieves much better performance on small objects compared with the state-of-the-arts.

References

1. Xu, M., Chen, P., Liu, H., Han, X.: To-scene: A large-scale dataset for understanding 3d tabletop scenes. In: ECCV. pp. 340–356. Springer (2022) [2](#), [4](#)



Fig. 3: Visualization of scenes in TO-SCENE before (originally provided in [1]) and after (our TO-SCENE-down benchmark) downsampling. After downsampling, the density of points on small objects is closer to others, which is more realistic.

Table 1: The class-specific detection results (AP@0.25) of different methods on ScanNet-md40 benchmark. We highlight the categories of small objects in blue.

	<i>VoteNet</i>	<i>VoteNet_S</i>	<i>H3DNet</i>	<i>GroupFree3D</i>	<i>GroupFree_S</i>	<i>RBGNet</i>	<i>CAGroup3D</i>	<i>FCAF3D</i>	<i>TR3D</i>	<i>FCAF3D_higher</i>	<i>TR3D_higher</i>	<i>Ours($\tau = 0$)</i>	<i>Ours($\tau = 0.3$)</i>
Bathtub	90.39	84.26	91.46	92.70	71.36	44.22	44.69	83.65	93.93	88.16	84.89	86.77	86.77
Bed	87.30	89.03	88.46	89.11	71.58	90.74	87.74	86.91	87.64	88.28	87.01	89.31	89.38
Bench	48.34	40.56	46.89	38.20	10.01	47.79	42.09	39.20	53.05	48.73	53.58	52.93	53.15
Bookshelf	55.47	54.43	59.88	58.90	20.97	61.86	69.09	65.88	66.17	66.01	62.27	67.06	67.43
Bottle	0.00	0.06	1.22	4.16	0.00	0.20	5.56	2.98	3.23	12.19	26.58	26.91	17.36
Chair	89.03	89.15	91.70	93.20	56.76	94.16	95.04	94.96	95.58	94.90	95.52	95.68	95.65
Cup	0.00	0.00	0.00	4.37	0.01	0.00	0.00	5.85	12.95	6.60	14.60	20.86	24.04
Curtain	56.69	59.17	67.00	70.31	27.31	62.81	72.45	68.00	62.54	67.06	69.52	70.73	70.72
Desk	68.81	60.05	76.48	75.13	40.43	76.83	79.21	74.94	74.27	70.04	74.33	72.83	72.87
Door	53.17	48.57	59.45	61.62	16.70	59.55	61.78	60.26	60.91	63.61	65.06	67.68	67.82
Dresser	32.63	38.88	34.70	48.60	28.88	40.23	60.42	31.62	40.82	37.22	36.81	28.67	26.37
Keyboard	0.03	0.19	0.09	3.19	0.00	0.00	22.37	27.96	46.58	44.27	58.24	58.55	60.91
Lamp	49.26	43.29	49.33	59.05	8.76	56.90	61.19	61.00	61.32	65.55	62.65	64.34	64.60
Laptop	1.17	3.91	11.09	19.10	0.81	23.11	38.45	36.95	47.31	47.64	67.38	72.85	72.77
Monitor	67.18	68.76	74.88	83.35	30.12	83.63	86.93	88.71	89.20	91.73	88.96	92.87	91.49
Night_Stand	81.35	78.26	86.12	83.77	56.51	80.86	91.62	90.39	91.44	80.64	92.10	81.95	81.41
Plant	29.36	18.08	29.45	21.71	4.24	50.47	59.87	43.29	35.78	61.35	58.18	65.92	63.95
Sofa	88.89	87.33	89.09	84.79	53.99	91.32	91.41	88.38	91.32	85.49	89.90	90.62	90.61
Stool	44.34	37.72	37.63	44.54	17.66	51.41	55.25	52.51	42.65	53.21	46.76	43.95	45.49
Table	64.35	60.42	65.69	74.31	32.61	74.41	70.37	71.47	69.99	69.52	70.46	70.66	70.63
Toilet	94.01	95.48	97.89	95.82	82.95	97.76	99.73	99.39	98.81	99.83	99.60	99.85	99.85
Wardrobe	20.67	12.04	18.72	43.01	16.02	26.80	31.12	34.48	29.49	36.17	29.51	17.61	17.66

Table 2: The class-specific detection results (AP@0.5) of different methods on ScanNet-md40 benchmark. We highlight the categories of small objects in blue.

	<i>VoteNet</i>	<i>VoteNet_S</i>	<i>H3DNet</i>	<i>GroupFree3D</i>	<i>GroupFree_S</i>	<i>RBGNet</i>	<i>CAGroup3D</i>	<i>FCAF3D</i>	<i>TR3D</i>	<i>FCAF3D_higher</i>	<i>TR3D_higher</i>	<i>Ours($\tau = 0$)</i>	<i>Ours($\tau = 0.3$)</i>
Bathtub	79.13	84.26	86.16	85.47	44.68	39.46	42.97	83.65	84.21	77.90	78.36	81.07	81.07
Bed	82.43	80.35	82.69	81.85	42.71	78.17	81.93	80.91	82.32	82.31	80.86	83.47	83.50
Bench	1.63	4.57	22.45	2.36	0.51	1.53	14.50	27.95	34.15	27.19	43.74	41.68	41.79
Bookshelf	34.16	29.23	43.99	44.51	4.07	44.06	55.92	56.06	54.22	56.38	51.46	56.55	56.84
Bottle	0.00	0.00	0.00	0.08	0.00	0.00	1.44	0.48	1.50	8.47	19.09	20.91	13.40
Chair	74.22	69.87	80.52	83.41	14.31	82.33	90.19	89.98	91.13	90.01	91.53	91.36	91.28
Cup	0.00	0.00	0.00	0.00	0.00	0.00	2.69	5.98	5.74	13.94	18.81	21.51	
Curtain	19.27	17.46	30.86	44.91	1.16	15.56	44.52	43.62	34.97	40.01	42.53	44.51	44.51
Desk	36.27	32.54	49.13	47.80	10.95	45.39	60.25	54.36	58.66	50.36	59.03	56.36	56.37
Door	22.37	18.54	32.57	38.00	2.05	34.14	46.36	42.34	43.72	42.28	48.50	49.40	49.54
Dresser	22.24	23.72	26.66	35.84	4.80	24.53	47.19	25.14	35.14	29.50	30.08	23.04	20.89
Keyboard	0.00	0.00	0.00	0.84	0.00	0.00	5.40	2.89	13.36	25.61	38.15	37.87	36.47
Lamp	21.95	11.31	28.96	35.29	0.08	26.10	53.80	47.10	42.60	51.48	44.77	49.65	50.62
Laptop	0.00	0.04	3.60	2.30	0.00	0.00	27.37	26.77	29.47	25.10	47.07	48.61	50.12
Monitor	28.18	24.70	35.05	42.82	2.01	30.24	68.77	66.31	74.31	73.87	74.63	75.01	76.03
Night_Stand	70.94	59.96	78.42	71.77	31.82	71.30	91.62	83.49	89.86	80.15	86.26	81.46	80.15
Plant	11.59	9.82	20.37	13.21	0.44	26.55	52.90	35.56	30.17	52.48	52.00	54.07	53.41
Sofa	72.68	76.60	74.89	70.23	24.38	67.25	83.29	78.04	78.14	77.04	83.63	83.00	82.99
Stool	28.24	21.08	25.53	40.49	7.10	15.68	51.59	47.54	40.50	46.59	43.85	40.99	42.27
Table	48.72	39.26	47.40	59.83	9.22	38.50	61.56	59.82	60.41	59.87	58.51	59.28	59.20
Toilet	81.74	86.43	85.06	89.99	61.14	75.64	96.08	95.72	87.51	97.65	90.95	95.98	96.07
Wardrobe	5.42	4.36	8.75	19.58	1.25	1.65	20.15	22.08	27.23	22.31	9.63	8.03	7.58

Table 3: The class-specific detection results (AP@0.25) of different methods on To-Scene benchmark. We highlight the categories of small objects in blue.

	<i>VaeNet</i>	<i>VaeNet_S</i>	<i>H3DNet</i>	<i>GroupFree3D</i>	<i>GroupFree_S</i>	<i>RgNet</i>	<i>CaGroupID</i>	<i>FcAF3D</i>	<i>Tr3D</i>	<i>FcAF3D_higher</i>	<i>Tr3D_higher</i>	<i>Ours($\tau = 0$)</i>	<i>Ours($\tau = 0.5$)</i>
Cabinet	53.34	49.72	58.94	61.90	57.12	65.36	66.65	63.93	61.56	67.44	67.26	64.05	64.36
Bed	84.96	82.54	80.13	82.13	80.25	92.11	84.66	80.93	78.29	75.81	71.90	76.28	76.28
Chair	87.79	85.54	89.54	92.55	88.29	92.57	94.20	92.70	94.14	93.65	93.97	93.48	93.61
Sofa	92.00	89.87	87.43	91.32	86.33	88.96	86.99	89.75	90.65	87.81	90.11	91.62	91.65
Table	67.19	64.44	68.24	74.24	69.97	86.21	73.25	75.72	79.42	78.25	77.30	78.99	78.99
Door	51.39	52.88	53.85	60.60	53.62	59.99	59.99	50.37	55.88	58.44	58.61	57.40	57.05
Window	41.05	43.40	44.87	48.21	41.62	58.83	53.19	46.33	43.79	47.99	45.21	43.10	41.56
Bookshelf	29.69	24.08	30.24	28.43	27.74	27.52	26.29	21.24	29.02	32.48	24.57	34.26	34.66
Picture	6.60	6.78	8.26	11.73	8.28	28.63	26.59	14.04	11.80	18.73	21.17	20.34	17.01
Counter	56.73	51.35	63.49	62.73	63.39	71.11	71.83	67.90	63.98	62.67	65.65	58.33	59.14
Desk	59.65	57.20	56.39	59.23	49.80	64.55	64.29	63.38	59.20	61.12	62.24	59.03	59.30
Curtain	48.39	46.38	54.85	54.23	56.41	37.68	65.68	54.77	43.18	51.79	53.61	54.46	54.64
Refrigerator	49.68	54.76	69.77	65.12	41.31	67.51	74.50	75.35	65.85	68.11	64.06	71.38	71.80
Showercurtain	75.65	78.95	75.76	78.47	81.55	83.46	79.70	78.48	39.93	82.46	56.37	57.29	51.09
Toilet	99.73	99.98	100.00	100.00	100.00	100.00	99.58	100.00	100.00	100.00	100.00	100.00	100.00
Sink	66.61	73.02	85.24	85.41	84.65	84.52	85.49	90.04	92.18	92.30	89.94	88.11	87.58
Bathtub	95.80	95.42	95.74	95.91	96.26	94.54	96.02	93.14	94.80	96.30	95.89	96.30	96.30
Garbagebin	51.42	49.21	56.03	68.63	58.57	68.96	69.86	68.51	66.30	71.44	71.36	72.83	70.77
Bag	39.22	49.08	44.83	60.35	69.97	73.75	89.27	83.63	89.28	89.33	91.71	91.90	91.19
Bottle	15.00	30.67	20.20	33.24	53.09	58.26	69.44	35.88	70.83	68.38	83.14	83.06	83.31
Bowl	11.79	23.27	8.72	12.58	44.17	39.89	85.21	55.08	73.95	85.52	93.06	92.29	92.71
Camera	7.88	15.57	9.40	6.91	24.00	13.06	53.30	44.11	62.24	65.23	70.61	79.41	78.45
Can	12.40	22.05	14.65	26.08	41.43	45.35	76.29	42.40	76.81	70.54	89.41	89.39	89.63
Cap	19.46	46.49	15.53	34.34	60.86	45.89	84.58	67.04	82.38	78.98	86.72	92.02	91.90
Clock	1.29	1.87	0.94	3.56	5.42	14.13	11.30	2.65	26.69	23.17	30.45	36.12	36.83
Keyboard	0.14	14.35	3.05	5.20	26.71	0.86	56.43	38.04	76.35	54.45	91.91	93.94	90.51
Display	53.27	47.56	54.15	46.78	66.93	81.61	88.27	86.55	87.09	81.23	92.96	93.94	93.96
Earphone	8.94	28.85	6.06	17.31	46.37	27.75	73.42	56.00	75.10	64.67	80.53	81.71	81.40
Jar	5.31	29.54	6.75	7.75	28.42	25.47	34.58	25.63	23.92	38.75	39.66	33.20	33.18
Knife	0.63	0.00	0.18	1.72	1.26	1.26	0.00	0.24	16.52	18.48	32.73	31.68	31.70
Lamp	34.45	53.44	41.38	58.99	67.95	72.67	89.10	78.45	83.13	90.53	89.47	92.34	92.16
Laptop	65.25	66.98	67.75	82.17	94.18	88.77	96.86	95.94	96.83	97.93	98.15	98.00	97.12
Microphone	0.04	0.00	0.01	0.01	0.04	0.16	0.00	0.16	0.96	7.87	1.38	2.26	2.45
Microwave	50.07	52.79	50.18	54.93	52.49	63.78	82.98	78.13	69.59	89.10	84.96	90.68	90.01
Mug	13.90	29.48	15.80	24.09	48.59	39.16	85.77	53.40	78.14	76.78	93.69	94.18	93.86
Printer	27.09	22.25	42.07	43.61	35.57	54.19	65.72	68.49	66.63	70.62	73.67	65.19	64.06
Remote Control	0.36	2.33	0.22	0.32	2.00	2.68	12.38	1.68	34.58	17.03	50.49	60.44	60.42
Phonem	1.52	6.22	1.61	2.89	15.96	14.54	29.13	9.97	66.23	29.49	79.46	84.59	84.60
Alarm	3.07	12.11	3.56	9.51	19.04	13.44	39.08	20.60	30.59	43.89	48.12	56.57	58.09
Book	20.37	31.58	27.02	31.09	38.88	33.74	57.75	34.95	63.88	59.24	72.07	76.00	76.61
Cake	20.69	27.18	22.09	27.41	38.48	31.28	64.14	56.94	54.51	65.54	56.40	65.61	64.76
Calculator	1.51	6.34	1.99	2.88	13.71	11.74	21.56	16.73	34.34	31.16	47.77	53.43	52.72
Candle	28.00	29.63	21.62	42.58	49.31	53.19	56.87	41.87	65.45	71.23	70.38	69.52	69.76
Charger	0.03	2.12	0.33	0.53	1.78	8.09	22.22	6.33	37.47	34.47	58.48	65.44	62.81
Chessboard	6.80	45.14	19.33	27.38	74.76	71.96	87.45	78.31	77.94	73.06	82.03	89.12	89.72
Coffee_Machine	41.21	27.28	32.04	34.88	47.09	53.52	77.94	62.97	38.69	56.74	49.34	60.68	60.85
Comb	0.30	1.21	0.12	1.67	6.28	4.82	11.05	2.44	23.96	34.23	48.43	53.38	45.74
Cutting_Board	10.57	8.29	14.22	17.90	38.76	30.21	0.00	32.18	65.59	77.53	72.34	69.72	62.20
Dishes	11.25	26.30	9.16	21.03	40.12	26.11	70.50	42.89	64.15	77.43	72.34	71.50	68.77
Doll	1.14	1.89	0.70	7.24	17.74	2.12	9.55	1.68	14.54	15.49	10.21	28.84	25.06
Eraser	0.00	0.04	0.00	0.00	0.00	0.55	0.00	0.29	34.87	13.71	61.28	66.13	60.98
Eye_Glasses	5.67	23.20	7.84	12.57	40.69	31.52	81.29	58.37	91.95	76.77	97.28	98.20	98.41
File_Box	56.97	49.39	33.74	40.07	45.78	55.42	63.47	60.84	67.27	70.03	73.17	71.86	72.55
Fork	0.84	0.61	1.76	1.31	1.86	1.49	6.52	6.84	17.14	13.33	29.99	30.95	32.48
Fruit	2.56	9.54	2.15	7.53	29.77	20.58	62.04	32.09	52.27	62.27	80.03	81.95	82.03
Globe	30.87	29.41	19.91	39.84	52.62	35.67	75.65	64.64	65.02	74.12	80.54	79.33	78.30
Hat	1.87	22.49	2.95	4.18	13.18	6.83	53.65	23.64	32.08	40.68	50.14	52.34	49.58
Mirror	0.70	17.36	0.76	0.20	0.54	5.63	0.58	28.93	1.30	23.89	1.55	3.25	2.87
Notebook	3.90	8.12	8.52	8.33	23.19	26.65	37.44	17.61	59.38	30.12	63.50	69.06	68.64
Pencil	0.01	1.14	0.08	0.06	1.00	1.51	0.00	3.47	32.09	28.53	55.31	65.04	65.32
Plane	31.59	49.74	35.44	53.65	65.60	60.77	87.03	73.41	78.99	86.43	88.62	87.34	87.54
Plate	5.31	20.83	7.71	10.31	27.52	38.64	60.91	19.40	80.18	63.41	96.92	98.03	98.03
Radio	1.95	5.50	5.59	3.13	6.80	12.77	15.56	10.42	18.59	25.11	25.87	32.59	32.35
Ruler	0.02	1.25	0.42	0.13	1.68	0.96	3.99	1.09	35.56	14.91	58.44	61.15	61.78
Saucerpan	31.34	32.74	24.73	39.52	47.05	37.65	73.89	37.29	30.28	48.26	50.70	63.28	63.36
Spoon	0.05	1.76	1.19	0.65	4.04	5.97	9.89	2.90	27.35	29.13	33.52	38.93	38.14
Tea_Pot	21.10	28.32	17.05	33.06	48.87	42.51	89.43	76.64	77.67	89.80	88.35	91.76	91.92
Toaster	13.88	21.95	19.51	11.42	16.27	19.90	34.61	31.32	29.11	37.50	24.44	34.88	35.01
Vase	25.95	37.29	17.00	31.59	46.84	37.72	65.79	52.50	54.39	64.01	67.67	73.63	73.27
Vegetables	0.43	7.12	0.40	0.66	18.35	10.27	0.01	4.73	9.62	9.79	7.06	14.00	13.52

Table 4: The class-specific detection results (AP@0.5) of different methods on To-Scene benchmark. We highlight the categories of small objects in blue.

	<i>VineNet</i>	<i>VineNet_S</i>	<i>H3DNet</i>	<i>GroupFree3D</i>	<i>GroupFree_S</i>	<i>R3GNet</i>	<i>CAGroup3D</i>	<i>FCAF3D</i>	<i>TR3D</i>	<i>FCAF3D_higher</i>	<i>TR3D_higher</i>	$O_{\text{ours}}(\tau = 0)$	$O_{\text{ours}}(\tau = 0.5)$	
Cabinet	19.75	18.39	25.36	34.62	25.64	40.75	48.45	36.36	37.93	46.04	45.36	42.75	42.93	
Bed	73.12	76.46	78.68	74.08	71.35	90.37	74.66	75.89	77.55	69.50	64.60	67.20	67.21	
Chair	71.68	66.72	79.05	84.35	77.56	85.99	90.35	87.31	89.64	88.29	90.28	88.48	88.34	
Sofa	86.54	82.29	84.88	86.89	79.51	83.64	81.79	88.81	90.65	78.45	88.87	88.61	88.34	
Table	51.04	47.21	58.03	66.25	59.27	76.61	69.99	71.10	72.52	72.11	70.76	72.76	72.78	
Door	25.72	24.80	33.47	43.78	33.52	41.23	49.61	39.67	42.73	45.75	46.82	44.34	43.53	
Window	18.49	188.00	20.23	22.56	18.05	34.76	31.92	24.36	24.19	23.29	21.30	15.27	15.48	
Bookshelf	22.22	14.42	15.49	12.83	16.29	20.03	22.90	10.03	10.33	22.22	23.78	20.23	30.47	30.81
Picture	0.69	0.35	1.75	6.88	3.42	13.88	13.49	5.12	3.50	13.51	19.41	15.87	8.27	
Counter	18.08	9.07	17.45	37.21	31.22	40.43	49.28	43.81	40.71	45.46	31.81	29.12	29.43	
Desk	35.78	26.70	35.47	45.83	37.67	45.68	37.99	42.25	42.13	33.71	40.19	39.06	39.18	
Curtain	11.85	13.01	6.57	15.00	19.05	12.10	19.58	10.60	15.42	9.24	14.46	21.27	21.37	
Refrigerator	38.74	33.15	47.15	27.88	21.22	53.58	64.15	54.13	50.53	59.20	62.29	57.12	57.40	
Showercurtain	41.76	41.14	70.98	71.58	40.11	78.05	68.52	72.77	30.12	73.76	44.63	52.55	46.85	
Toilet	92.55	92.28	100.00	100.00	100.00	100.00	99.58	100.00	100.00	100.00	100.00	100.00	100.00	
Sink	19.97	22.51	38.04	43.85	42.29	40.28	51.54	46.37	55.16	53.83	44.04	52.09	50.92	
Bathtub	72.46	81.61	79.25	80.75	80.94	81.01	81.27	88.77	85.38	90.30	83.50	76.03	76.03	
Garbagebin	27.98	23.46	40.25	50.67	41.58	56.65	64.57	60.39	57.68	65.61	64.48	63.97	61.21	
Bag	12.48	18.08	20.08	26.86	41.31	57.46	82.31	75.13	81.16	87.70	87.94	89.19	88.55	
Bottle	3.35	7.77	6.43	8.22	13.78	43.00	66.27	27.81	65.95	66.51	64.48	82.36	82.31	
Bowl	0.81	5.34	0.50	0.49	12.83	19.49	82.56	52.06	68.56	82.05	92.50	92.29	92.71	
Camera	2.19	2.05	3.38	1.52	10.81	8.98	49.93	35.38	57.19	64.43	68.06	75.50	74.32	
Can	2.06	3.50	3.60	5.47	10.44	36.19	73.51	31.74	68.29	66.53	86.73	87.88	88.00	
Cap	1.69	16.38	6.49	10.87	33.43	37.72	80.34	64.26	82.36	78.63	86.67	91.81	91.36	
Clock	0.00	0.19	0.00	2.73	0.40	8.94	8.68	0.97	14.65	17.33	26.70	27.32	25.22	
Keyboard	0.00	7.46	0.00	1.07	2.21	0.46	46.01	18.12	51.17	46.25	90.25	84.05	80.65	
Display	11.84	12.10	26.07	31.46	28.19	51.38	82.24	77.47	80.11	78.20	90.89	91.58	91.65	
Earphone	2.59	6.62	0.92	4.52	22.85	20.82	337.073	49.99	71.87	61.81	78.13	79.25	78.86	
Jar	2.10	13.77	2.96	2.29	21.22	22.42	33.81	21.27	22.18	38.75	39.66	33.20	33.15	
Knife	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.40	16.89	27.70	26.66	26.57		
Lamp	13.97	27.06	25.67	43.75	52.96	62.17	89.10	73.67	80.54	90.53	89.47	90.68	90.48	
Laptop	24.34	17.31	42.20	52.85	81.32	75.85	94.51	91.86	94.32	97.04	97.15	96.59	95.52	
Microphone	0.00	0.00	0.00	0.01	0.01	0.06	0.00	0.02	0.96	7.87	1.38	2.26	2.45	
Microwave	16.18	25.78	36.97	41.91	47.12	54.50	82.98	77.52	66.45	87.76	84.96	90.68	90.01	
Mug	2.60	7.84	4.74	5.00	13.03	27.83	83.00	42.79	73.64	73.79	92.40	93.15	92.73	
Printer	10.56	6.99	26.64	32.36	26.62	45.87	65.05	66.80	61.81	66.61	73.67	65.19	64.06	
Remote Control	0.00	0.33	0.00	0.00	0.00	0.19	1.66	0.85	21.92	12.52	43.67	54.75	54.73	
Phone	0.04	0.39	0.02	0.09	0.50	1.95	18.86	4.90	34.50	21.68	66.15	75.14	74.42	
Alarm	0.49	4.37	0.85	2.44	6.84	7.79	35.16	17.02	26.70	36.62	43.81	49.04	50.49	
Book	3.91	5.70	6.59	5.72	8.87	19.42	54.52	30.53	57.04	58.81	70.69	75.29	75.12	
Cake	15.39	15.40	20.09	23.34	33.24	30.27	61.54	56.42	53.17	64.27	55.50	64.51	63.42	
Calculator	0.02	0.19	0.68	0.05	0.61	2.56	16.88	10.28	27.70	29.14	46.45	51.23	50.27	
Candle	11.18	10.59	11.51	18.20	17.60	36.10	53.74	36.69	26.06	71.00	69.85	69.29	69.32	
Charger	0.01	0.01	0.07	0.00	0.01	0.71	10.35	0.90	12.03	20.33	38.89	49.32	46.48	
Chessboard	0.00	3.19	0.11	8.91	36.56	45.26	78.72	62.71	67.45	61.24	70.46	76.69	78.07	
Coffee_Machine	11.13	20.39	20.38	18.43	34.55	53.51	77.56	57.93	38.69	56.74	49.34	60.68	60.85	
Comb	0.00	0.00	0.00	0.00	0.08	0.01	5.77	0.03	2.13	19.59	35.99	43.72	37.76	
Cutting_Board	2.79	0.69	2.19	4.57	19.23	15.97	0.00	27.23	54.40	61.25	49.67	63.59	55.86	
Dishes	1.30	2.28	1.73	5.15	10.01	15.77	65.85	29.00	61.69	77.31	72.25	71.16	68.38	
Doll	0.14	1.01	0.00	6.84	5.52	2.06	9.12	1.44	14.48	15.49	10.18	28.82	25.03	
Eraser	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.29	3.41	19.20	35.99	36.67		
Eye_Glasses	0.15	1.78	0.65	0.48	2.96	9.69	72.73	37.83	77.15	71.12	90.49	95.52	95.21	
File_Box	15.22	15.48	23.51	26.95	35.66	53.42	63.36	62.91	66.86	70.03	73.19	71.31	71.46	
Fork	0.00	0.00	0.00	0.00	0.17	0.00	0.05	0.00	2.98	5.59	8.86	14.91	14.34	
Fruit	0.77	0.88	0.41	1.82	7.11	11.44	58.14	22.36	42.00	59.38	76.82	77.79	78.10	
Globe	25.48	25.42	16.80	37.32	49.97	32.95	75.62	64.77	64.98	74.12	80.54	79.33	78.30	
Hat	0.04	13.90	2.46	1.66	3.41	6.23	46.89	24.34	32.08	40.68	50.14	52.34	49.58	
Mirror	0.13	16.71	0.03	0.00	0.00	0.90	0.47	3.76	0.97	23.89	1.17	2.61	2.30	
Notebook	0.31	1.19	1.19	0.41	2.04	6.87	24.77	7.09	45.73	25.23	52.65	64.35	63.36	
Pencil	0.00	0.03	0.00	0.00	0.02	0.03	0.00	0.21	7.83	13.81	23.23	39.72	40.72	
Plant	12.55	25.19	24.01	39.13	49.13	52.49	84.15	66.91	75.74	83.58	86.05	86.11	85.76	
Plate	0.36	0.69	0.41	0.87	1.61	16.54	38.90	18.06	74.66	58.51	94.49	96.05	95.99	
Radio	0.07	0.13	2.14	0.02	1.85	3.39	4.81	3.18	11.42	10.58	16.00	16.58	13.37	
Ruler	0.00	0.06	0.00	0.00	0.00	0.17	0.07	8.07	6.75	23.11	38.20	37.26		
Saucerpan	21.64	16.14	11.19	26.24	17.81	31.15	73.49	30.25	24.75	48.26	50.70	63.28	63.36	
Spoon	0.00	0.00	0.00	0.00	0.10	0.20	0.56	1.21	5.45	9.08	17.86	22.30	20.90	
Tea_Pot	7.03	12.42	9.29	21.50	31.24	34.85	87.60	73.44	76.46	88.12	88.04	91.11	91.24	
Toaster	2.18	6.18	10.51	5.12	4.86	15.79	32.65	26.29	27.72	35.77	24.27	34.40	34.52	
Vase	7.43	17.93	11.02	19.63	36.39	33.34	64.57	52.35	52.75	63.92	67.60	73.40	73.03	
Vegetables	0.00	0.18	0.13	0.20	4.91	9.75	0.01	5.00	9.62	9.34	7.05	14.00	13.44	