

Improving Gaussian Splatting with Localized Points Management

Supplementary Material

6. Additional Results

Robustness to sparse training images We conducted further ablation studies to verify the impact of the number of training images. In Table 5, we present the results of training 3DGS and our method using randomly selected subsets comprising 25%, 50%, 75%, and 100% of the training images. Remarkably, our method consistently achieves superior rendering results compared to 3DGS across different percentages of training images.

Per-scene Result of Static 3D We provide additional quantitative results for all three datasets in the tables referenced. Tables 6, 7, 8, 9, 10, and 11 present the metrics for each scene in the Mip-NeRF360 [3], Tanks&Temples [15], and DeepBlending [12] datasets. Our method consistently improve 3DGS [14] scene modeling in the vast majority of scenarios.

Per-scene Result of Dynamic 4D In Table 13, we provide the PSNR on different scenes. The quantitative results clearly show that LPM improve STGS [18] to faithfully capture the subtle static and dynamic information.

7. More visualizations

Figure 6 provides more examples on static 3D and dynamic 4D dataset.

Scene	Method	25%		50%		75%		100%	
		PSNR	LPIPS	PSNR	LPIPS	PSNR	LPIPS	PSNR	LPIPS
PlayRoom	3DGS	25.33	0.313	27.37	0.270	29.16	0.253	30.03	0.244
	3DGS+ LPM	25.43	0.313	27.42	0.267	29.06	0.252	30.22	0.241
Trunk	3DGS	22.46	0.177	24.15	0.154	24.86	0.150	25.42	0.146
	3DGS + LPM	22.95	0.173	24.55	0.157	25.14	0.152	25.61	0.154

Table 5. Effect of different training view ratios in the *PlayRoom* and *Truck*.

	Bicycle	Flowers	Garden	Stump	Treehill	Room
Plenoxels	21.912	20.097	23.4947	20.661	22.487	27.594
INGP-Big	22.171	20.652	25.069	23.466	22.373	29.690
Mip-NeRF 360	24.37	21.73	26.98	26.40	22.87	31.63
3DGS	25.246	21.520	27.410	26.550	22.490	30.632
3DGS*	25.166	21.576	27.388	26.637	22.487	31.53
3DGS + LPM	25.4	21.73	27.43	26.81	22.78	31.58

Table 6. Performance comparison of different methods on various scenes (PSNR $\uparrow$). (Part 1).

	Counter	Kitchen	Bonsai	Dr Johnson	Playroom	Truck	Train
Plenoxels	23.624	23.420	24.669	23.142	22.980	23.221	18.927
INGP-Big	26.691	29.479	30.685	28.257	21.665	23.383	20.456
Mip-NeRF 360	29.55	32.23	33.46	29.140	29.657	24.912	19.523
3DGS	28.700	30.317	31.980	28.766	30.044	25.187	21.097
3DGS*	28.90	31.43	32.14	29.08	30.03	25.42	21.91
3DGS + LPM	28.91	31.45	32.20	29.30	30.22	25.61	22.05

Table 7. Performance comparison of different methods on various scenes (PSNR $\uparrow$). (Part 2).

	Bicycle	Flowers	Garden	Stump	Treehill	Room
Plenoxels	0.506	0.521	0.3864	0.503	0.540	0.4186
INGP-Big	0.446	0.441	0.257	0.421	0.450	0.261
Mip-NeRF 360	0.301	0.344	0.170	0.261	0.339	0.211
3DGS	0.205	0.336	0.103	0.210	0.317	0.220
3DGS*	0.211	0.336	0.107	0.215	0.324	0.218
3DGS + LPM	0.203	0.337	0.108	0.224	0.347	0.209

Table 8. Performance comparison of different methods on various scenes (LPIPS $\downarrow$). (Part 1).

	Counter	Kitchen	Bonsai	Dr Johnson	Playroom	Truck	Train
Plenoxels	0.441	0.447	0.398	0.521	0.499	0.335	0.422
INGP-Big	0.306	0.195	0.205	0.352	0.428	0.249	0.360
Mip-NeRF 360	0.204	0.127	0.176	0.237	0.252	0.159	0.354
3DGS	0.204	0.129	0.205	0.244	0.241	0.148	0.218
3DGS*	0.200	0.126	0.204	0.245	0.244	0.146	0.207
3DGS + LPM	0.200	0.125	0.202	0.241	0.241	0.154	0.209

Table 9. Performance comparison of different methods on various scenes (LPIPS $\downarrow$). (Part 2).

	Bicycle	Flowers	Garden	Stump	Treehill	Room
Plenoxels	0.496	0.431	0.6063	0.523	0.509	0.8417
INGP-Big	0.512	0.486	0.701	0.594	0.542	0.871
Mip-NeRF 360	0.685	0.583	0.813	0.744	0.632	0.913
3DGS	0.771	0.605	0.868	0.775	0.638	0.914
3DGS*	0.765	0.606	0.867	0.773	0.634	0.920
3DGS + LPM	0.776	0.609	0.870	0.781	0.636	0.923

Table 10. Performance comparison of different methods on various scenes (SSIM $\uparrow$). (Part 1).

	Counter	Kitchen	Bonsai	Dr Johnson	Playroom	Truck	Train
Plenoxels	0.759	0.648	0.814	0.787	0.802	0.774	0.663
INGP-Big	0.817	0.858	0.906	0.854	0.779	0.800	0.689
Mip-NeRF 360	0.894	0.920	0.941	0.901	0.900	0.857	0.660
3DGS	0.905	0.922	0.938	0.899	0.906	0.879	0.802
3DGS*	0.908	0.927	0.942	0.901	0.907	0.882	0.815
3DGS + LPM	0.909	0.929	0.943	0.905	0.910	0.883	0.817

Table 11. Performance comparison of different methods on various scenes (SSIM $\uparrow$). (Part 2).

Method	Indoor			Outdoor		
	PSNR	SSIM	LPIPS	PSNR	SSIM	LPIPS
2DGS*	24.210	0.705	0.282	30.105	0.911	0.211
2DGS + LPM	24.427	0.716	0.264	30.432	0.919	0.193

Table 12. Comparison of various methods across different scenes on the Mip-NeRF 360 dataset, Tanks&Temples and Deep Blending. 3DGS* indicates the retrained model from the official implementation. **Bold** represents best, underline indicates second best.

	Coffee Martini	Spinach	Beef Cut	Salmon Flame	Steak Flame	Sear Steak
K-Planes-explicit	28.74	32.19	31.93	28.71	31.80	31.89
K-Planes-hybrid	29.99	32.60	31.82	30.44	32.38	32.52
MixVoxels	29.36	31.61	31.30	29.92	31.21	31.43
NeRFPlayer	31.53	30.56	29.35	31.65	31.93	29.12
HyperReel	28.37	32.30	32.92	28.26	32.20	32.57
Dynamic-4D	27.34	32.46	32.90	29.20	32.51	32.49
4DGS	28.33	32.93	33.85	29.38	34.03	33.51
STGS	28.61	33.18	33.52	29.48	33.64	33.89
STGS*	28.48	33.05	33.40	29.48	33.74	33.80
STGS+LPM	28.93	33.27	33.90	29.84	34.26	34.20

Table 13. Performance comparison of different methods on various scenes (PSNR $\uparrow$).

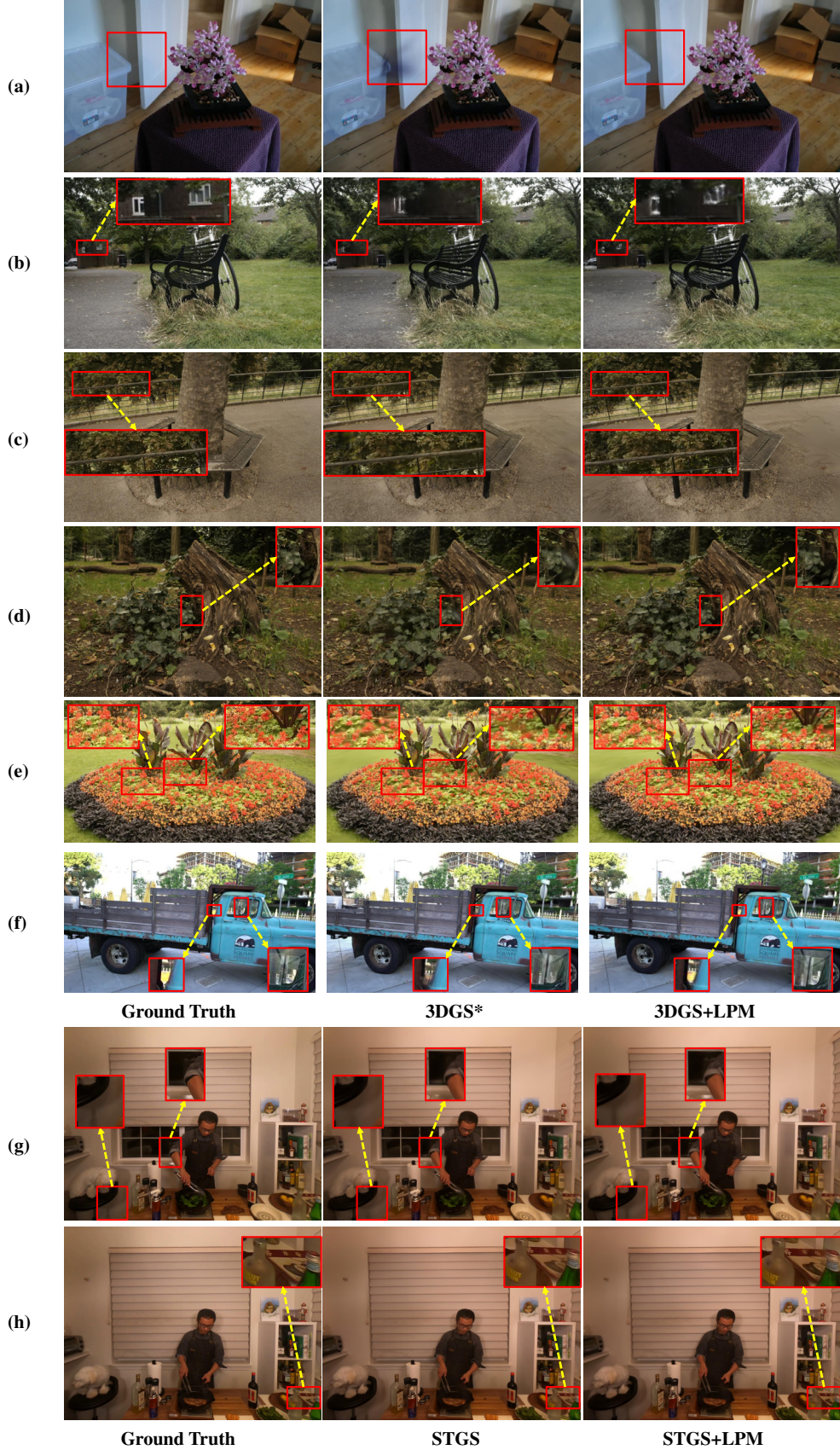


Figure 6. Additional qualitative comparisons on static 3D and dynamic 4D datasets.