



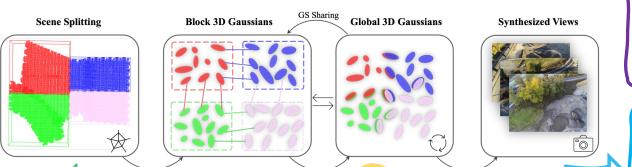
DOGS: Distributed-Oriented Gaussian Splatting for Large-Scale

3D Reconstruction Via Gaussian Consensus





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GS Consensus

 $(\mathbf{x}_i^k)^{t+1} := \arg\min\left(f(\mathbf{x}_i^k) + \frac{\rho}{2}\|(\mathbf{x}_i^k)^t - \mathbf{z}^t + (\mathbf{u}_i^k)^t\|_2^2\right),$



Split & Expand





Assign points & views





Splatting

Scenes	Building			Rubble			Campus			Residence			Sci-Art		
	PSNR ↑	SSIM ↑	LPIPS ↓	PSNR ↑	SSIM ↑	LPIPS ↓	PSNR ↑	SSIM ↑	LPIPS ↓	PSNR ↑	SSIM ↑	LPIPS ↓	PSNR ↑	SSIM ↑	LPIPS ↓
Mega-NeRF 46	20.92	0.547	0.454	24.06	0.553	0.508	23.42	0.537	0.636	22.08	0.628	0.401	25.60	0.770	0.312
Switch-NeRF 31	21.54	0.579	0.397	24.31	0.562	0.478	23.62	0.541	0.616	22.57	0.654	0.352	26.51	0.795	0.271
3D-GS 18	22.53	0.738	0.214	25.51	0.725	0.316	23.67	0.688	0.347	22.36	0.745	0.247	24.13	0.791	0.262
VastGaussian† [22]	21.80	0.728	0.225	25.20	0.742	0.264	23.82	0.695	0.329	21.01	0.699	0.261	22.64	0.761	0.261
Hierarchy-GS 19	21.52	0.723	0.297	24.64	0.755	0.284	-	-	-	-	-	-	-	-	-
DoGaussian	22.73	0.759	0.204	25.78	0.765	0.257	24.01	0.681	0.377	21.94	0.740	0.244	24.42	0.804	0.219

DOGS accelerates 3DGS training by 6+ times with better rendering quality on five compute nodes

2.7 km² reconstruction in 6 hours



CHECK OUT OUR PROJECT PAGE FOR MORE DETAILS!



https://aibluefisher.github.io/DOGS