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Dalian University Of Technology

SGS-SLAM

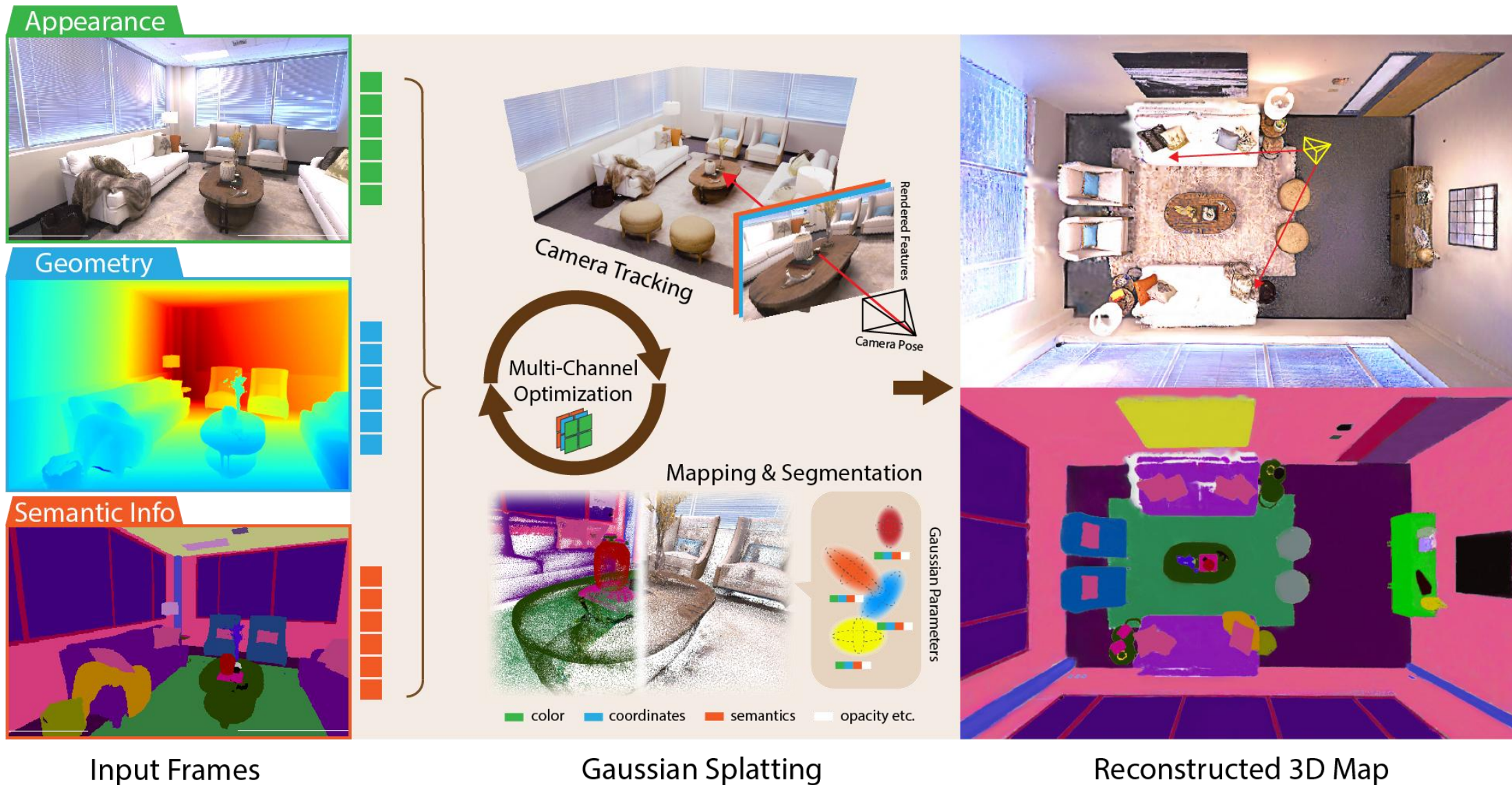
Semantic Gaussian Splatting For Neural Dense SLAM

ECCV 2024

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* Equal Contributions

SGS-SLAM



***SGS-SLAM*: Semantic Gaussian Splatting For Neural Dense SLAM**

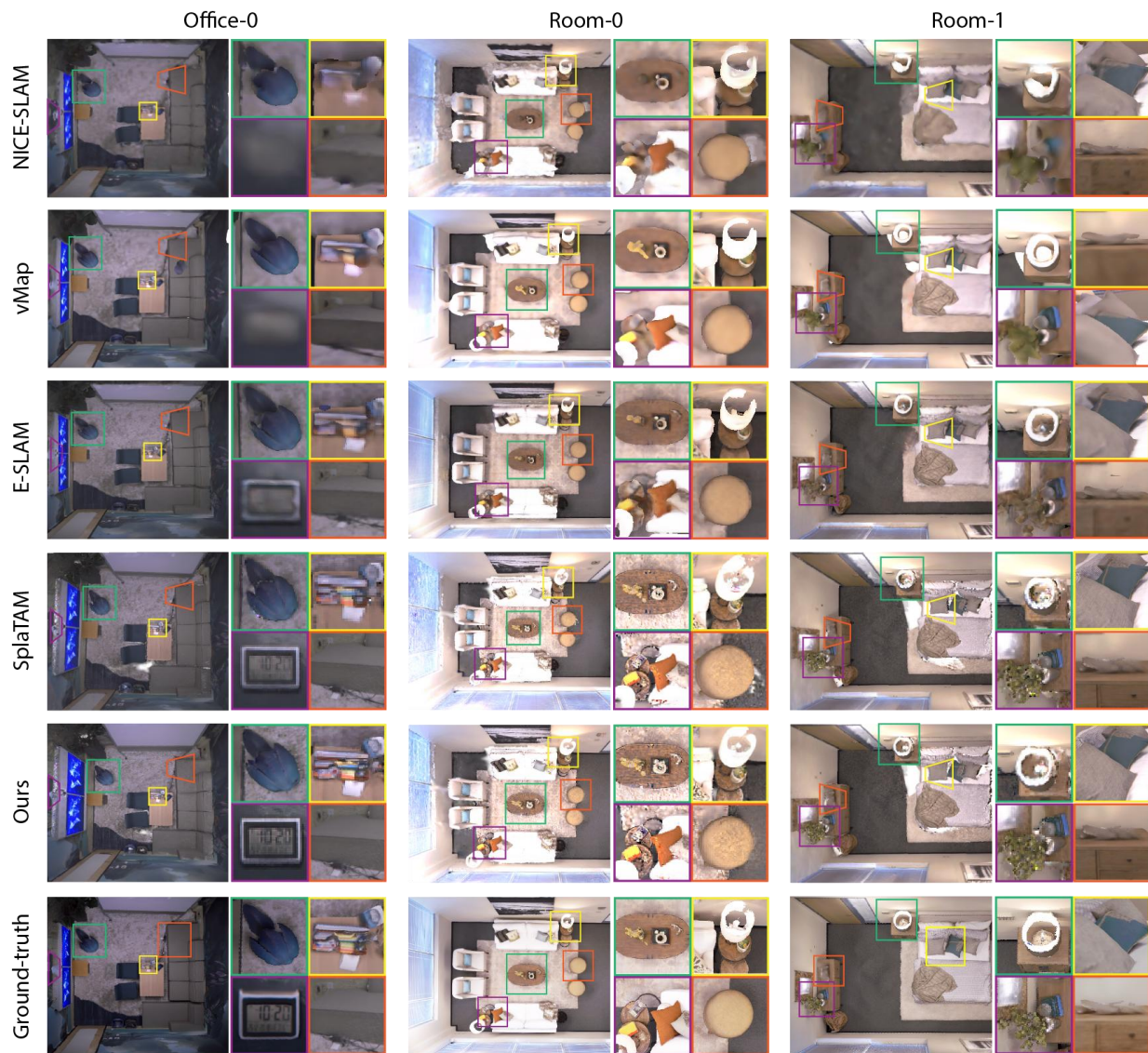
— *supplementary video* —



EUROPEAN CONFERENCE ON COMPUTER VISION

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2024

Evaluation of Mapping and Localization



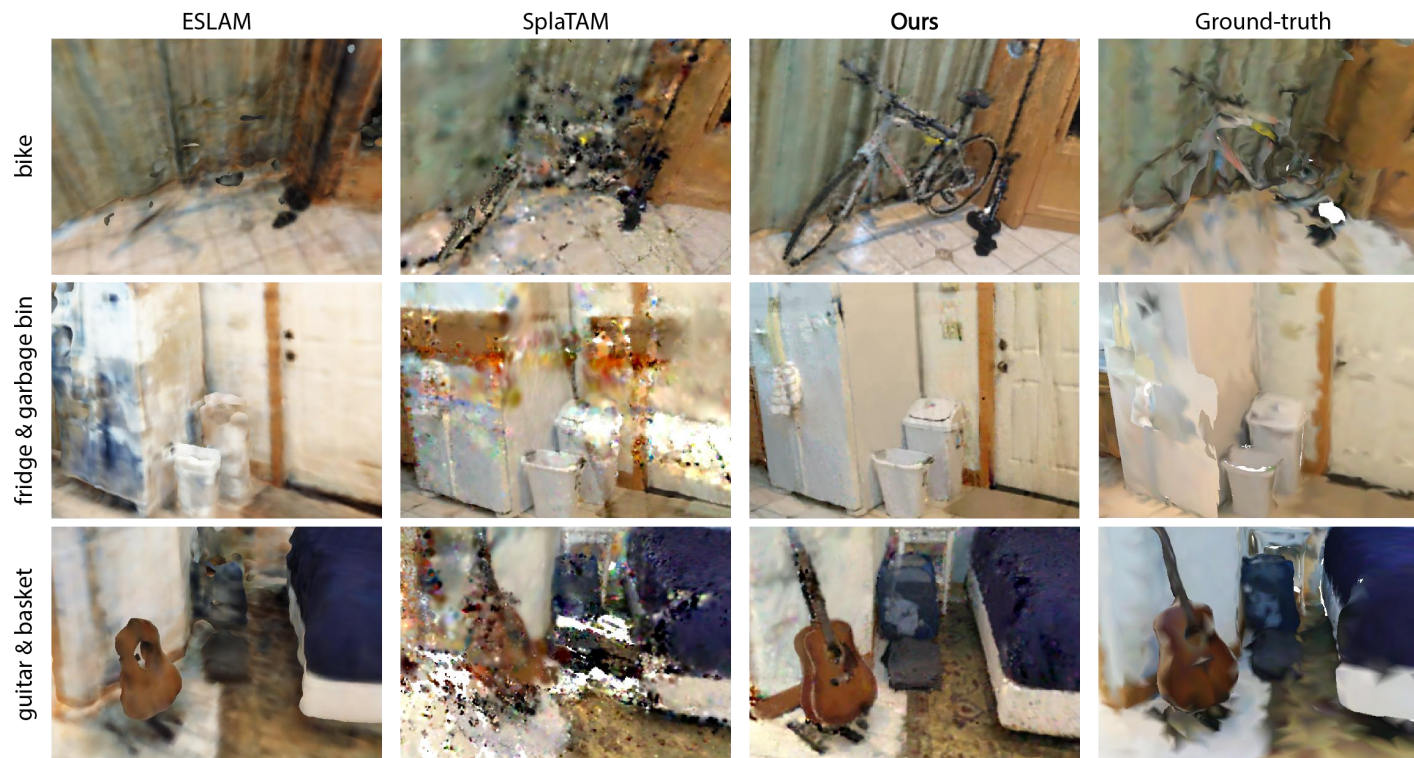
Methods	Metrics	Avg.	Room0	Room1	Room2	Office0	Office1	Office2	Office3	Office4
NICE-SLAM	PSNR \uparrow	24.42	22.12	22.47	24.52	29.07	30.34	19.66	22.23	24.94
	SSIM \uparrow	0.809	0.689	0.757	0.814	0.874	0.886	0.797	0.801	0.856
	LPIPS \downarrow	0.233	0.330	0.271	0.208	0.229	0.181	0.235	0.209	0.198
Co-SLAM	PSNR \uparrow	30.24	27.27	28.45	29.06	34.14	34.87	28.43	28.76	30.91
	SSIM \uparrow	0.939	0.910	0.909	0.932	0.961	0.969	0.938	0.941	0.955
	LPIPS \downarrow	0.252	0.324	0.294	0.266	0.209	0.196	0.258	0.229	0.236
ESLAM	PSNR \uparrow	29.08	25.32	27.77	29.08	33.71	30.20	28.09	28.77	29.71
	SSIM \uparrow	0.929	0.875	0.902	0.932	0.960	0.923	0.943	0.948	0.945
	LPIPS \downarrow	0.336	0.313	0.298	0.248	0.184	0.228	0.241	0.196	0.204
SplaTAM	PSNR \uparrow	33.98	32.48	33.72	34.96	38.34	39.04	31.90	29.70	31.68
	SSIM \uparrow	0.969	0.975	0.970	0.982	0.982	0.982	0.965	0.950	0.946
	LPIPS \downarrow	0.099	0.072	0.096	0.074	0.083	0.093	0.100	0.118	0.155
Ours	PSNR \uparrow	34.66	32.50	34.25	35.10	38.54	39.20	32.90	32.05	32.75
	SSIM \uparrow	0.973	0.976	0.978	0.981	0.984	0.980	0.967	0.966	0.949
	LPIPS \downarrow	0.096	0.070	0.094	0.070	0.086	0.087	0.101	0.115	0.148

Methods	Depth L1 [cm] \downarrow	ATE Mean [cm] \downarrow	ATE RMSE [cm] \downarrow	Track. FPS Unit \uparrow	Map. FPS Unit \uparrow	SLAM FPS Unit \uparrow
iMAP	4.645	3.118	4.153	9.92	2.23	1.82
NICE-SLAM	1.903	1.795	2.503	13.70	0.20	0.20
Co-SLAM	1.513	0.935	1.059	17.24	10.20	6.41
ESLAM	1.180	0.520	0.630	18.11	3.62	3.02
Ours	0.356	0.327	0.412	5.27	3.52	2.11

Evaluation of Semantic Segmentation

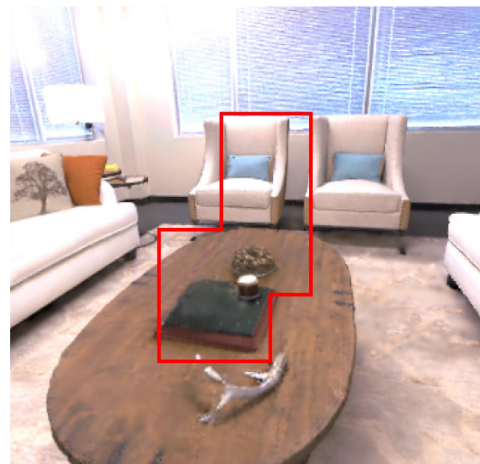
Methods	Avg. mIoU \uparrow	Room0 [%] \uparrow	Room1 [%] \uparrow	Room2 [%] \uparrow	Office0 [%] \uparrow
NIDS-SLAM	82.37	82.45	84.08	76.99	85.94
DNS-SLAM	84.77	88.32	84.90	81.20	84.66
SNI-SLAM	87.41	88.42	87.43	86.16	87.63
Ours	92.72	92.95	92.91	92.10	92.90

Evaluation of Keyframe Optimization

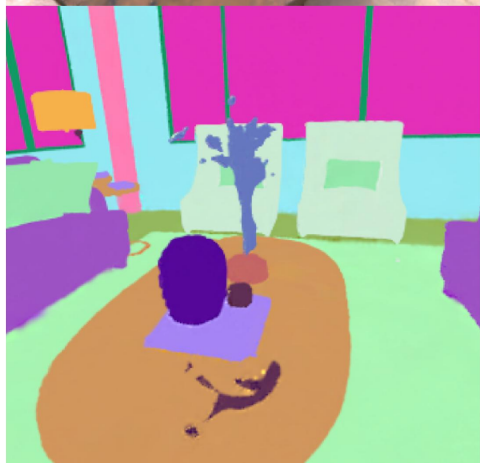


Scene Manipulation

Our Rendered Scene



Our Semantic Mask



Original

Remove

Move

Rotate



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Thank you for your careful listening!