



# FewViewGS: Gaussian Splatting with Few View Matching and Multi-stage Training

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# Introduction

## Few-shot novel view synthesis:

➤ **Overfitting issue**



**Sampling novel views**

*The model tends to easily overfit to sparse training views*

➤ **Inaccuracy in pseudo labels**



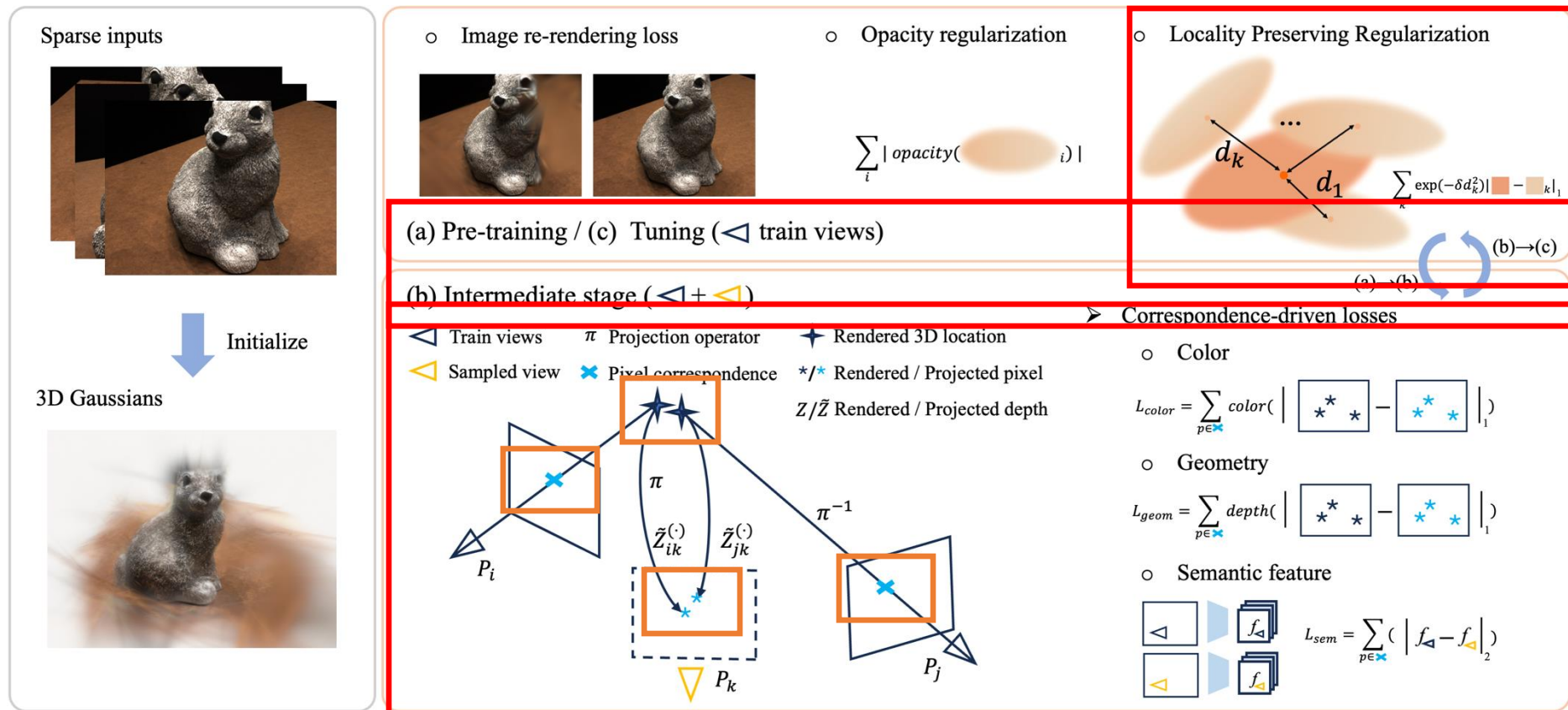
**Using training views**

*(a) Generate pseudo labels using a pretrained network: multi-view consistency issue*

*(b) Generate depth using a pretrained network: scale issue*

# Proposed Method

- A **multi-stage training scheme** enabling knowledge transfer from known to novel views
- A **robust warping-based novel view consistency constraint** ensuring the coherence of the synthesized unseen images.
- A **locality preserving regularization** handling visual artifacts



# Experimental Results

Table 1. Quantitative evaluation on DTU and LLFF. We use 3 training views.

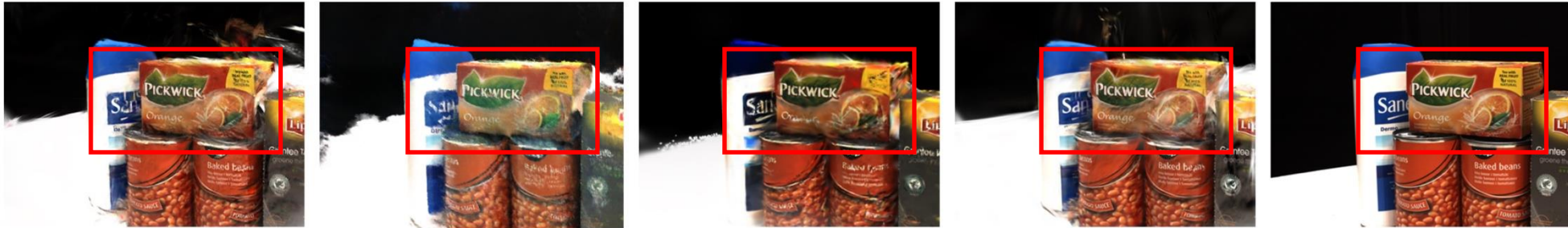
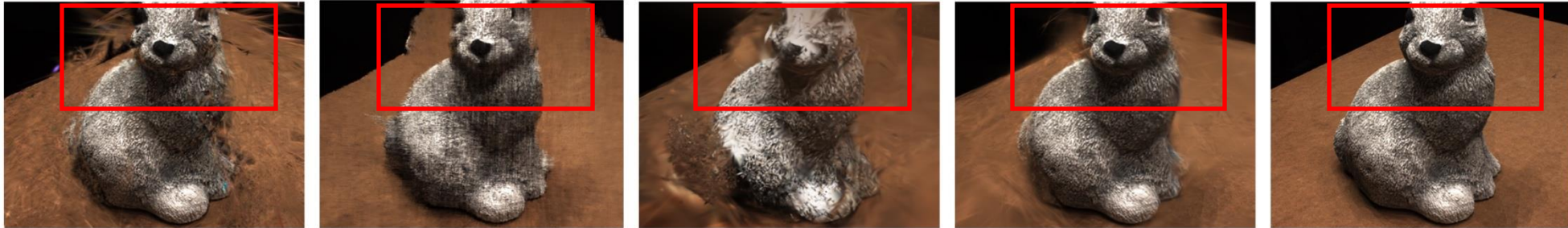
Setting	DTU			LLFF		
	PSNR $\uparrow$	SSIM $\uparrow$	LPIPS $\downarrow$	PSNR $\uparrow$	SSIM $\uparrow$	LPIPS $\downarrow$
SRF[5]	15.32	0.671	0.304	12.34	0.250	0.591
PixelNeRF[43]	16.82	0.695	0.270	7.93	0.272	0.682
MVSNeRF[3]	18.63	0.769	0.197	17.25	0.557	0.356
Mip-NeRF[1]	8.68	0.571	0.353	14.62	0.351	0.495
DietNeRF[11]	11.85	0.633	0.314	14.94	0.370	0.496
RegNeRF[22]	18.89	0.745	0.190	19.08	0.587	0.336
FreeNeRF[40]	<b>19.92</b>	0.787	0.182	19.63	0.612	0.308
SparseNeRF[34]	19.55	0.769	0.201	19.86	0.624	0.328
3DGS[13]	16.94	0.816	0.152	19.48	0.664	0.220
DRGS[6]*	-	-	-	17.17	0.497	0.337
SparseGS[38]*	18.89	0.702	0.229	-	-	-
DNGaussian[15]*	18.23	0.780	0.184	18.86	0.600	0.294
FSGS[46]*	-	-	-	20.43	0.682	0.248
Ours (Rand. Init.)	19.13	0.792	0.186	18.96	0.585	0.307
Ours	19.74	<b>0.861</b>	<b>0.127</b>	<b>20.54</b>	<b>0.693</b>	<b>0.214</b>

Table 2. Quantitative evaluation on Blender.

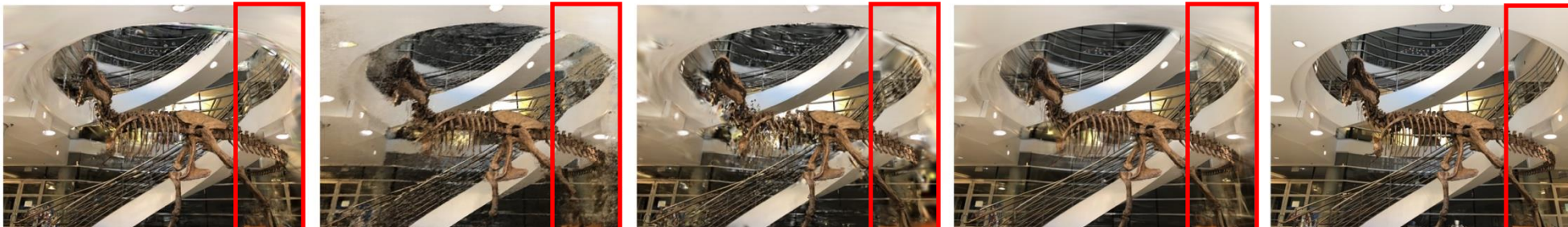
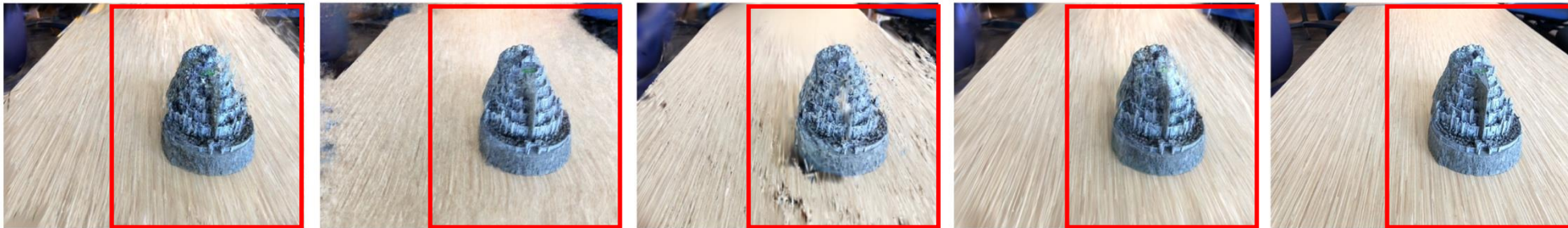
Method	PSNR $\uparrow$	SSIM $\uparrow$	LPIPS $\downarrow$
NeRF[20]	14.934	0.687	0.318
DietNeRF[11]	23.147	0.866	0.109
FreeNeRF[40]	24.259	0.883	0.098
SparseNeRF[34]	22.410	0.861	0.119
3DGS[13]	22.226	0.858	0.114
DNGaussian[15]*	24.305	<b>0.886</b>	<b>0.088</b>
Ours	<b>25.550</b>	<b>0.886</b>	0.092

# Experimental Results

DTU



LLFF



3DGS

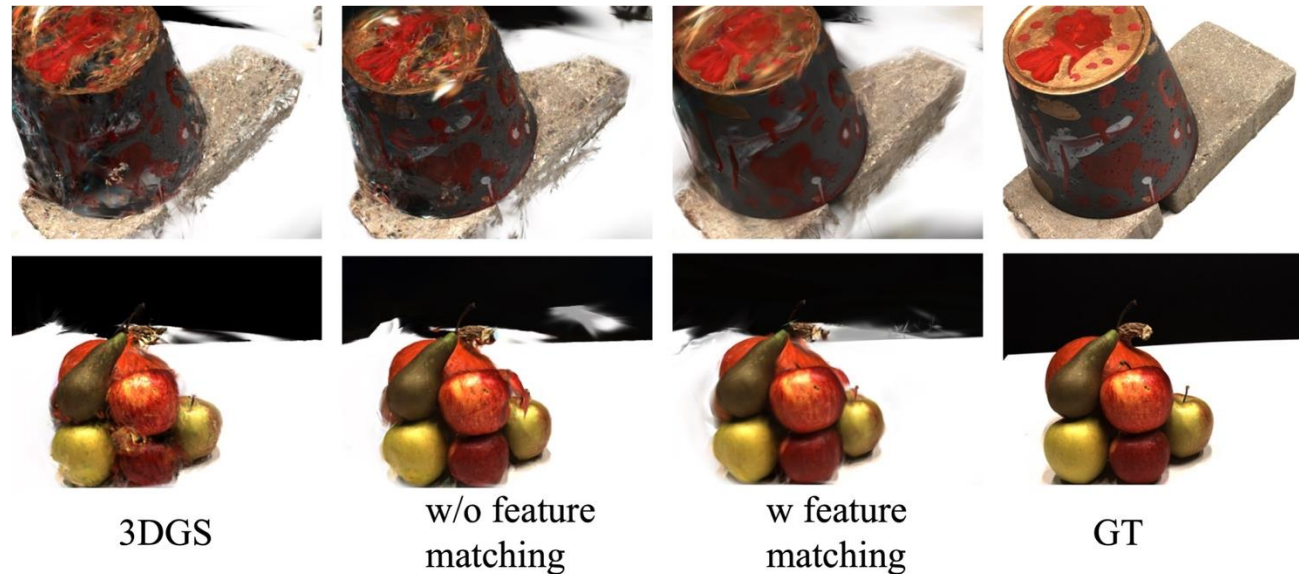
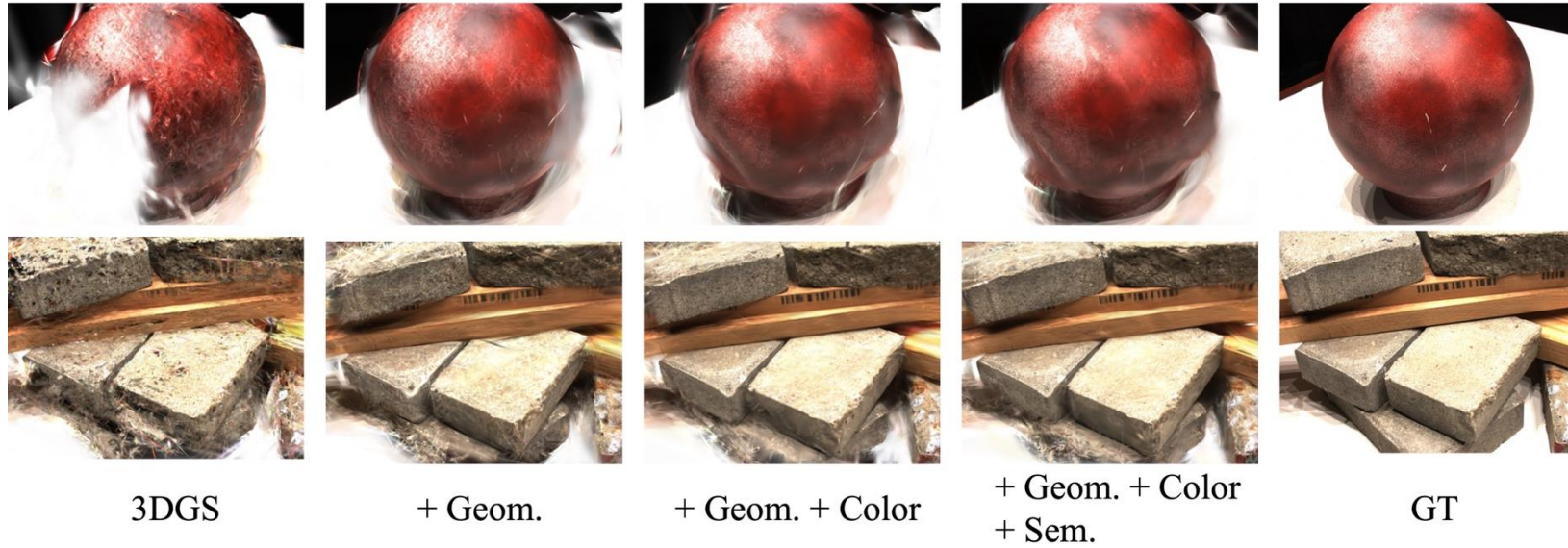
RegNeRF

DNGaussian

Ours

GT

# Experimental Results



Thanks for watching