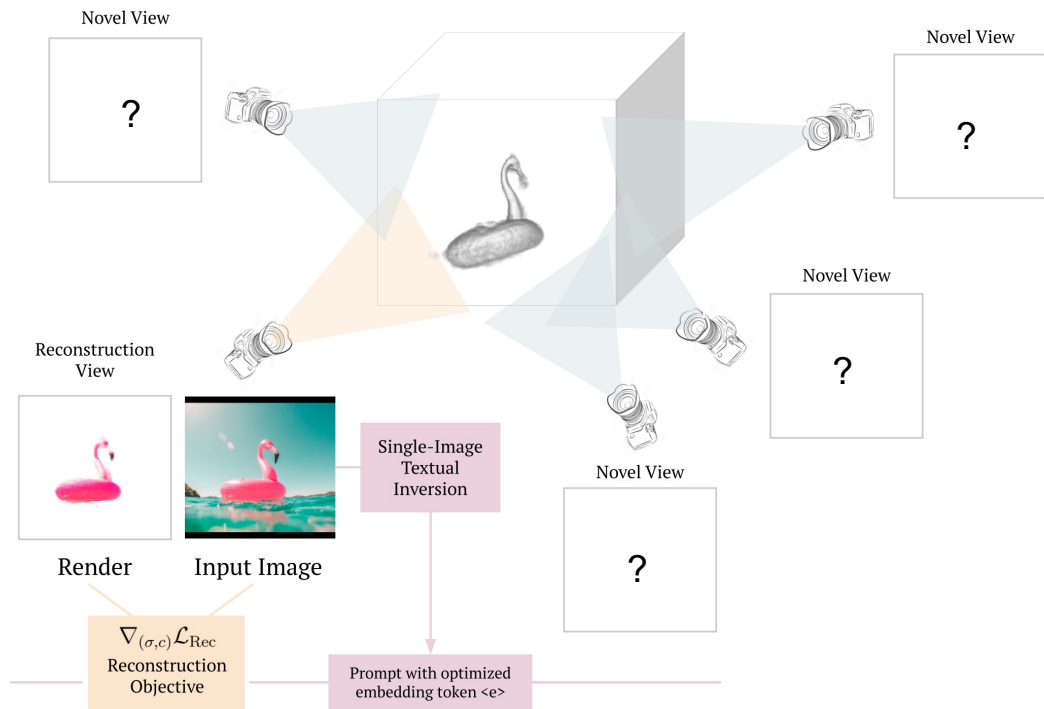


Magic123: One Image to High-Quality 3D Object Generation Using Both 2D and 3D Diffusion Priors



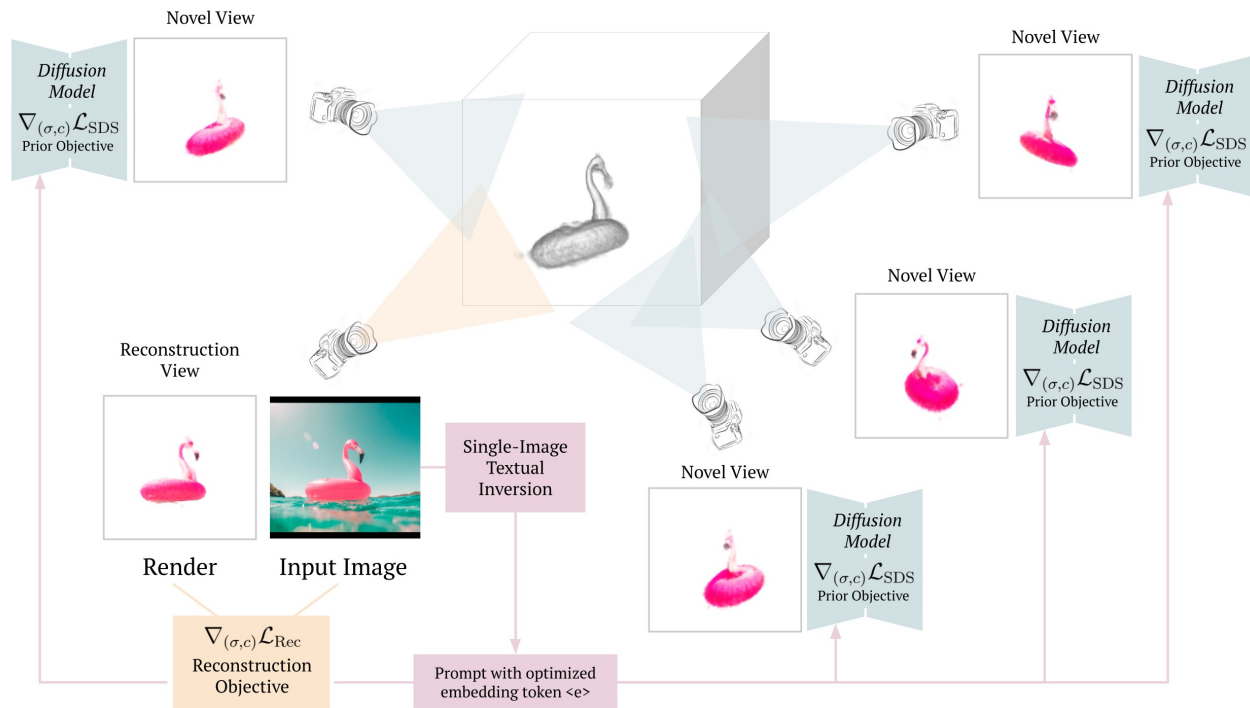
Image-to-3D is an Ill-Posed Problem



primary focus of this task is the utilization of **priors**.



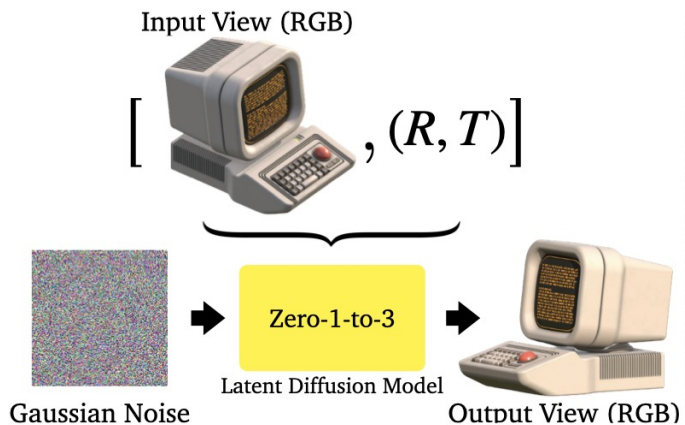
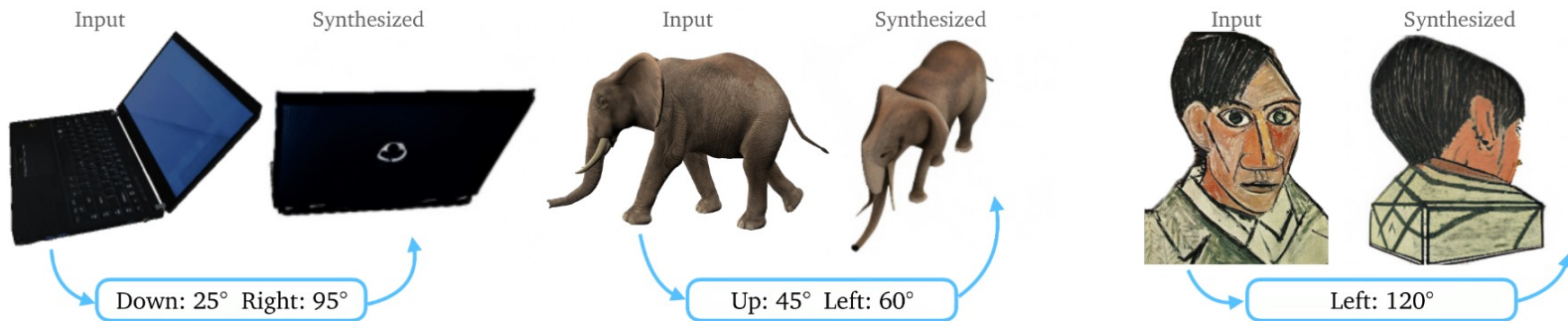
Related Works – 2D Prior Based



Melas-Kyriazi *et al.* "RealFusion: 360° Reconstruction of Any Object from a Single Image." (CVPR 2023)



Related Works – 3D Prior Based



**3D prior
(CADs)**

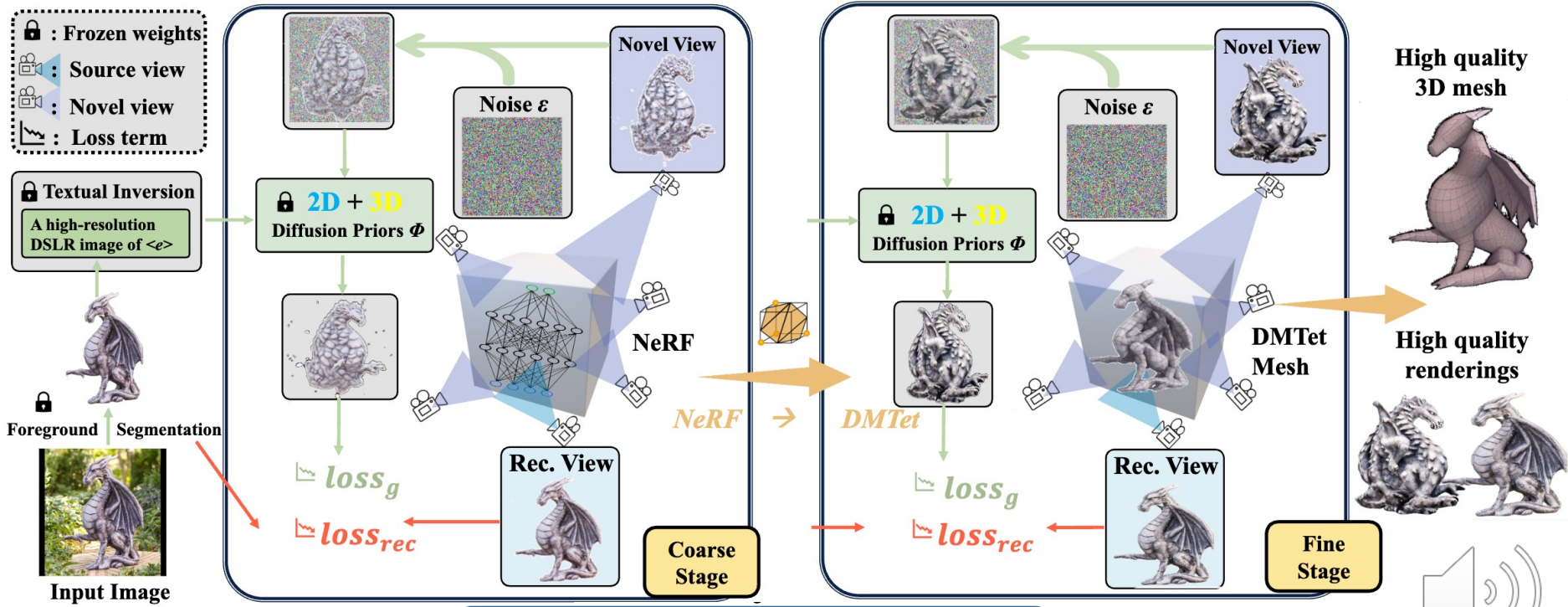
Liu et al. "Zero-1-to-3: Zero-shot One Image to 3D Object" (Arxiv 2023)



Magic123: One Image to High-Quality 3D Object Generation Using Both 2D and 3D Diffusion Priors



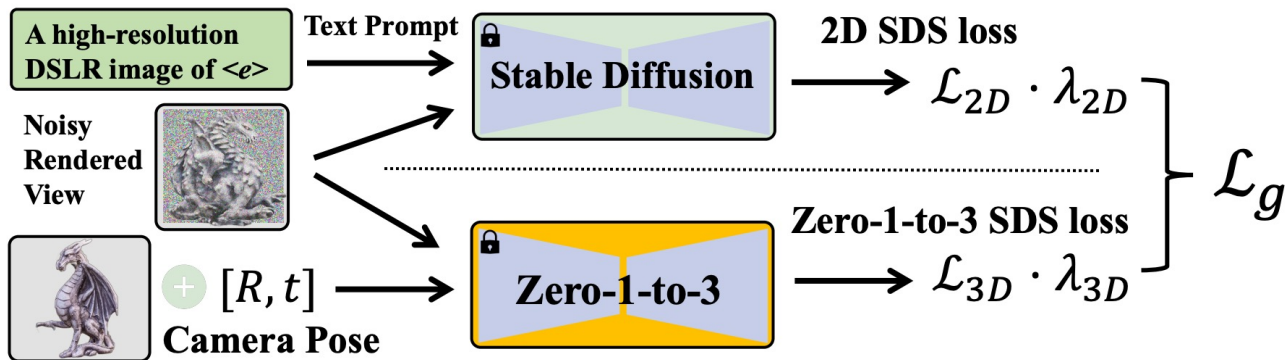
Pipeline



$$\mathcal{L}_c = \mathcal{L}_{rec} + \mathcal{L}_g$$



Combined 2D Prior and 3D Prior



$$\mathcal{L}_g = \lambda_{2D} \mathcal{L}_{2D} + \lambda_{3D} \mathcal{L}_{3D},$$



Intuition



Results



Results



Results



Results



Results

Dataset	Metrics\Methods	Point-E	Shap-E	3DFuse	NeuralLift	RealFusion	Zero-1-to-3	Magic123 (Ours)
NeRF4	CLIP-Similarity↑	0.48	0.60	0.60	0.52	0.38	0.62	0.80
	PSNR↑	0.70	0.99	11.64	12.55	15.37	23.96	24.62
	LPIPS↓	0.80	0.76	0.29	0.40	0.20	0.05	0.03
RealFusion15	CLIP-Similarity↑	0.53	0.59	0.67	0.65	0.67	0.75	0.82
	PSNR↑	0.98	1.23	18.87	11.08	10.32	19.49	19.50
	LPIPS↓	0.78	0.74	0.38	0.53	0.14	0.11	0.10



Comparisons

Input



Shap-
E



Input



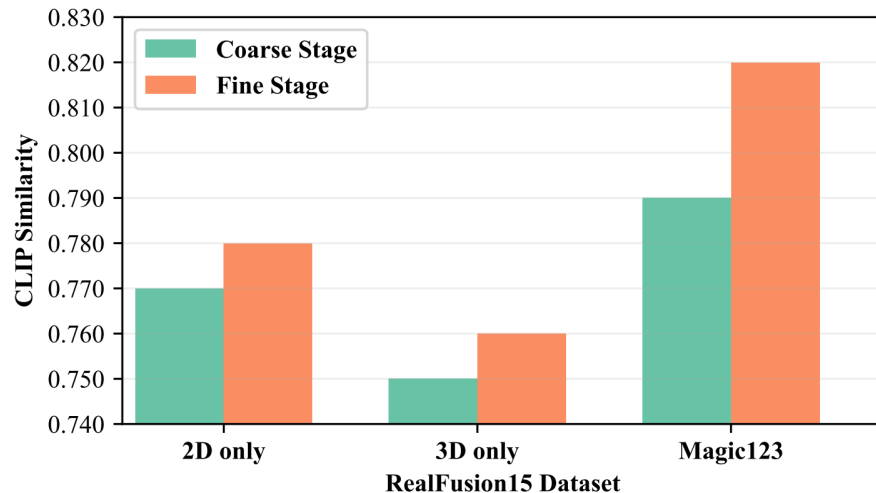
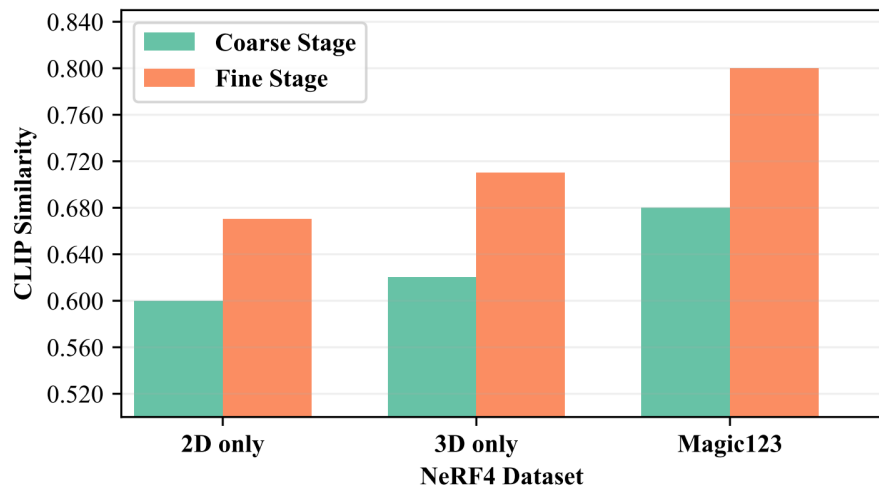
Real Fusion



Magic123
(Ours)



Ablation Study



Magic123 full pipeline achieves the best performance, demonstrating the effectiveness of the joint 2D and 3D prior and the coarse-to-fine pipeline.



Ablation Study



Magic123 full pipeline achieves the best performance, demonstrating the effectiveness of the joint 2D and 3D prior and the coarse-to-fine pipeline.

2D Prior Only

Magic123 2D Prior



3D Prior Only

Magic123 3D Prior



Magic123

Magic123



Magic123 Normals

Magic123 Normals



Magic123 2D Prior



Magic123 3D Prior



Magic123



Magic123 Normals



Magic123 2D Prior



Magic123 3D Prior



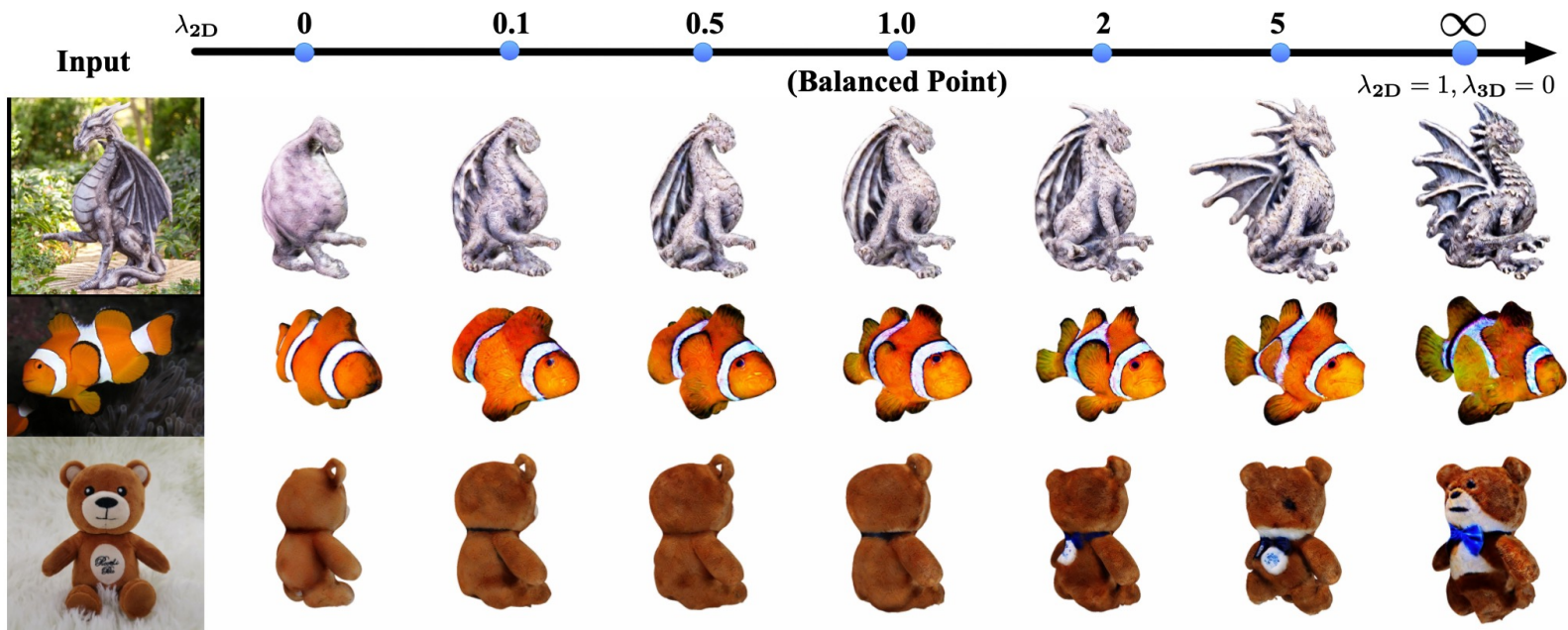
Magic123



Magic123 Normals



Ablation Study for the Joint 2D and 3D Prior



Increasing the 2D prior weight leads to a 3D geometry with **higher imagination and more details but less 3D consistencies** and vice versa.



3D Prior Only

+ 0.1 2D Prior

+ 1.0 2D Prior

+ 2.0 2D Prior

+ 5.0 2D Prior

2D Prior Only

3D Prior Only



+ 0.1 2D Prior



+ 1.0 2D Prior



+ 2.0 2D Prior



+ 5.0 2D Prior



2D Prior only



3D Prior Only



+ 0.1 2D Prior



+ 1.0 2D Prior



+ 2.0 2D Prior



+ 5.0 2D Prior



2D Prior only



3D Prior Only



+ 0.1 2D Prior



+ 1.0 2D Prior



+ 2.0 2D Prior



+ 5.0 2D Prior



2D Prior only



3D Prior Only



+ 0.1 2D Prior



+ 1.0 2D Prior



+ 2.0 2D Prior



+ 5.0 2D Prior



2D Prior only



3D Prior Only



+ 0.1 2D Prior



+ 1.0 2D Prior



+ 2.0 2D Prior



+ 5.0 2D Prior



2D Prior only



Limitations



Discontinuity



Limitations

FLAT
OBJECTS



Check Website + Code

<https://guochengqian.github.io/project/magic123>

Magic123: One Image to High-Quality 3D Object Generation
Using Both 2D and 3D Diffusion Priors

Magic123 Team

