IMFine: 3D Inpainting via Geometry-guided Multi-view Refinement

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Multi-view Consistent Inpainting Pipeline

(a) Multi-view Inpainting Pipeline

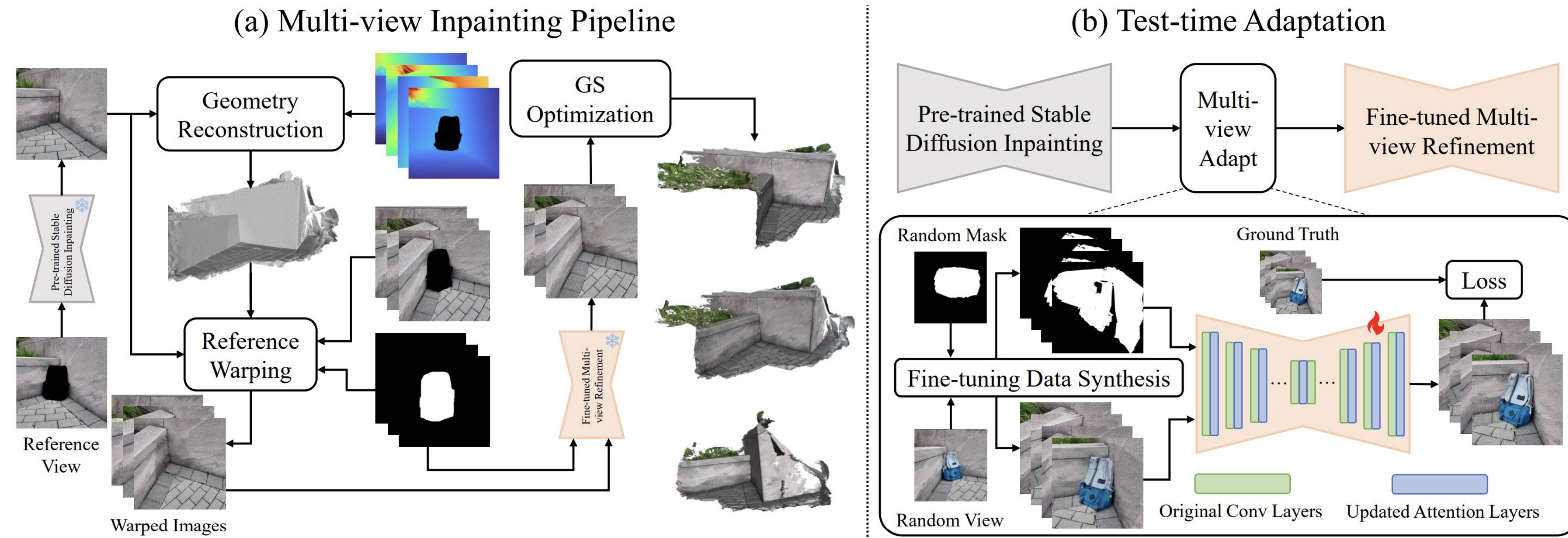(b) Test-time Adaptation

A robust 3D inpainting pipeline that incorporates geometric priors and a multi-view refinement network trained via test-time adaptation, building on a pretrained image inpainting model.

Our contributions:
- A multi-view consistent inpainting pipeline.
- An inpainting mask detection technique.
- Achieved state-of-the-art performance across various benchmarks.
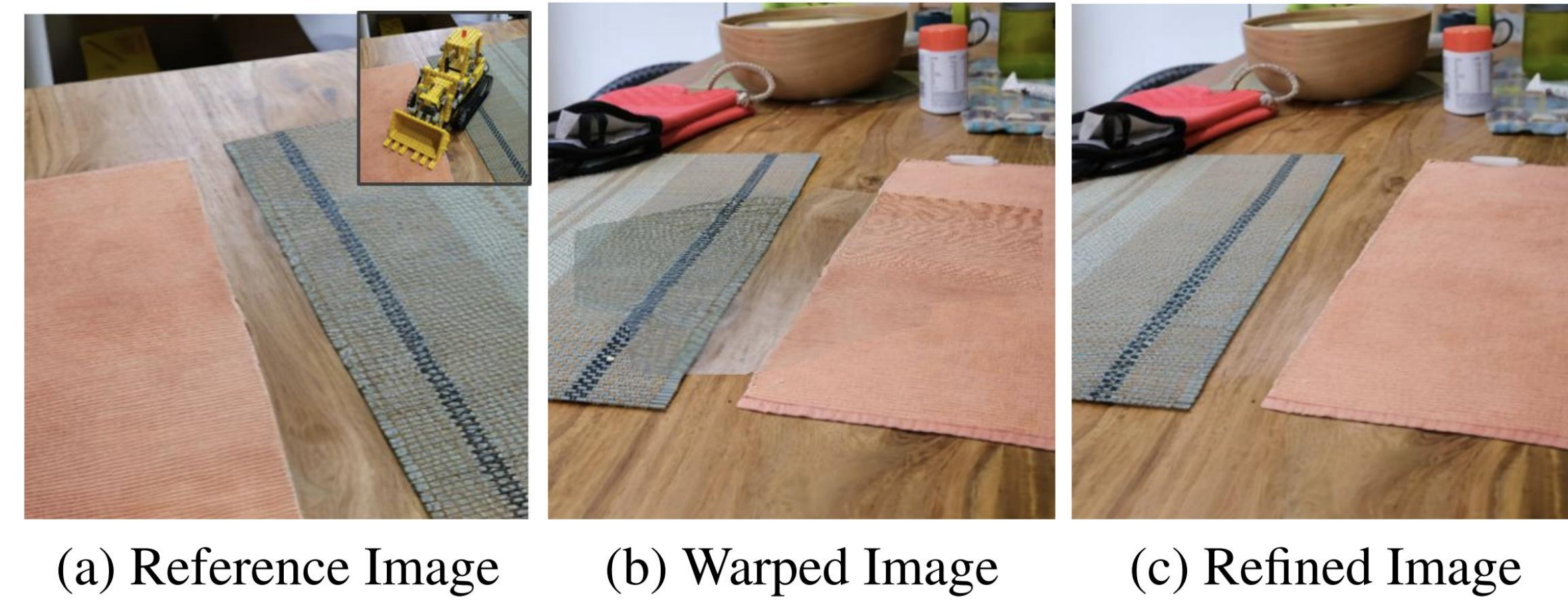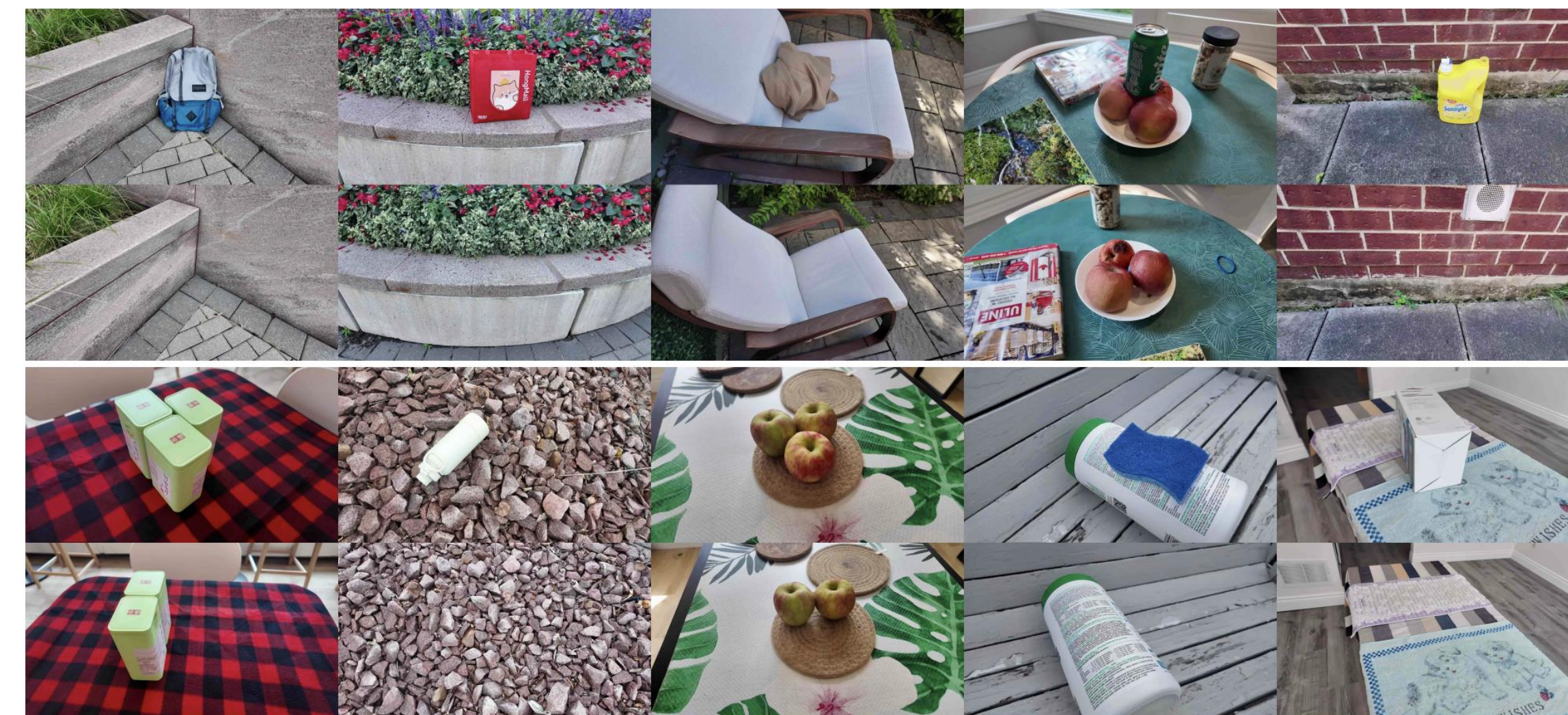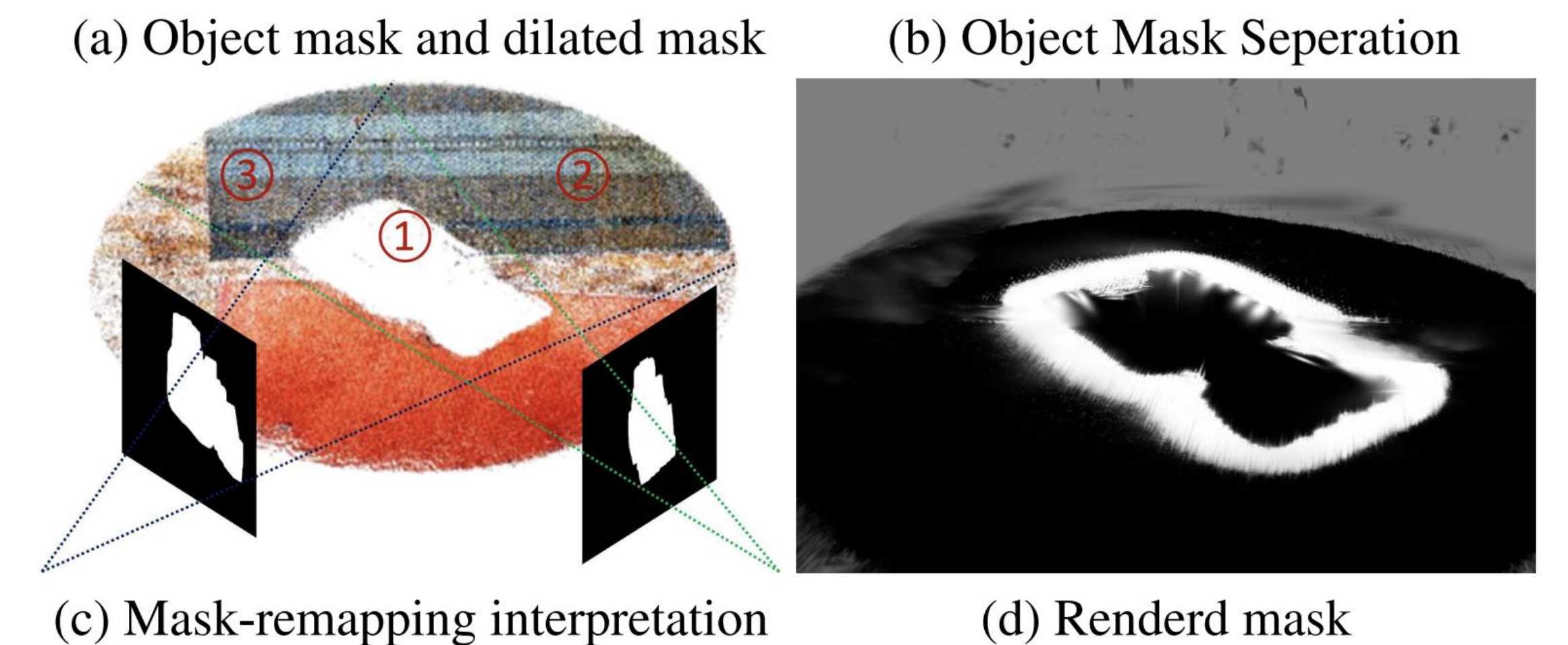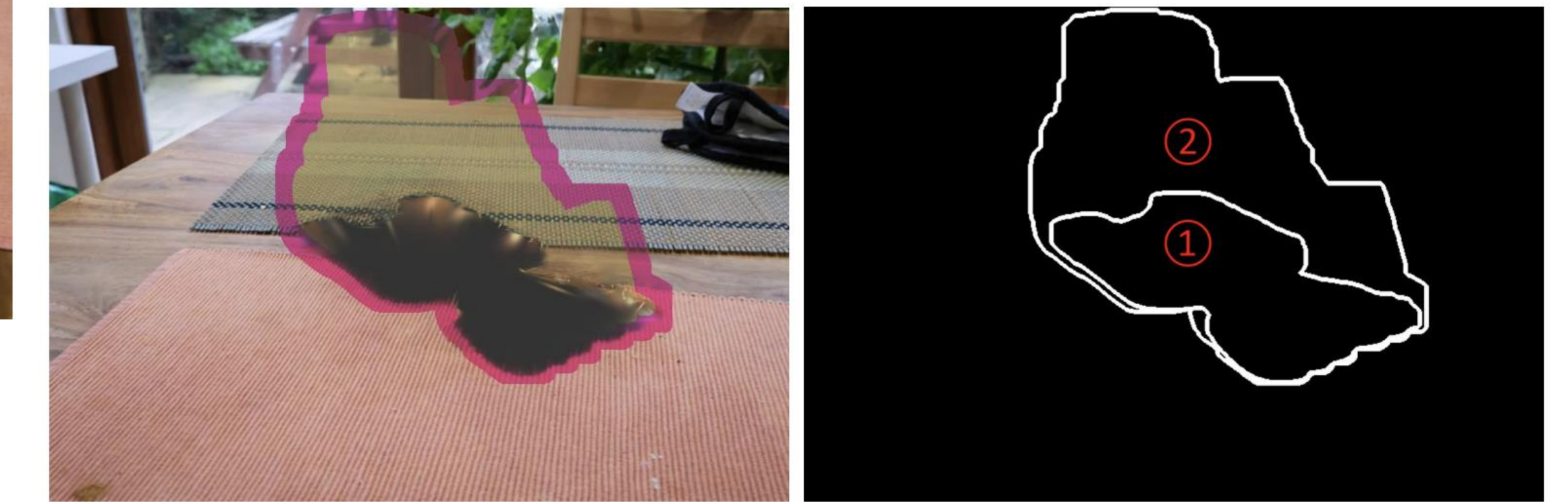- A new and challenging 3D scene inpainting benchmark.

(a) Reference Image   (b) Warped Image   (c) Refined Image

Illustration of the importance of multi-view refinement.

Inpainting Mask Detection

(a) Object mask and dilated mask   (b) Object Mask Seperation

(c) Mask-remapping interpretation   (d) Renderd mask

Preview of our collected dataset.

Experimental Results

Method	Ours			SPINeRF		
	PSNR (↑)	LPIPS (↓)	FID (↓)	PSNR (↑)	LPIPS (↓)	FID (↓)
GaussianEditor	15.71	0.6163	375.03	14.41	0.6247	343.16
GScream	17.18	0.4431	290.63	16.96	**0.3931**	154.71
SPInNeRF	18.75	0.3519	206.43	17.47	0.5740	239.99
MVIPNeRF	18.63	0.4332	278.99	**17.67**	0.5070	255.51
Ours	**19.67**	**0.2685**	**149.52**	17.58	0.4513	**154.34**

Quantitative evaluation on the SPINeRF dataset and our dataset.

Method	PSNR (↑)	LPIPS (↓)	FID (↓)
w/o Warping	17.85	0.3215	198.24
w/o Refinement	18.90	0.3069	206.96
General Refinement	19.08	0.2719	165.80
Single-View Refinement	19.46	0.2725	154.33
Multi-View Refinement (Ours)	19.67	0.2685	149.52

Quantatitive results of ablation studies.