



# GIMME: 3D Gaussian Inverse Rendering for Mobile Mesh Extraction

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## Problem

We present a method to enhance the practicality of radiance fields for real-time mesh-extraction applications on mobile platforms. While Neural Radiance Fields (NeRF) [1] offer photorealistic scene rendering, their computational intensity hampers real-time execution in environments lacking compute resources, such as mobile devices. By leveraging 3D Gaussian Splatting (3DGS) [2], we address the computational challenges associated with NeRF, enabling photorealistic scene rendering on resource-constrained platforms. Then, by utilizing the SuGaR 3D mesh reconstruction pipeline [3], we extract textured meshes ready to render for downstream applications, such as AR/VR gaming.

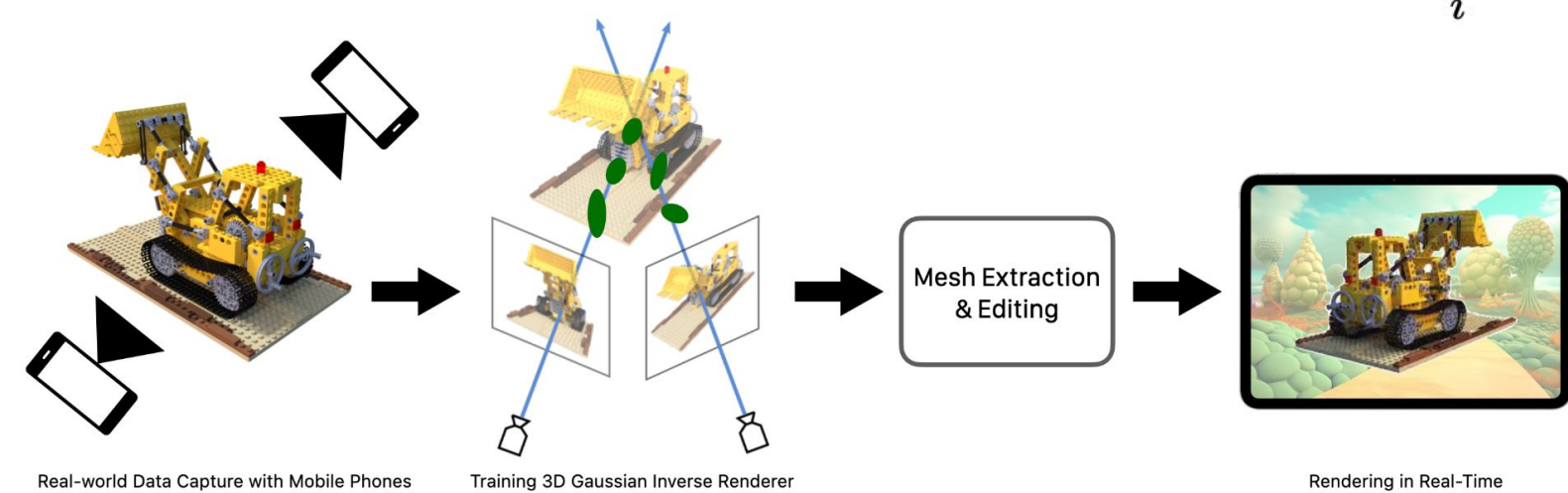
## Methods

The core of our methodology has three components:

- iOS app to capture data for neural rendering with ARKit
- Pipeline to train 3DGS models for real-time rendering
- SuGaR mesh extraction system to retrieve textured meshes

$$V(\mathbf{x}) = \sum_i s_i \cdot \exp\left(-\frac{\|\mathbf{x} - \mathbf{x}_i\|^2}{2\sigma^2}\right)$$

$$G(\mathbf{x}) = \sum_i V_i(\mathbf{x})$$



## Results

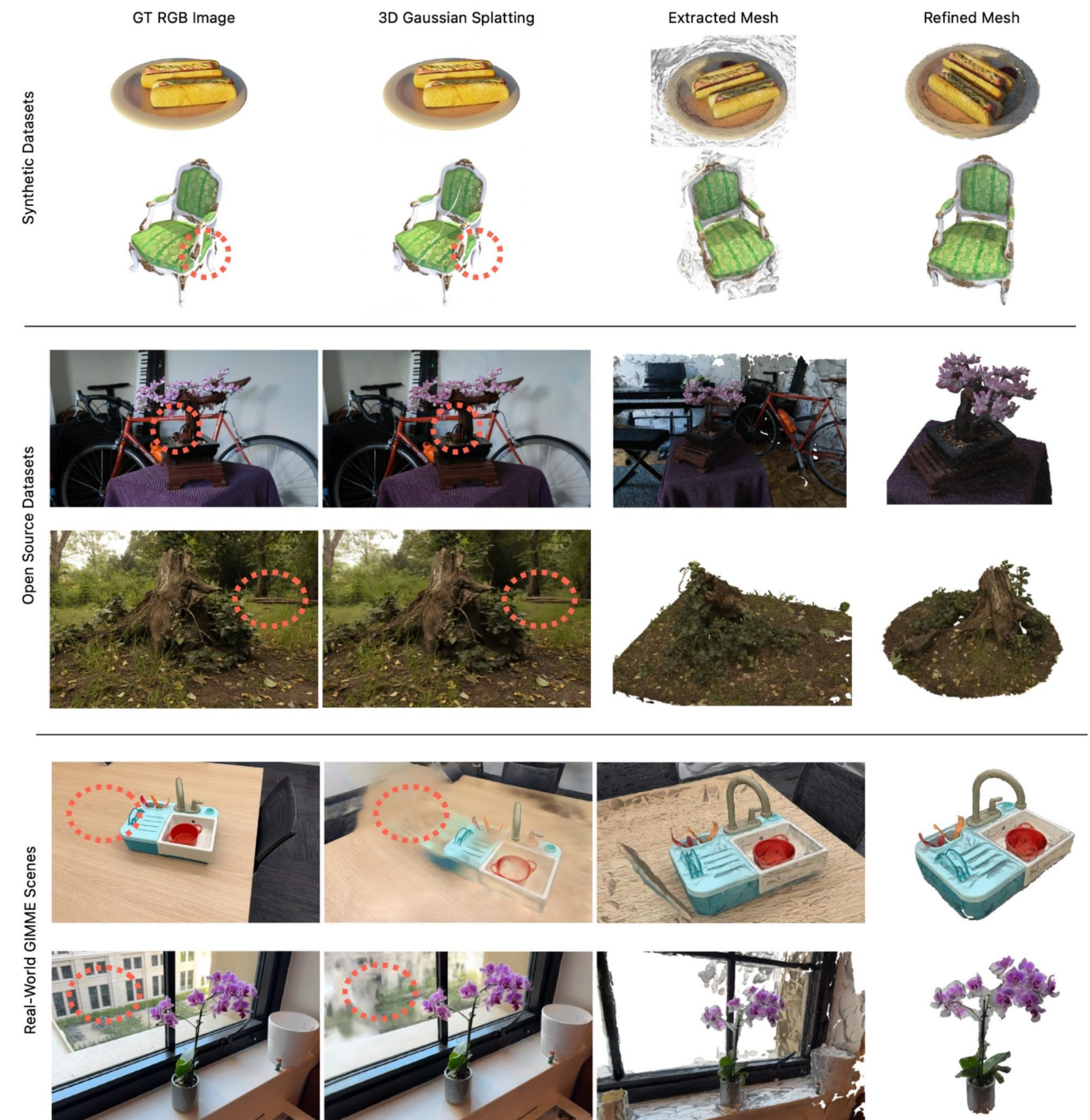
Metric	Synthetic		Real World		Our Data	
	Hotdog	Chair	Bonsai	Stump	Sink	Orchid
PSNR ↑	32.03	28.34	28.50	24.70	19.21	21.10
LPIPS ↑	0.0561	0.0669	0.1770	0.3320	0.4264	0.3805
SSIM ↓	0.9698	0.9451	0.9237	0.7231	0.6079	0.7627

Table 1. Evaluation metrics for different scenes.

## Conclusions

- We successfully developed a pipeline for 3D Gaussian-enabled mesh extraction via a mobile app, achieving high-quality 3D scene rendering and integration with the SuGaR system.
- Future efforts will focus on automating the mesh refinement process within the pipeline, enabling more efficient and sophisticated object-specific mesh extraction from scene data.

## Experiments



## References

- [1] B. Mildenhall, P. P. Srinivasan, M. Tancik, J. T. Barron, R. Ramamoorthi, and R. Ng. Nerf: Representing scenes as neural radiance fields for view synthesis. *ECCV*, 2020.
- [2] B. Kerbl, G. Kopanas, T. Leimkühler, and G. Drettakis. 3d gaussian splatting for real-time radiance field rendering. *ACM Trans. Graph.*, 42(4), 2023.
- [3] A. Guédon and V. Lepetit. Sugar: Surface-aligned gaussian splatting for efficient 3d mesh reconstruction and high-quality mesh rendering. *arXiv*, 2023.