

Introduction

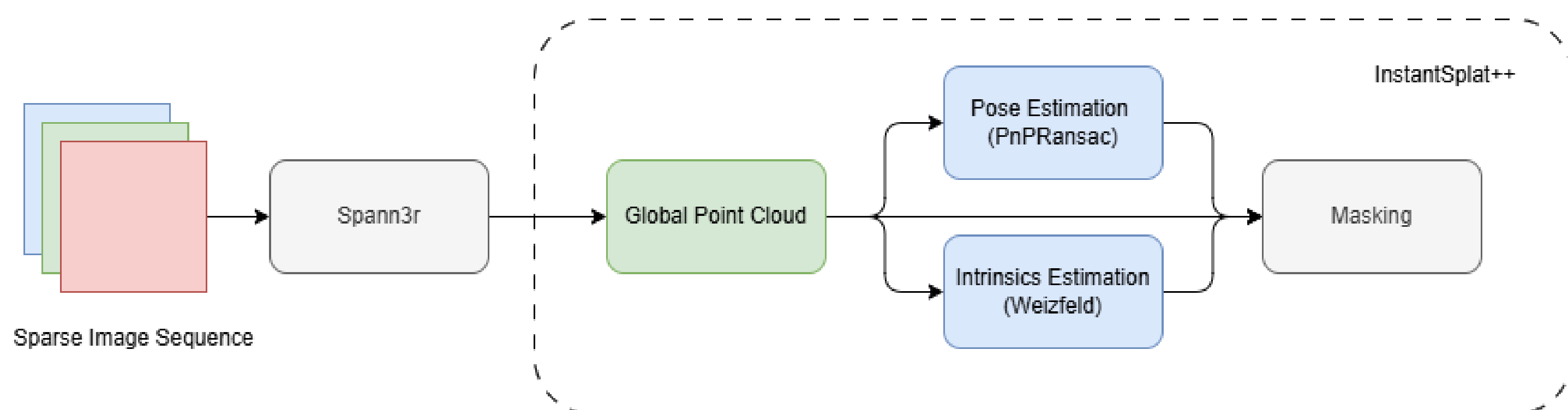
Motivation

❑ Neural 3D Reconstruction

- Recent advances enable photorealistic scene Reconstruction.
- Typically relies on dense multi-view data & external pose initialization (e.g., COLMAP).

❑ Our Goal

- Achieve **fast** reconstruction suitable for real-world scenarios.



Key Contributions

❑ Spann3r

- Builds a global point cloud from sparse sequences **without** pairwise registration.
- Integrates **Spann3R** for faster, more robust initialization.

❑ Masking Technique

- Uses **depth matching** and **frustum overlap** to detect redundant points.
- Improves reconstruction quality by removing overlaps.

❑ Multi-Representation Compatibility

- Seamlessly supports **3D-GS**, **2D-GS**

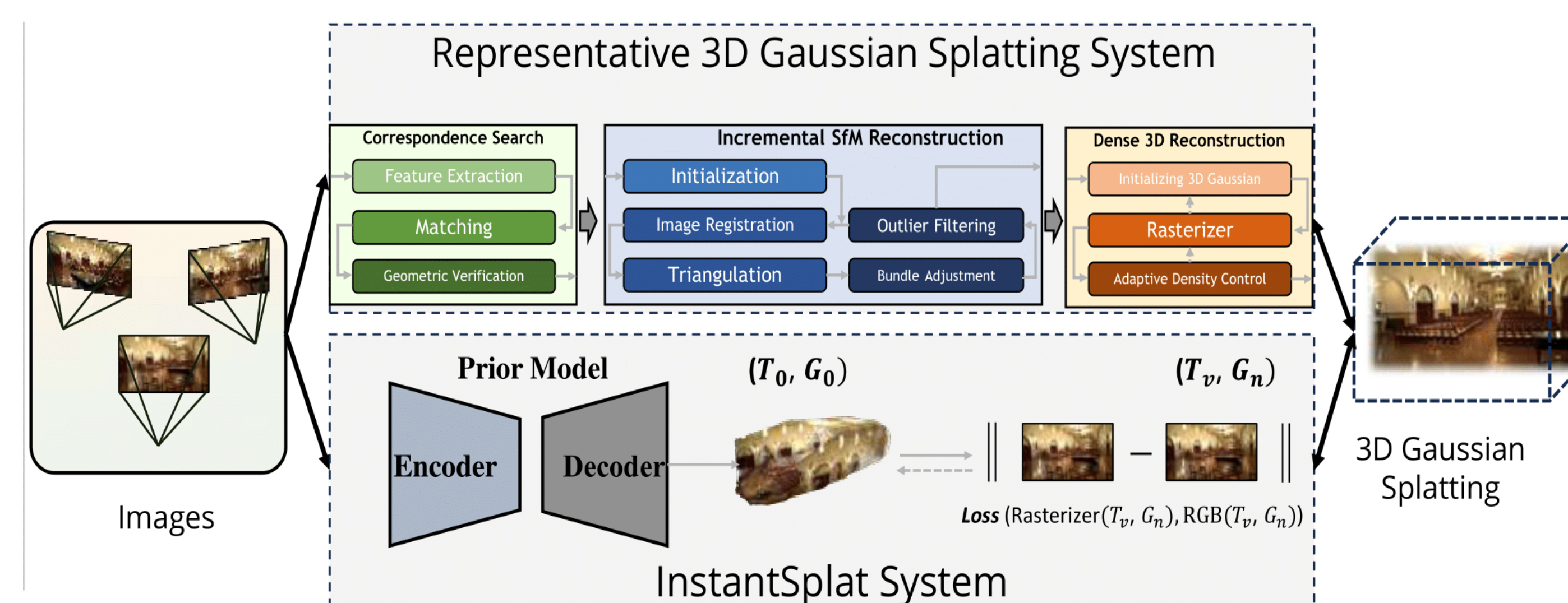


[1] Z. Fan *et al.*, 'InstantSplat: Sparse-view SfM-free Gaussian Splatting in Seconds', *arXiv [cs.CV]*. 2024.
 [2] H. Wang and L. Agapito, '3D Reconstruction with Spatial Memory', *arXiv [cs.CV]*. 2024.
 [3] B. Huang, Z. Yu, A. Chen, A. Geiger, and S. Gao, '2D Gaussian Splatting for Geometrically Accurate Radiance Fields', in *Special Interest Group on Computer Graphics and Interactive Techniques Conference Conference Papers '24*, 2024, pp. 1–11.

Method

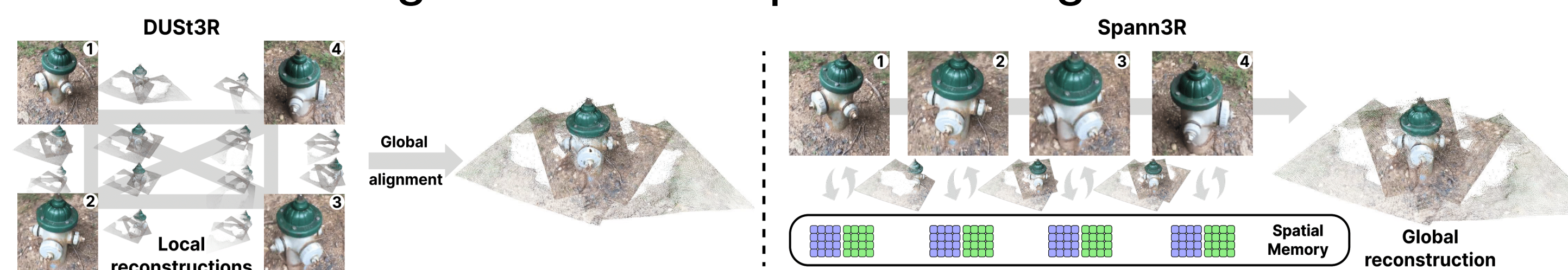
InstantSplat

- A self-supervised approach that fuses 2D images with 3D representations,
- Accelerates scene optimization through an initial point cloud.



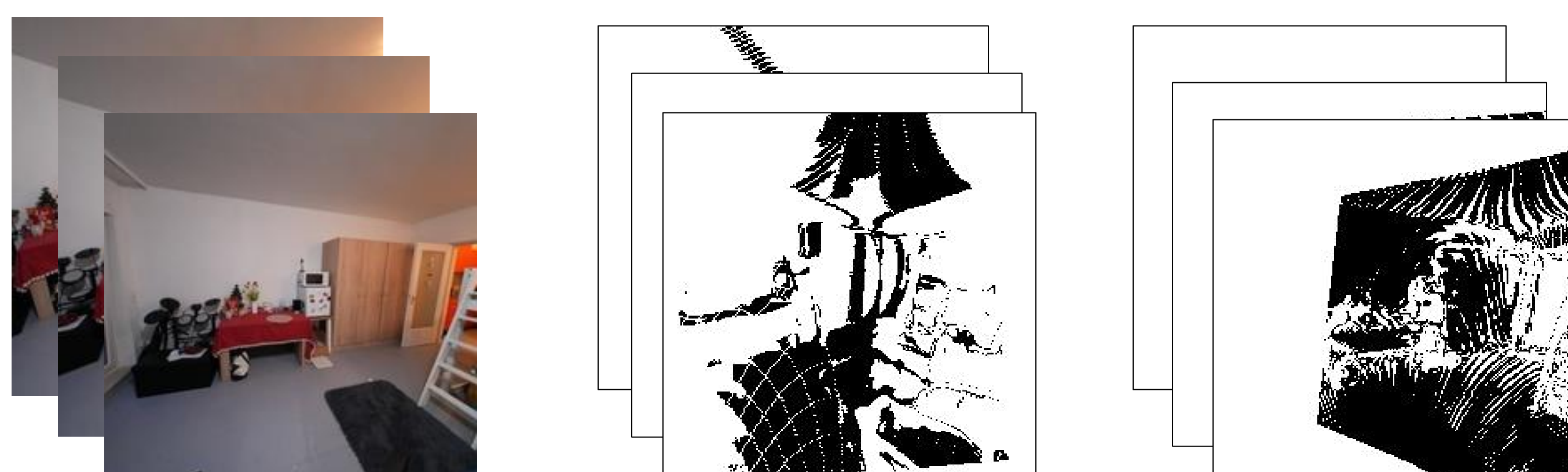
Spann3r

- Predicts a global point cloud directly from a sparse image sequence, anchored in the first frame, eliminating the need for pairwise alignment.



Masking

- Leverages depth matching and frustum overlap checks to detect and remove redundant points.



Input

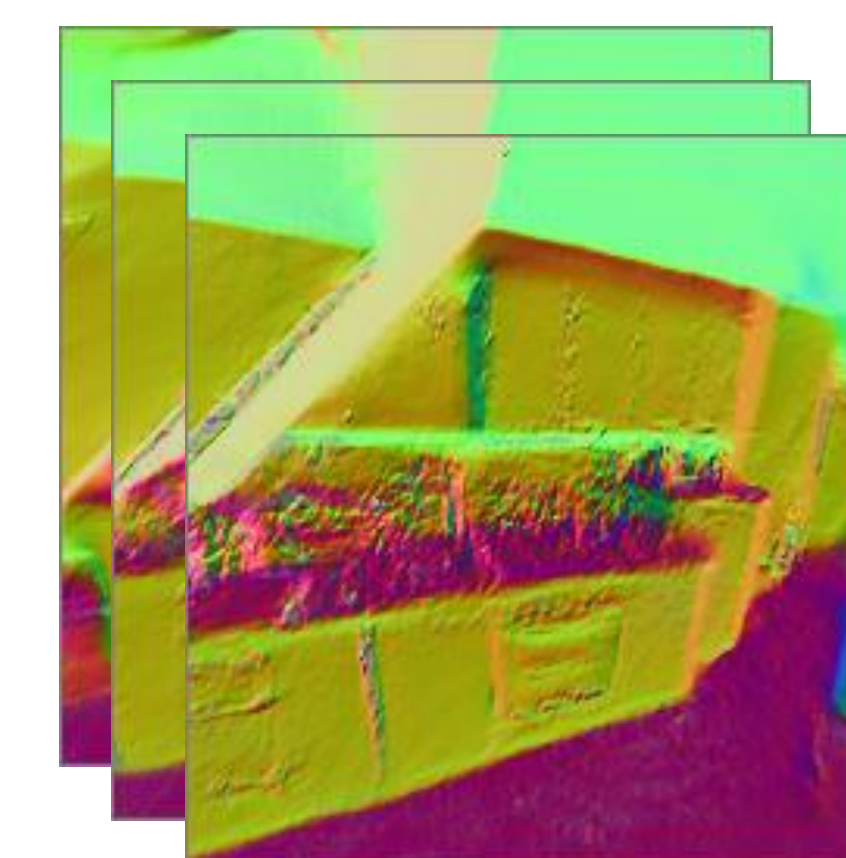
InstantSplat

Ours

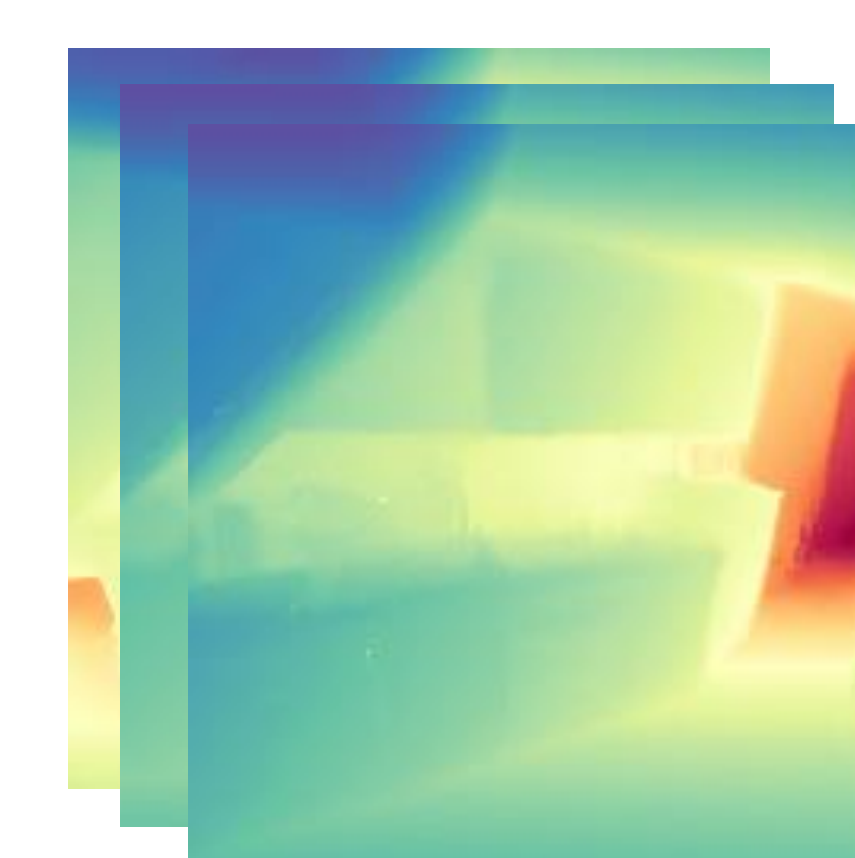
Experiments

2D Gaussian Splatting

	SSIM	PSNR	LPIPS	Rel Err	Tau	Time
MASt3R	0.99	40.15	0.015	8.49	29.92	2.83
Spann3R	0.99	45.22	0.005	5.55	53.58	0.66



Normals



Depths



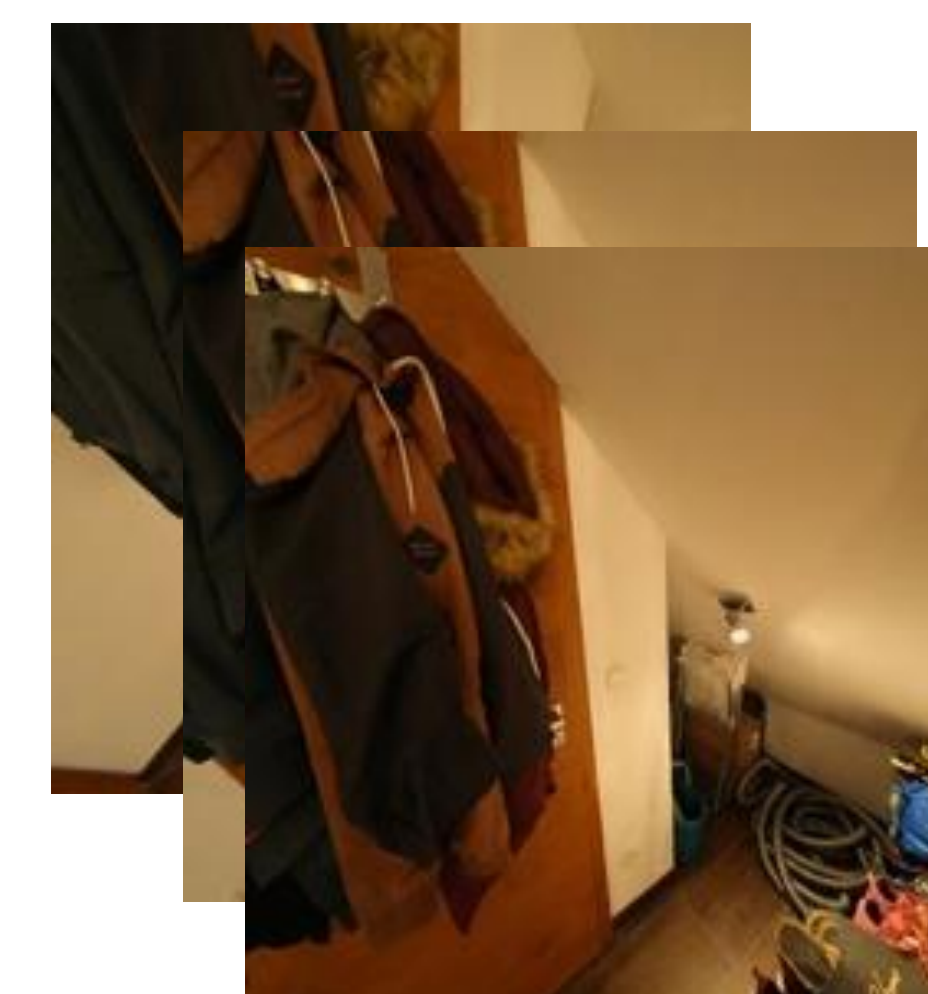
Renderings



Mesh

3D Gaussian Splatting

	SSIM	PSNR	LPIPS	Time
MASt3R	0.994	42.48	0.009	2.81
Spann3R	0.997	48.01	0.003	0.69



Renderings



Mesh