

Novelty Assessment Report

Paper: SurfSplat: Conquering Feedforward 2D Gaussian Splatting with Surface Continuity Priors

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Abstract

Reconstructing 3D scenes from sparse images remains a challenging task due to the difficulty of recovering accurate geometry and texture without optimization. Recent approaches leverage generalizable models to generate 3D scenes using 3D Gaussian Splatting (3DGS) primitive. However, they often fail to produce continuous surfaces and instead yield discrete, color-biased point clouds that appear plausible at normal resolution but reveal severe artifacts under close-up views. To address this issue, we present SurfSplat, a feedforward framework based on 2D Gaussian Splatting (2DGS) primitive, which provides stronger anisotropy and higher geometric precision. By incorporating a surface continuity prior and a forced alpha blending strategy, SurfSplat reconstructs coherent geometry together with faithful textures. Furthermore, we introduce High-Resolution Rendering Consistency (HRRC), a new evaluation metric designed to evaluate high-resolution reconstruction quality. Extensive experiments on RealEstate10K, DL3DV, and ScanNet demonstrate that SurfSplat consistently outperforms prior methods on both standard metrics and HRRC, establishing a robust solution for high-fidelity 3D reconstruction from sparse inputs.

Disclaimer

This report is **AI-GENERATED** using Large Language Models and WisPaper (a scholar search engine). It analyzes academic papers' tasks and contributions against retrieved prior work. While this system identifies **POTENTIAL** overlaps and novel directions, **ITS COVERAGE IS NOT EXHAUSTIVE AND JUDGMENTS ARE APPROXIMATE**. These results are intended to assist human reviewers and **SHOULD NOT** be relied upon as a definitive verdict on novelty.

Note that some papers exist in multiple, slightly different versions (e.g., with different titles or URLs). The system may retrieve several versions of the same underlying work. The current automated pipeline does not reliably align or distinguish these cases, so human reviewers will need to disambiguate them manually.

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Core Task Landscape

This paper addresses: **Feedforward 3D Scene Reconstruction from Sparse Multi-View Images**

A total of **50 papers** were analyzed and organized into a taxonomy with **30 categories**.

Taxonomy Overview

The research landscape has been organized into the following main categories:

- **Gaussian Splatting-Based Feedforward Reconstruction**
- **Neural Radiance Field-Based Feedforward Reconstruction**
- **Pointmap and Depth-Based Feedforward Reconstruction**
- **Hybrid and Multi-Stage Feedforward Frameworks**
- **Pose Estimation and Structure-from-Motion Integration**
- **Specialized Domain Applications**
- **Theoretical Foundations and Survey Literature**
- **Line-Based and Alternative Geometric Representations**
- **Neural Field and Implicit Representation Methods**
- **Few-Shot View Synthesis and Localization**

Complete Taxonomy Tree

- Feedforward 3D Scene Reconstruction from Sparse Multi-View Images Survey Taxonomy
- Gaussian Splatting-Based Feedforward Reconstruction
 - 3D Gaussian Splatting Approaches
 - Cost Volume-Guided 3D Gaussian Prediction (3 papers)
 - [1] Mvsplat: Efficient 3d gaussian splatting from sparse multi-view images (Chen Yue-dong, 2024) [View paper](#)
 - [4] Drivingforward: Feed-forward 3d gaussian splatting for driving scene reconstruction from flexible surround-view input (Ma Lizhuang, 2025) [View paper](#)
 - [8] Mvsplat360: Feed-forward 360 scene synthesis from sparse views (Jianfei Cai, 2024) [View paper](#)
 - Transformer-Based 3D Gaussian Reconstruction (2 papers)
 - [12] FastAvatar: Towards Unified Fast High-Fidelity 3D Avatar Reconstruction with Large Gaussian Reconstruction Transformers (Wu Yue, 2025) [View paper](#)
 - [16] GS-LRM: Large Reconstruction Model for 3D Gaussian Splatting (Kai Zhang, 2024) [View paper](#)
 - Unposed and Flexible Input 3D Gaussian Methods (2 papers)
 - [9] No pose, no problem: Surprisingly simple 3d gaussian splats from sparse unposed images (Botao Ye, 2024) [View paper](#)
 - [10] Flex3d: Feed-forward 3d generation with flexible reconstruction model and input view curation (Han Junlin, 2024) [View paper](#)
 - Generative and Densification-Enhanced 3D Gaussian Methods (2 papers)
 - [13] SparSplat: Fast Multi-View Reconstruction with Generalizable 2D Gaussian Splatting (Jena, 2025) [View paper](#)
 - [23] Generative Densification: Learning to Densify Gaussians for High-Fidelity Generalizable 3D Reconstruction (Seungtae Nam, 2025) [View paper](#)
 - Compact and Efficient 3D Gaussian Representations (1 papers)
 - [19] TinySplat: Feedforward Approach for Generating Compact 3D Scene Representation (Zetian Song, 2025) [View paper](#)
 - 2D Gaussian Splatting Approaches ★ (1 papers)
 - [0] SurfSplat: Conquering Feedforward 2D Gaussian Splatting with Surface Continuity Priors (Anon et al., 2026) [View paper](#)
 - Unified and Multi-Task Gaussian Splatting Frameworks (2 papers)

- [6] Forge4D: Feed-Forward 4D Human Reconstruction and Interpolation from Uncalibrated Sparse-view Videos (Hu Ying-dong, 2025) [View paper](#)
- [7] UniForward: Unified 3D Scene and Semantic Field Reconstruction via Feed-Forward Gaussian Splatting from Only Sparse-View Images (Tian Qi-jian, 2025) [View paper](#)
- Neural Radiance Field-Based Feedforward Reconstruction
 - Diffusion Prior-Regularized NeRF Methods (2 papers)
 - [3] Reconfusion: 3d reconstruction with diffusion priors (Rundi Wu, 2024) [View paper](#)
 - [25] Videoscene: Distilling video diffusion model to generate 3d scenes in one step (Hanyang Wang, 2025) [View paper](#)
 - CAD-Assisted and Retrieval-Based NeRF Reconstruction (1 papers)
 - [17] CAD-NeRF: learning NeRFs from uncalibrated few-view images by CAD model retrieval (Xin Wen, 2025) [View paper](#)
 - Feedforward NeRF with Foundation Model Features (1 papers)
 - [28] DistillNeRF: Perceiving 3D Scenes from Single-Glance Images by Distilling Neural Fields and Foundation Model Features (Sanja Fidler, 2024) [View paper](#)
 - Specialized NeRF for Non-Standard Imaging Conditions (3 papers)
 - [15] Fvmd-isre: 3-d reconstruction from few-view multirate satellite images based on the implicit surface representation of neural radiance fields (Chi Zhang, 2024) [View paper](#)
 - [27] 3D Reconstruction for Scenes with Noticeable Differences in Elevation based on Few-view Satellite Images (Xinqi Liu, 2024) [View paper](#)
 - [44] SuNeRF: 3D Reconstruction of the Solar EUV Corona Using Neural Radiance Fields (Jarolim, 2024) [View paper](#)
- Pointmap and Depth-Based Feedforward Reconstruction
 - Single-Stage Pointmap Prediction (1 papers)
 - [2] Mv-dust3r+: Single-stage scene reconstruction from sparse views in 2 seconds (Zhenggang Tang, 2025) [View paper](#)
 - Surface Reconstruction with Depth and Pose Estimation (1 papers)
 - [5] Surf3R: Rapid Surface Reconstruction from Sparse RGB Views in Seconds (Zhu Hao-dong, 2025) [View paper](#)
 - Epipolar Depth Prior-Enhanced Reconstruction (2 papers)
 - [29] NexusGS: Sparse View Synthesis with Epipolar Depth Priors in 3D Gaussian Splatting (Zheng Yu-long, 2025) [View paper](#)
 - [39] Neural Field-Based Space Target 3D Reconstruction with Predicted Depth Priors (Tao Fu, 2024) [View paper](#)
- Hybrid and Multi-Stage Feedforward Frameworks
 - Two-Stage Generation and Reconstruction Pipelines (1 papers)
 - [22] Bolt3d: Generating 3d scenes in seconds (Szymanowicz, 2025) [View paper](#)
 - Divide-and-Conquer Scene Reconstruction (1 papers)
 - [33] Gen3DSR: Generalizable 3D Scene Reconstruction Via Divide and Conquer From a Single View (Andreea Ardelean, 2024) [View paper](#)
- Pose Estimation and Structure-from-Motion Integration
 - Joint Pose and Shape Optimization (2 papers)
 - [20] Few-view object reconstruction with unknown categories and camera poses (Hanwen Jiang, 2024) [View paper](#)
 - [26] Fvor: Robust joint shape and pose optimization for few-view object reconstruction (Zhenpei Yang, 2022) [View paper](#)
 - Feedforward Structure-from-Motion (1 papers)
 - [24] Light3R-SfM: Towards Feed-forward Structure-from-Motion (Sven Elflein, 2025) [View paper](#)
 - Pose Probes and Calibration-Free Methods (1 papers)
 - [21] Generic objects as pose probes for few-shot view synthesis (Zhirui Gao, 2025) [View paper](#)
 - Sparse Object Reconstruction with Pose Estimation (1 papers)
 - [30] Sparp: Fast 3d object reconstruction and pose estimation from sparse views (Xu Chao, 2024) [View paper](#)
- Specialized Domain Applications
 - Medical and Tomographic Reconstruction (7 papers)
 - [18] Deep learning-based image reconstruction for few-view computed tomography (Dobin Yim, 2021) [View paper](#)
 - [31] 3DGR-CT: Sparse-view CT reconstruction with a 3D Gaussian representation. (Yingtai Li, 2025) [View paper](#)
 - [32] $\hat{\rho}$ cone-beam computed tomography reconstruction through a fast three-dimensional compressed sensing method based on the three-dimensional pseudo-polar fourier $\hat{\rho}$; (N Teyfour, 2022) [View paper](#)
 - [35] Accurate image reconstruction from few-view and limited-angle data in diffraction tomography (Samuel J. LaRoque, 2008) [View paper](#)
 - [36] Two-stage deep learning network-based few-view image reconstruction for parallel-beam projection tomography (Huiyuan Wang, 2022) [View paper](#)
 - [38] Optimization-based reconstruction of sparse images from few-view projections (Xiao Han, 2012) [View paper](#)
 - [45] Few-view image reconstruction with dual dictionaries (Yang Lu, 2011) [View paper](#)
 - Macrophotography and Deblurring-Integrated Reconstruction (1 papers)
 - [42] Joint Deblurring and 3D Reconstruction for Macrophotography (Zhao Yi-fan, 2025) [View paper](#)
 - Articulated and Dynamic Object Reconstruction (1 papers)
 - [50] DreaMo: Articulated 3D Reconstruction from a Single Casual Video (Tao, 2023) [View paper](#)
 - Single-View and Surface-of-Revolution Reconstruction (2 papers)
 - [37] A Pixel Is Worth More Than One 3D Gaussians in Single-View 3D Reconstruction (Shen Jianghao, 2024) [View paper](#)
 - [49] Single-view 3D reconstruction of surface of revolution (Seyed M. Hosseini, 2025) [View paper](#)
 - Specialized Geometric and Vascular Reconstruction (1 papers)
 - [43] Three-dimensional reconstruction of cerebral vasculature (Henri, 1993) [View paper](#)
- Theoretical Foundations and Survey Literature
 - Feedforward Reconstruction Surveys and Reviews (3 papers)
 - [11] Review of feed-forward 3d reconstruction: From dust3r to vggg (Zhang Wei, 2025) [View paper](#)
 - [14] Sparse-view 3d reconstruction: Recent advances and open challenges (Cheng Zhanglin, 2025) [View paper](#)
 - [41] Scene-Level Reconstruction with Sparse Inputs (Yang, 2024) [View paper](#)
- Line-Based and Alternative Geometric Representations
 - Plücker Coordinate-Based Reconstruction (2 papers)
 - [46] $PL\hat{\rho}$ RF: A Line-based 3D Representation for Few-view Reconstruction (Sam Bahrami, 2025) [View paper](#)
 - [47] PluckerRF: A Line-based 3D Representation for Few-view Reconstruction (Sam Bahrami, 2025) [View paper](#)

- Neural Field and Implicit Representation Methods
 - SDF-Based Reconstruction Without 3D Supervision (1 papers)
 - [40] Neural 3D Scene Reconstruction from Multi-view Images without 3D Supervision (Guo Yi, 2023) [View paper](#)
 - Virtual Neural Feature Field Generation (1 papers)
 - [34] Info-Giraffe: virtual neural feature field generation for object in limited views condition (Fan Zhou, 2023) [View paper](#)
- Few-Shot View Synthesis and Localization (1 papers)
 - [48] Few-shot nerf-based view synthesis for viewpoint-biased camera pose estimation (Sota Ito, 2023) [View paper](#)

Narrative

Core task: feedforward 3D scene reconstruction from sparse multi-view images. The field has evolved around several complementary representation paradigms, each offering distinct trade-offs between speed, quality, and geometric fidelity. Gaussian Splatting-Based Feedforward Reconstruction has emerged as a prominent branch, leveraging efficient point-based primitives for real-time rendering; within this branch, works like MVSplat[1] and MVSplat360[8] demonstrate how 3D Gaussians can be predicted directly from sparse views. Neural Radiance Field-Based approaches (e.g., ReConFusion[3], DistillNeRF[28]) continue to explore implicit volumetric representations, while Pointmap and Depth-Based methods (MV-DUST3R+[2], Surf3R[5]) emphasize explicit geometric priors. Hybrid and Multi-Stage frameworks (UniForward[7], Forge4D[6]) combine multiple representations or refine predictions iteratively, and Pose Estimation integration (No Pose Problem[9], Light3R-SfM[24]) addresses the challenge of unknown camera parameters. Specialized domains (DrivingForward[4], CAD-NeRF[17]) and theoretical surveys (Feed-forward Review[11], Sparse-view Survey[14]) round out the taxonomy, alongside alternative geometric representations such as line-based methods (PluckerRF[46]).

Recent activity highlights a tension between representation expressiveness and computational efficiency. Gaussian splatting methods have attracted considerable attention for their balance of quality and speed, yet debates persist over whether 3D or 2D Gaussian primitives better capture surface detail and view-dependent effects. SurfSplat[0] sits within the 2D Gaussian Splatting subgroup, emphasizing surface-aligned representations that may offer improved geometric accuracy compared to volumetric 3D Gaussians like those in MVSplat[1] or GS-LRM[16]. This focus on surface fidelity contrasts with works such as Surf3R[5], which prioritizes dense pointmap prediction, and ReConFusion[3], which relies on diffusion-based NeRF refinement. The interplay between feedforward efficiency and reconstruction quality remains a central open question, with SurfSplat[0] contributing to the ongoing exploration of how geometric priors and representation choices shape the sparse-view reconstruction landscape.

Related Works in Same Category

No sibling papers were found in the same taxonomy leaf. A taxonomy-subtopic-level comparison will be produced instead.

Taxonomy-Level Summary

Both subtopics use Gaussian-based representations for feedforward 3D scene reconstruction from sparse views, but differ fundamentally in their primitive dimensionality and task scope. The original leaf focuses specifically on 2D Gaussian primitives with surface continuity constraints for geometry-texture reconstruction, while the sibling addresses unified frameworks that jointly reconstruct multiple scene properties (geometry plus semantics) or handle diverse inputs using Gaussian representations.

Similarities: - Both employ Gaussian-based representations for 3D scene reconstruction - Both target feedforward reconstruction from sparse multi-view images - Both aim to produce renderable scene representations

Differences: - Primitive type: 2D anisotropic Gaussians with surface priors vs. general Gaussian representations (likely 3D) in multi-task frameworks - Task scope: Single-task geometry-texture reconstruction vs. multi-task joint reconstruction (geometry + semantics) or multi-modal handling - Specialization: Surface continuity and accurate geometry focus vs. unified frameworks handling diverse scene properties - Exclusion boundaries: Original explicitly excludes 3D Gaussian methods, while sibling explicitly excludes single-task geometry-only approaches

Suggested Search Directions: - Investigate whether 2D Gaussian methods could be extended to multi-task settings while preserving surface continuity benefits - Explore hybrid approaches combining 2D surface-aware primitives with semantic field reconstruction - Compare computational efficiency and geometric accuracy trade-offs between 2D and 3D Gaussian primitives in unified frameworks

Sibling Subtopics

- **Unified and Multi-Task Gaussian Splatting Frameworks** (leaves: 1, papers: 2)
- Scope: Feedforward models jointly reconstructing 3D scenes and semantic fields or handling diverse input modalities with Gaussian representations.
- Exclude: Excludes single-task geometry-only methods; see 3D Gaussian Splatting Approaches.

Contributions Analysis

Overall novelty summary. SurfSplat introduces a feedforward framework using 2D Gaussian primitives with surface continuity priors and forced alpha blending to reconstruct coherent geometry and textures from sparse views. The paper resides in the '2D Gaussian Splatting Approaches' leaf, which currently contains only this single work within the broader Gaussian Splatting-Based Feedforward Reconstruction branch. This positioning suggests the paper occupies a relatively sparse research direction, distinguishing itself from the more populated 3D Gaussian methods that dominate sibling categories like Cost Volume-Guided and Transformer-Based approaches.

The taxonomy reveals substantial activity in neighboring 3D Gaussian Splatting categories, with multiple papers exploring cost volumes, transformers, and generative priors. SurfSplat diverges by prioritizing anisotropic 2D primitives over isotropic 3D Gaussians, aiming for stronger surface alignment and geometric precision. This choice connects conceptually to Pointmap and Depth-Based methods that emphasize explicit geometry, yet differs by retaining the splatting rendering paradigm. The `exclude_note` clarifies that 2D Gaussian approaches focus on surface continuity, separating them from 3D methods that may produce discrete point clouds.

Among the three contributions analyzed, the core SurfSplat framework examined six candidates with zero refutations, the HRRC metric examined ten candidates with zero refutations, and the performance claims examined ten candidates with zero refutations. The limited search scope (26 total candidates examined) means these statistics reflect top-K semantic matches rather than exhaustive coverage. The absence of refutable prior work across all contributions suggests that within this bounded search, the specific combination of 2D Gaussians, surface continuity priors, and high-resolution evaluation appears relatively unexplored, though the small candidate pool limits definitive conclusions.

Based on the top-26 semantic matches examined, SurfSplat appears to introduce a distinct approach within the Gaussian splatting paradigm, occupying a sparsely populated taxonomy leaf. The analysis does not cover the full breadth of related work in implicit representations or alternative geometric methods, and the limited candidate pool means potentially relevant papers outside the top-K may exist. The novelty assessment reflects what is visible within this constrained search scope rather than an exhaustive field survey.

This paper presents **3 main contributions**, each analyzed against relevant prior work:

Contribution 1: SurfSplat feedforward framework with surface continuity prior and forced alpha blending

Description: The authors introduce SurfSplat, a feedforward model that uses 2D Gaussian Splatting primitives to reconstruct 3D scenes from sparse images. The method incorporates a surface continuity prior that binds rotation and scale attributes to spatial positions, and a forced alpha blending strategy to prevent opacity collapse and maintain 3D alignment.

This contribution was assessed against **6 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. COLMAP-Free 3D Gaussian Splatting

URL: [View paper](#)

Brief Assessment

COLMAP-Free[71] focuses on eliminating the need for pre-computed camera poses in sequential video processing, not on surface continuity priors or forced alpha blending strategies for feedforward reconstruction.

2. Vidu4D: Single Generated Video to High-Fidelity 4D Reconstruction with Dynamic Gaussian Surfels

URL: [View paper](#)

Brief Assessment

Vidu4D[73] focuses on 4D reconstruction from generated videos using dynamic Gaussian surfels with time-varying warping functions, not feedforward 3D reconstruction from sparse static images with surface continuity priors and forced alpha blending.

3. Towards Robustness in Visual Localization

URL: [View paper](#)

Brief Assessment

Visual Localization[74] focuses on robustness in visual localization tasks, not on feedforward 3D reconstruction using Gaussian splatting primitives with surface continuity priors and forced alpha blending strategies.

4. Towards Photo-Realistic 3D Reconstruction from Casual Scanning

URL: [View paper](#)

Brief Assessment

Casual Scanning[75] focuses on photo-realistic 3D reconstruction from RGB-D sensors and hand-held cameras for small-scale indoor scenes, addressing appearance modeling, lighting recovery, and shape completion. It does not present a feedforward Gaussian Splatting framework with surface continuity priors or forced alpha blending strategies for sparse-view reconstruction.

5. Differentiable 3D Scene Representations With Point-Based Neural Methods

URL: [View paper](#)

Brief Assessment

Point-Based Neural[72] mentions 'gaussian surfels' and 'alpha blending' only in passing fragments without describing any feedforward framework, surface continuity priors, or forced alpha blending strategies. The candidate provides insufficient detail to challenge the novelty of SurfSplat's specific technical contributions.

6. SurfelSplat: Learning Efficient and Generalizable Gaussian Surfel Representations for Sparse-View Surface Reconstruction

URL: [View paper](#)

Brief Assessment

SurfelSplat[76] focuses on Nyquist sampling theorem-guided surfel adaptation and cross-view feature aggregation for sparse-view surface reconstruction, while the original paper's surface continuity prior binds rotation/scale to spatial positions with forced alpha blending to prevent opacity collapse. These are fundamentally different technical approaches to achieving surface-aligned Gaussian representations.

Contribution 2: High-Resolution Rendering Consistency (HRR) evaluation metric

Description: The authors propose HRR, a novel evaluation metric that assesses 3D scene quality by rendering at higher resolutions to expose geometric artifacts like spatial voids and discontinuities that are hidden at standard resolutions. This metric can be computed from standard datasets without requiring new annotations.

This contribution was assessed against **10 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. Introducing Unbiased Depth into 2D Gaussian Splatting for High-accuracy Surface Reconstruction

URL: [View paper](#)

Brief Assessment

Unbiased Depth[61] focuses on improving 2DGS reconstruction quality for glossy surfaces through depth convergence loss and depth criterion rectification, not on evaluation metrics for assessing 3D scene quality at different resolutions.

2. LoG3D: Ultra-High-Resolution 3D Shape Modeling via Local-to-Global Partitioning

URL: [View paper](#)

Brief Assessment

LoG3D[65] focuses on 3D shape modeling using unsigned distance fields and variational autoencoders, not on rendering-based evaluation metrics for 3D scene reconstruction quality.

3. Method for automated discontinuity analysis of rock slopes with three-dimensional laser scanning

URL: [View paper](#)

Brief Assessment

Discontinuity Analysis[69] focuses on analyzing rock slope discontinuities using 3D laser scanning and geometric clustering, not on evaluating 3D scene reconstruction quality through rendering metrics.

4. Fully automated structured light scanning for high-fidelity 3D reconstruction via graph optimization.

URL: [View paper](#)

Brief Assessment

Structured Light[66] focuses on structured light scanning for physical 3D reconstruction with graph optimization for multi-frame registration, not on neural rendering quality metrics or evaluating geometric artifacts through high-resolution rendering.

5. Three-dimensional reconstruction optimization of tunnel face and intelligent extraction of discontinuity orientation based on binocular stereo vision

URL: [View paper](#)

Brief Assessment

Tunnel Face[62] focuses on binocular stereo vision for tunnel face reconstruction and discontinuity extraction in civil engineering, not on evaluating 3D scene quality through high-resolution rendering metrics for neural rendering methods.

6. Multiscale Modeling and Reconstruction of Joint Motion: Finite Element Optimization Based on Particle Swarm Algorithm

URL: [View paper](#)

Brief Assessment

Joint Motion[70] focuses on finite element analysis for biomechanical joint reconstruction using CT/MRI scans, not on evaluating 3D scene rendering quality or surface discontinuities in computer vision contexts.

7. Orthophoto generation from sparse views via structurally consistent prior-guided 3D Gaussian splatting

URL: [View paper](#)

Brief Assessment

Orthophoto Gaussian[68] focuses on orthophoto generation from sparse views for aerial/satellite imagery applications, not on developing evaluation metrics for 3D scene reconstruction quality assessment.

8. ST-3DView: Multi-Scale Contrast-Enhanced 3D Point Cloud Reconstruction of Single-View Objects From Video Scene Transition

URL: [View paper](#)

Brief Assessment

ST-3DView[67] focuses on 3D reconstruction of single-view objects from video scene transitions using point cloud methods, not on evaluating 3D scene quality through high-resolution rendering metrics.

9. An Adaptive Reconstruction Method for Arbitrary High-Order Accuracy Using Discontinuity Feedback

URL: [View paper](#)

Brief Assessment

Adaptive Reconstruction[64] focuses on numerical methods for computational fluid dynamics using discontinuity feedback factors, not on 3D scene reconstruction or rendering quality metrics.

10. Tunnel face videogrammetry for low-cost digitization and discontinuity set orientation measurements

URL: [View paper](#)

Brief Assessment

Tunnel Videogrammetry[63] focuses on tunnel face digitization and discontinuity orientation measurements in rock masses, not on evaluating 3D scene reconstruction quality through rendering metrics.

Contribution 3: State-of-the-art performance on multiple benchmarks

Description: The authors demonstrate through comprehensive experiments that SurfSplat outperforms prior methods on standard novel view synthesis metrics and the proposed HRRC metric across RealEstate10K, DL3DV, and ScanNet datasets, establishing a new performance benchmark for sparse-view 3D reconstruction.

This contribution was assessed against **10 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. Deep fashion3d: A dataset and benchmark for 3d garment reconstruction from single images

URL: [View paper](#)

Brief Assessment

Deep Fashion3D[55] focuses on 3D garment reconstruction from single images, not sparse-view 3D scene reconstruction or novel view synthesis. The domains and technical approaches are fundamentally different.

2. Abo: Dataset and benchmarks for real-world 3d object understanding

URL: [View paper](#)

Brief Assessment

ABO Dataset[53] focuses on creating a dataset for 3D object understanding with product catalog images and 3D models, not on novel view synthesis or sparse-view reconstruction methods. The benchmarks in ABO evaluate 3D reconstruction, material estimation, and retrieval tasks using different evaluation protocols than SurfSplat's novel view synthesis metrics.

3. DVS-3D: Diffusion-based novel view synthesis and 3D object reconstruction from a single image

URL: [View paper](#)

Brief Assessment

DVS-3D[60] focuses on single-image 3D reconstruction using diffusion models for novel view synthesis, evaluated on object-centric datasets (Objaverse, OmniObject3D, GSO). The original paper addresses sparse multi-view 3D reconstruction from multiple input images on scene-level datasets (RealEstate10K, DL3DV, ScanNet), representing fundamentally different problem settings and evaluation protocols.

4. Stereo radiance fields (srf): Learning view synthesis for sparse views of novel scenes

URL: [View paper](#)

Brief Assessment

Stereo Radiance[57] focuses on generalizable view synthesis from sparse views of novel scenes using stereo correspondence encoding, not on establishing benchmarks for sparse-view 3D reconstruction with surface continuity priors and 2D Gaussian splatting primitives.

5. Fsgs: Real-time few-shot view synthesis using gaussian splatting

URL: [View paper](#)

Brief Assessment

FSGS[59] focuses on real-time few-shot view synthesis using Gaussian splatting, but the provided context is too limited (only fragments) to assess whether it challenges SurfSplat's novelty claims about state-of-the-art performance on RealEstate10K, DL3DV, and ScanNet benchmarks with the proposed HRRC metric.

6. FrameNeRF: a simple and efficient framework for few-shot novel view synthesis

URL: [View paper](#)

Brief Assessment

FrameNeRF[54] focuses on few-shot novel view synthesis using NeRF-based models with a regularization-then-fine-tuning approach, while the original paper addresses sparse-view 3D reconstruction using 2D Gaussian Splatting with surface continuity priors. These are fundamentally different technical approaches to related but distinct problems.

7. Sparsenerf: Distilling depth ranking for few-shot novel view synthesis

URL: [View paper](#)

Brief Assessment

SparseNeRF[58] focuses on few-shot novel view synthesis using depth ranking distillation from sparse views, while the original paper addresses feedforward 2D Gaussian splatting for sparse-view 3D reconstruction. These are fundamentally different technical approaches to related but distinct problems.

8. Charge: A Comprehensive Novel View Synthesis Benchmark and Dataset to Bind Them All

URL: [View paper](#)

Brief Assessment

CHARGE[56] presents a novel view synthesis dataset with multiple modalities and benchmarking scenarios, but does not present a method or claim state-of-the-art performance on existing benchmarks like RealEstate10K, DL3DV, or ScanNet that the original paper evaluates on.

9. ViewCrafter: Taming Video Diffusion Models for High-fidelity Novel View Synthesis

URL: [View paper](#)

Brief Assessment

ViewCrafter[51] focuses on novel view synthesis from single or sparse images using video diffusion models, not on sparse-view 3D reconstruction with Gaussian splatting primitives or the HRRC metric proposed in the original paper.

10. Spatialcrafter: Unleashing the imagination of video diffusion models for scene reconstruction from limited observations

URL: [View paper](#)

Brief Assessment

SpatialCrafter[52] focuses on video diffusion-based scene reconstruction from sparse views, while the original paper addresses feedforward 2D Gaussian splatting for novel view synthesis. These are fundamentally different technical approaches to sparse-view reconstruction.

Appendix: Text Similarity Detection

No high-similarity text segments were detected across any compared papers.

References

- [0] SurfSplat: Conquering Feedforward 2D Gaussian Splatting with Surface Continuity Priors [View paper](#)
- [1] Mvsplat: Efficient 3d gaussian splatting from sparse multi-view images [View paper](#)
- [2] Mv-dust3r+: Single-stage scene reconstruction from sparse views in 2 seconds [View paper](#)
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- [6] Forge4D: Feed-Forward 4D Human Reconstruction and Interpolation from Uncalibrated Sparse-view Videos [View paper](#)
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- [8] Mvsplat360: Feed-forward 360 scene synthesis from sparse views [View paper](#)
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- [14] Sparse-view 3d reconstruction: Recent advances and open challenges [View paper](#)
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