HybridPC: a hybrid implicit-explicit framework for zero-shot point cloud completion

Yongwei MIAO, Yijun LI, Ran FAN, Zhenghui HU, Fuchang LIU

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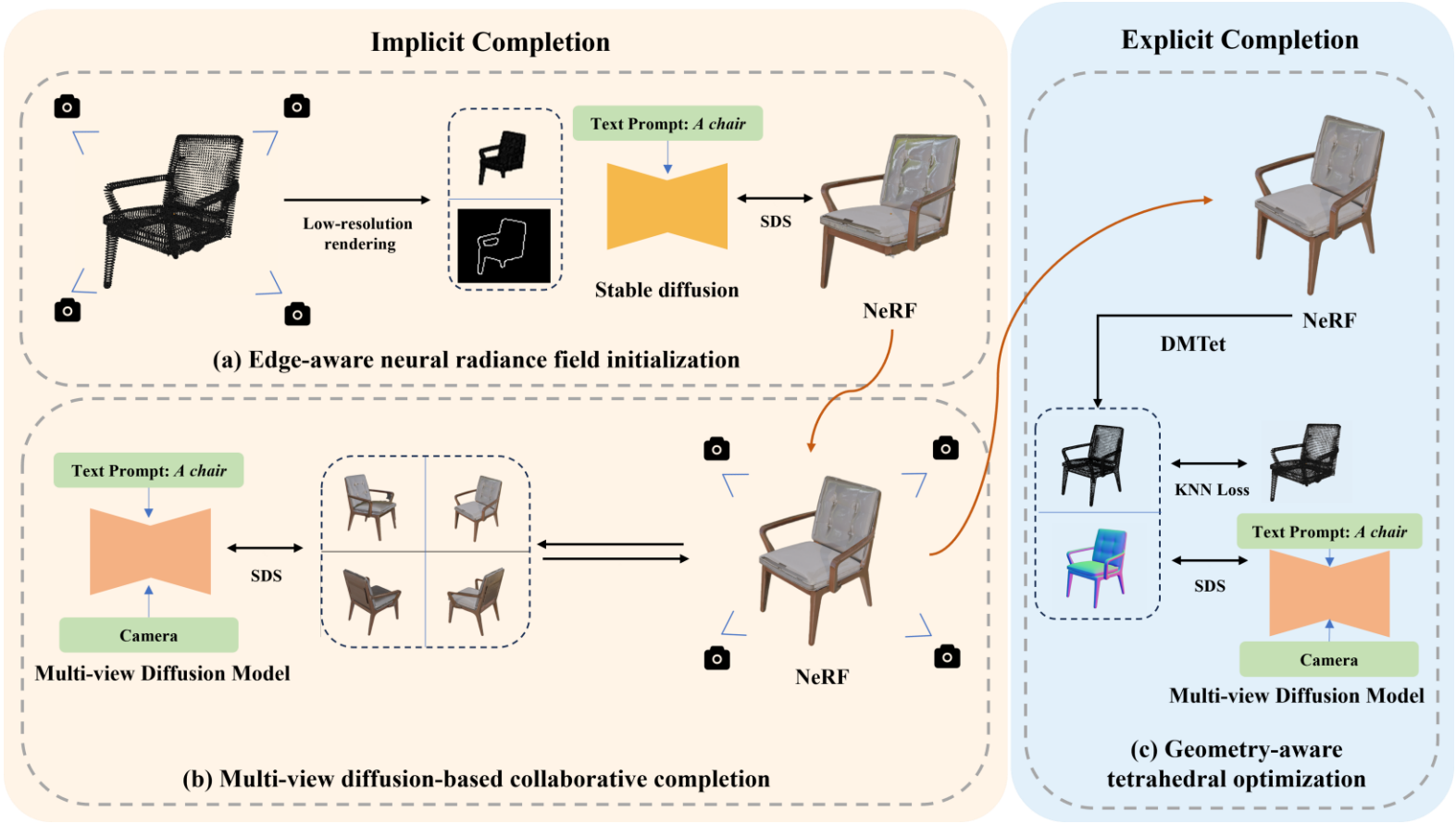
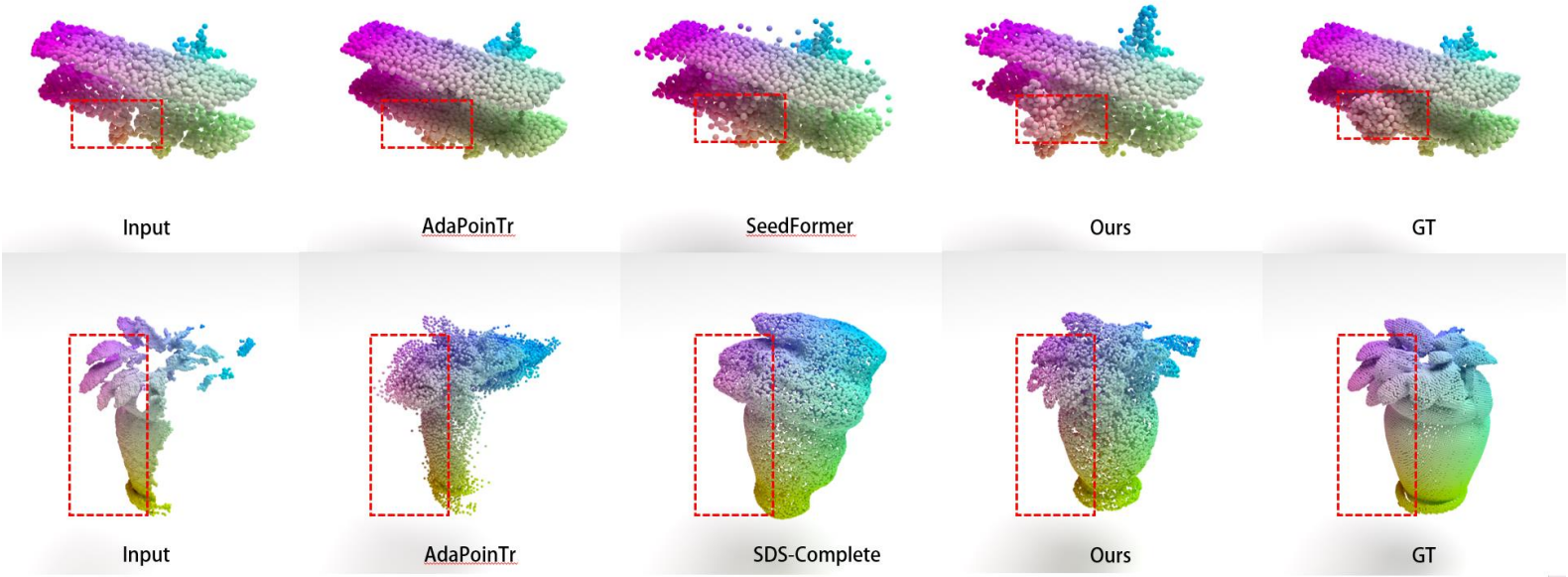
Problems & Ideas

- Problems of conventional stereo matching approaches:
  - **Supervised Point Cloud Completion Methods:** Rely on large-scale 3D training data, leading to poor generalization to “out-of-distribution” shapes and real-world noisy scans.
  - **Zero-Shot Point Cloud Completion Methods:** Struggle with geometric inconsistency.
- Ideas: Propose a three-stage hybrid implicit-explicit framework that integrates pre-trained 2D diffusion priors with 3D geometric constraints, achieving zero-shot completion without 3D supervision.



Main Contributions

- Contributions:
  - Propose HybridPC: a zero-shot point cloud completion paradigm with 2D diffusion priors + hybrid 3D pipeline, no 3D supervision needed;
  - Design 3-stage architecture (edge-init, multi-view completion, tetrahedral refinement) for incompleteness/complex shapes.
  - Strong generalization and empirical effectiveness. Outperforms baselines on ShapeNetPart/Redwood



Qualitative results on point cloud completion. For both synthetic and real world partial inputs, ours outperform baselines (AdaPoinTr, SeedFormer, SDS-Complete). Red boxes highlight critical regions. Our method preserves input structures and accurately completes missing parts.