Triplane Meets Gaussian Splatting

VAST

梁鼎

AI的变与不变

判别式

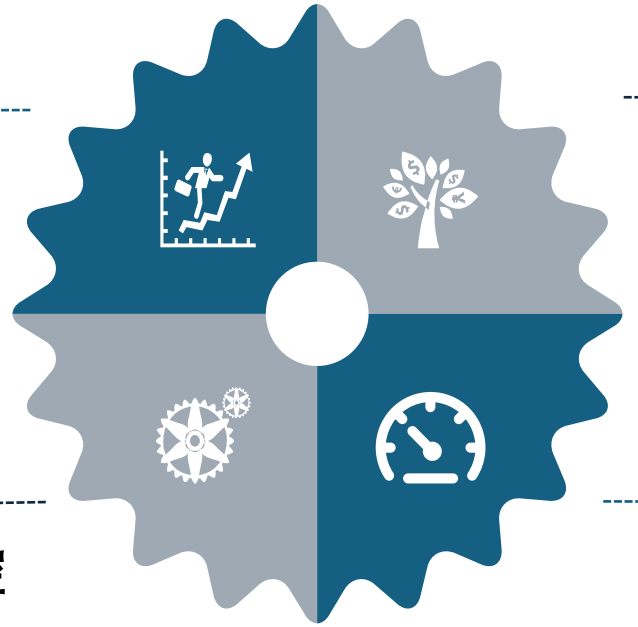
精度

速度

生成式

质量

多样



可控

速度

AI的变与不变

表示

数据

模型

3D AIGC 表示

Mesh	Voxel Grid	SDF/ UDF	DMTet	NerF	Gaussian Splatting
点云	Octree	Depth/ Normal	Flexi Cubes	Triplane	

精度

表达能力

效率

- 转换
- 存储
- 渲染
- 训练

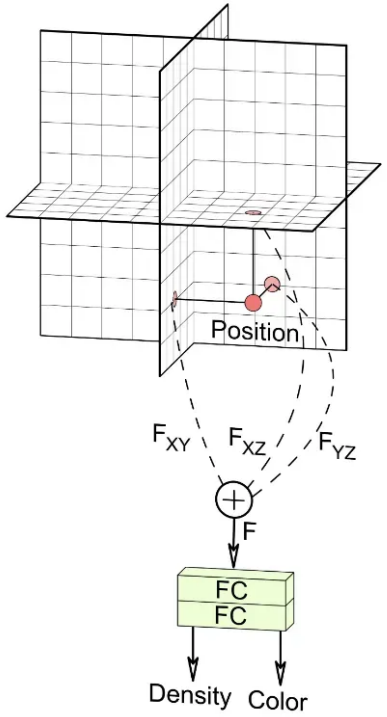
Triplane Meets Gaussian Splatting: Fast and Generalizable Single-View 3D Reconstruction with Transformers

Zi-Xin Zou, Zhipeng Yu, Yuan-Chen Guo, YangguangLi, Ding Liang, Yan-Pei Cao, Song-Hai Zhang

Arxiv: https://arxiv.org/abs/2312.09147
Project Page: https://zouzx.github.io/TriplaneGaussian/

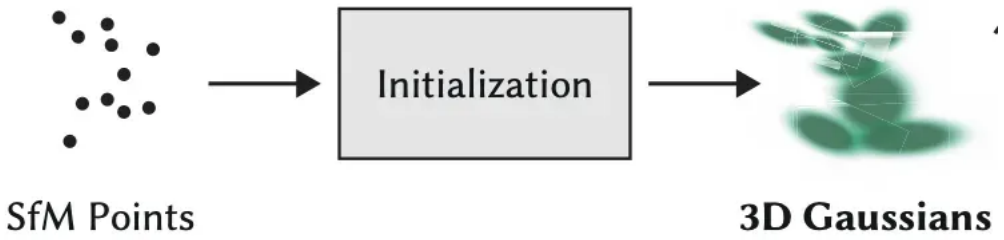
3D Representation && Rendering

Triplane Volume Rendering (Implicit)



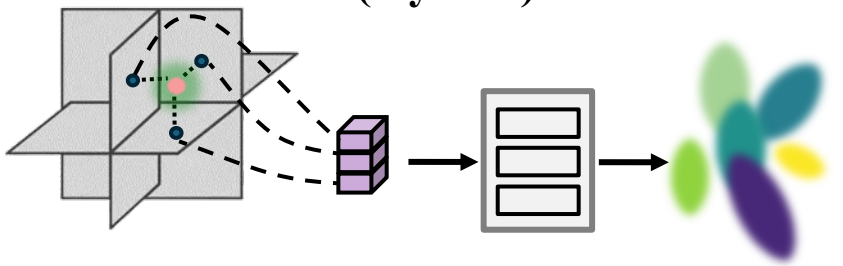
- Good Generalizability
- Time- and Memory-Consuming Volume Rendering

3D Gaussian Splatting (Explicit)



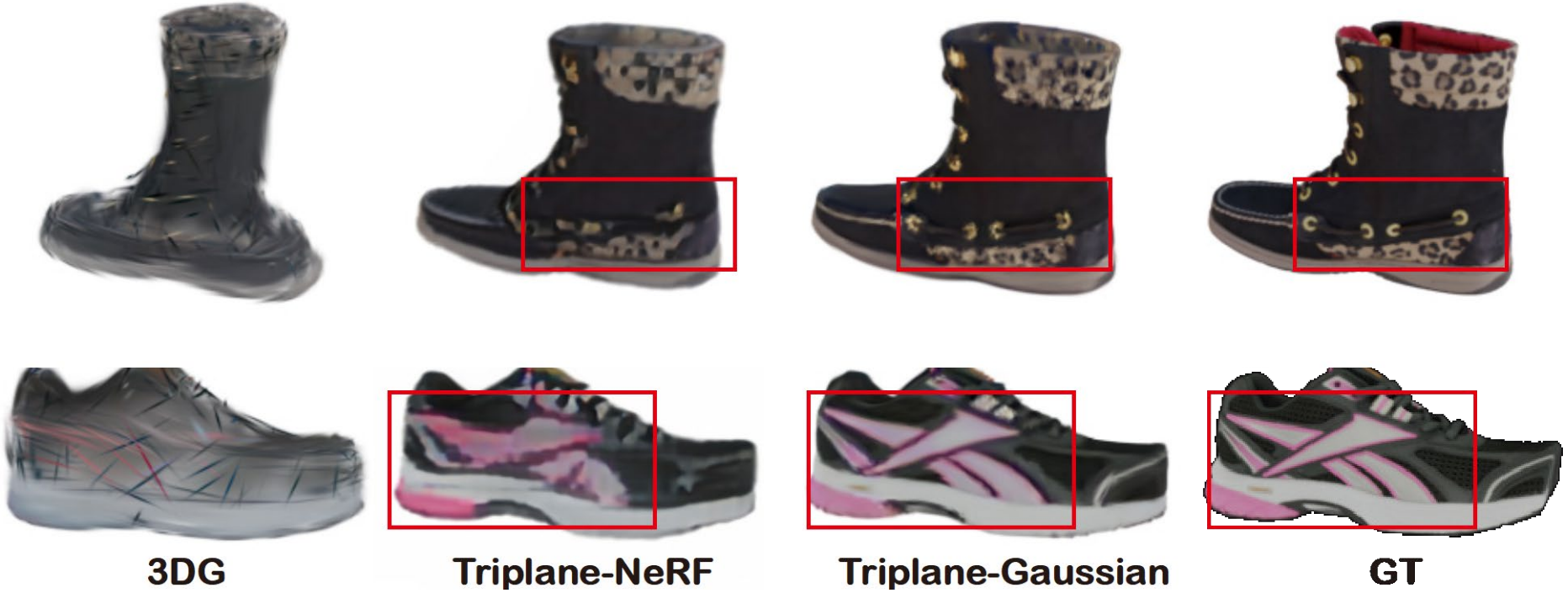
- Fast Rendering with Rasterization
- High Rendering Quality for Scene-specific Optimization Scenario
- Generalizability ?

Triplane-Gaussian Splatting (Hybrid)



Why Triplane-Gaussian?

- Better generalizability and easier to train
- Better texture benefit from projection feature by explicit geometry
- Support fast and high-resolution rendering by leveraging Gaussian Splatting



Overview

Single-view Input

Point-cloud Tokens

Point Cloud Decoder

Upsample

Hybrid Triplane-Gaussian

Point Clouds

(x, y, z)

Hybrid Features

Novel Views

Splatting

Image Condition

Image Encoder

Projection-aware Condition

Gaussian Decoder

3D Gaussians

Camera Embedding

Triplane Tokens

Triplane Decoder

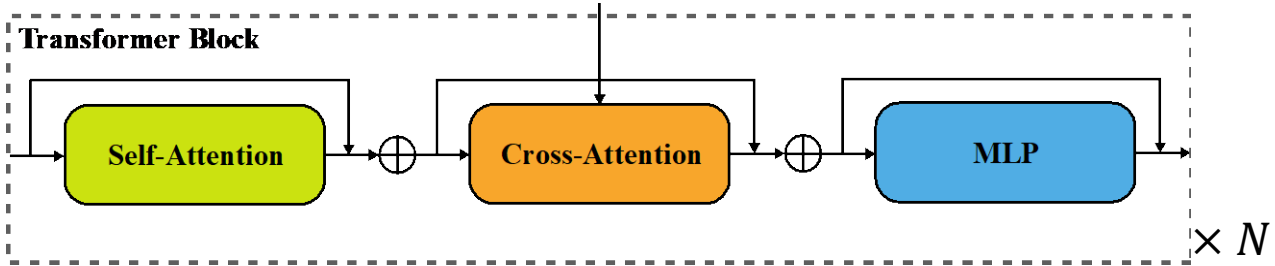
Reshape & Upsample

Reshape

× 3

Geometry-aware Encoding

- **Transformer Architecture**



Comparison on GSO

More Results on GSO

Results from Generated Images

Limitations && Future works

- Limitations:
  - Rely on the initial geometry quality
  - Backside tends to be blurry

- Future works
  - Diffusion model based on Triplane-Gaussian representation
  - Larger training dataset
  - Higher image resolution
  - More feature interaction between point cloud decoder and triplane decoder