



# Interp3D: Correspondence-aware Interpolation for Generative Textured 3D Morphing

Xiaolu Liu<sup>1,2</sup>, Yicong Li<sup>2\*</sup>, Qiyuan He<sup>2</sup>, Jiayin Zhu<sup>2</sup>, Wei Ji<sup>3</sup>, Angela Yao Ji<sup>2</sup>, Jianke Zhu<sup>1,4,\*</sup>  
CAD&CG ZJU<sup>1</sup>, NUS<sup>2</sup>, NJU<sup>3</sup>, SLAI<sup>4</sup>



Web



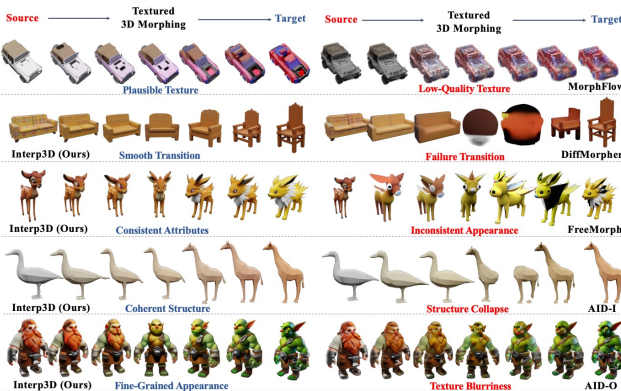
Code



ICLR

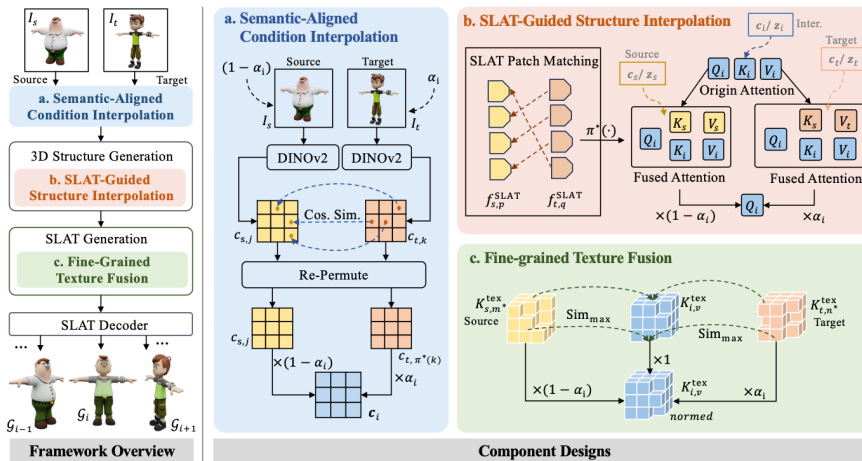
## Motivation & Task Definition

- Motivation:** Existing 3D morphing methods face issues like semantic misalignment and texture blurring, limiting their practical use for high-quality content creation.
- Task:** Given the source and target input, the goal is to address the challenges in textured 3D morphing by ensuring both structural and texture consistency during transitions.
- Objective:** Enabling smooth, plausible transitions between 3D assets, focusing on geometric fidelity and texture coherence.



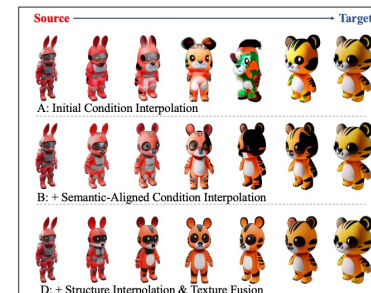
## Interp3D Framework

We propose Interp3D, a correspondence-aware morphing framework that integrates progressive alignment into the 3D generation process, preserving faithful morphing through three stages: Semantic, Structural, and Texture alignment.



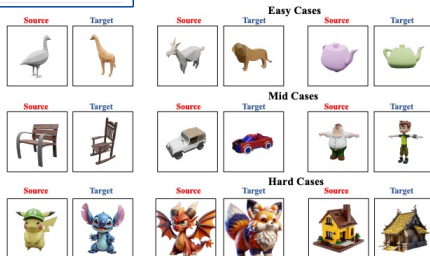
## Module Designs

- Semantic-Aligned Condition Interpolation:** Aligns source and target semantics for smooth transitions.
- SLAT-Guided Structure Interpolation:** Guides structurally coherent interpolation with SLAT correspondences.
- Fine-Grained Texture Fusion:** Fuses fine-grained textures for coherent surface appearance.



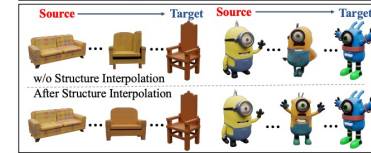
## Experiments

- Interp3DData: We curate the benchmark dataset for textured 3D morphing categorized into three difficulty levels, on which our method achieves superior performance over prior baselines, especially on the most challenging hard cases.



Method	Easy			Mid			Hard			Average		
	FID↓	PPL↓	LPIS↑	FID↓	PPL↓	LPIS↑	FID↓	PPL↓	LPIS↑	FID↓	PPL↓	LPIS↑
MorphFlow	101.36	2.79	0.111	107.57	2.96	0.156	105.71	2.92	0.187	104.88	2.89	0.151
DiffMorpher	160.93	4.18	0.088	177.45	4.16	0.113	170.26	4.92	0.183	169.54	4.42	0.128
FreeMorph	114.01	5.36	0.120	124.02	6.16	0.160	135.69	5.31	0.217	124.57	5.61	0.166
AID-1	84.35	2.92	0.072	84.64	3.10	0.104	94.64	3.57	0.159	87.88	3.20	0.112
AID-O	77.65	2.75	0.068	83.62	2.78	0.092	<b>81.81</b>	3.24	0.145	81.03	2.92	0.102
<b>Interp3D (Ours)</b>	<b>70.79</b>	<b>2.42</b>	<b>0.059</b>	<b>83.58</b>	<b>2.37</b>	<b>0.079</b>	<b>82.54</b>	<b>2.62</b>	<b>0.119</b>	<b>78.97</b>	<b>2.47</b>	<b>0.086</b>

Method	Easy			Mid			Hard			Average		
	FID↓	PPL↓	LPIS↑	FID↓	PPL↓	LPIS↑	FID↓	PPL↓	LPIS↑	FID↓	PPL↓	LPIS↑
Initial Condition Interp.	79.14	3.02	0.074	86.87	3.25	0.109	90.64	3.47	0.157	85.55	3.25	0.113
+ Semantic Align.	75.09	2.75	0.067	86.82	2.98	0.101	88.63	3.24	0.146	83.51	2.99	0.105
+ Structure Interp.	73.81	2.67	0.066	84.64	2.61	0.088	86.42	3.21	0.143	81.62	2.83	0.098
+ Texture Fusion	<b>70.79</b>	<b>2.42</b>	<b>0.059</b>	<b>83.58</b>	<b>2.37</b>	<b>0.079</b>	<b>82.54</b>	<b>2.62</b>	<b>0.119</b>	<b>78.97</b>	<b>2.47</b>	<b>0.086</b>



Method	Fidelity↑	Smoothness↑	Plausibility↑	Overall↑
DiffMorpher	2.35%	1.57%	1.96%	1.96%
FreeMorph	9.02%	12.16%	10.20%	10.46%
AID-O	16.86%	12.94%	18.43%	16.08%
MorphFlow	17.65%	23.14%	11.37%	17.39%
<b>Interp3D (Ours)</b>	<b>54.12%</b>	<b>50.20%</b>	<b>58.04%</b>	<b>54.12%</b>