LIM: Large Interpolator Model for Dynamic Reconstruction

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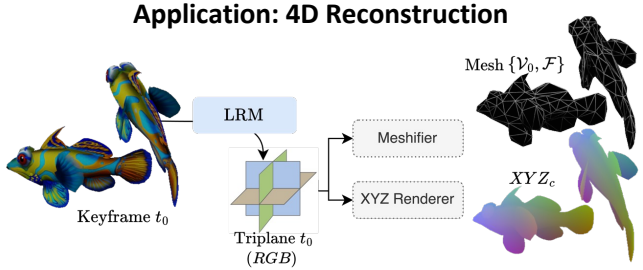
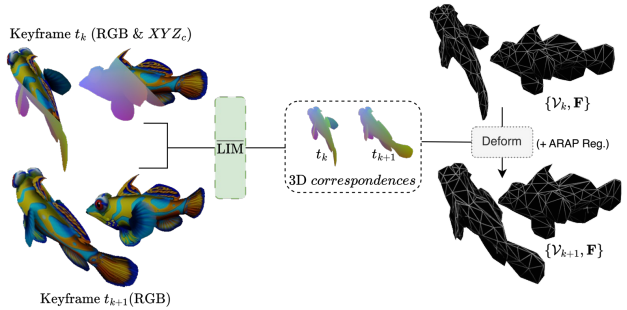
Solving continuous 3D interpolation to unlock feedforward 4D-reconstruction

Project Page with **Video** results

Application: 4D Reconstruction

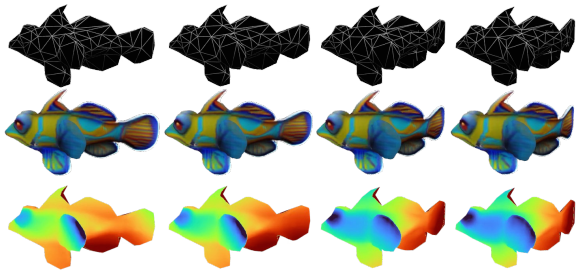


❖ **For the first frame**, we reconstruct a mesh and render dense correspondences XYZ. Topology & Texture are **fixed**.



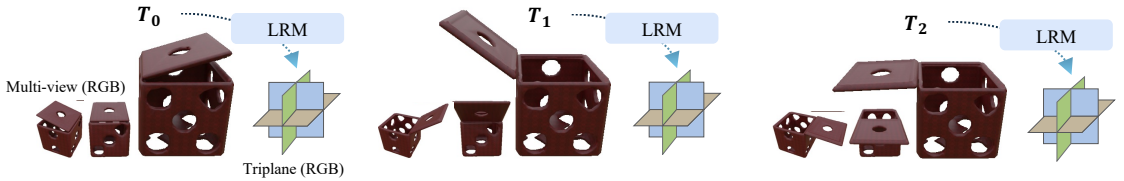
❖ **For each step**, **LIM** propagates the dense correspondences.
❖ We use **LIM** correspondences to **deform** the mesh between keyframes.

LIM – Reconstruction Result



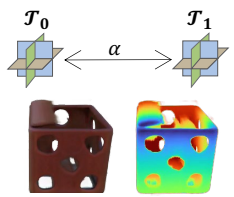
Problem Statement – LIM (Interpolate)

❖ Given a multi-view video of an animated object, Multiview-**LRM** can **only** reconstruct a 3D representations $\mathcal{T}_k$ **per keyframe.**



❖ **How can we get any 3D representation, $\mathcal{T}_\alpha$, $\alpha \in [0, 1]$, in-between keyframes ?**

Linear Interpolation ✗



LIM – Interpolation in 3D ☑

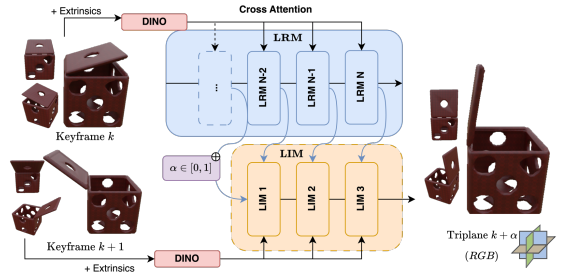
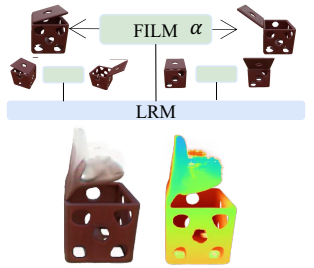
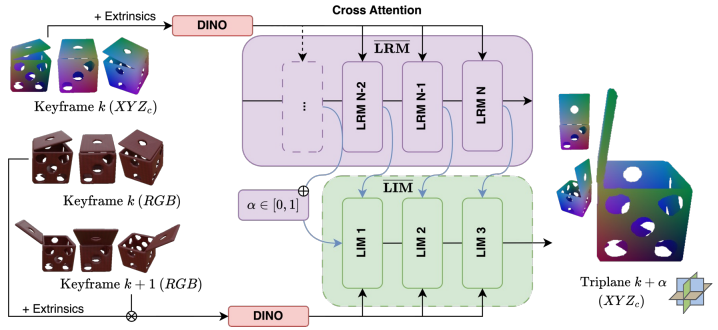
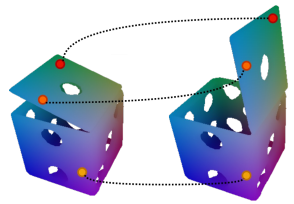


Image Interpolation (FILM) ✗



Propagating dense correspondences - LIM (Track)

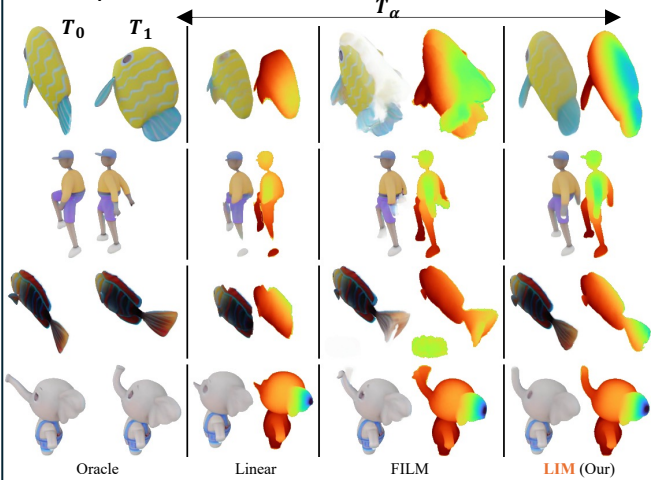




❖ A variant of our model, **LIM** **propagates** XYZ correspondences from one keyframe to another, unlocking **4D-reconstruction**

Main Results

3D Interpolation:



Monocular Reconstruction:

	Feed-fwd.	Inf. Time	LPIPS ↓	FVD ↓
Consistent4D	✗	∼1.5hours	0.429	1136.3
TripoSR	✓	∼30secs	0.504	1427.2
LIM (Ours)	✓	∼3min	**0.142**	**811.1**

References

- Yanqin Jiang, Li Zhang, Jin Gao, Weimin Hu, Yao Yao (2024). **Consistent4D**: Consistent 360-degree Dynamic Object Generation from Monocular Video
- Dmitry Tochilkin, David Pankratz, Zexiang Liu, Zixuan Huang, Adam Letts, Yangguang Li, Ding Liang, Christian Laforte, Varun Jampani, Yan-Pei Cao (2024). **TripoSR**: Fast 3D Object Reconstruction from a Single Image
- Fitsum Reda, Janne Kontkanen, Eric Tabellion, Deqing Sun, Caroline Pantofaru, Brian Curless (2022). **FILM**: Frame Interpolation for Large Motion
- Yicong Hong, Kai Zhang, Jiuxiang Gu, Sai Bi, Yang Zhou, Difan Liu, Feng Liu, Kalyan Sunkavalli, Trung Bui, Hao Tan (2023). **LRM**: Large Reconstruction Model for Single Image to 3D