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Multi-videos 3D modelling

Kinovis platform@inria (68 cameras)
Multi-videos 3D modelling

Build precise models of both shape and appearance
Multi-videos 3D modelling

Multi-videos | Shapes | Appearances | Models

Traditionnal Modeling Pipeline
Multi-videos 3D modelling

Models still have limited precision and poor material and dynamic properties
Multi-videos 3D modelling

Challenges (some)

• Representations: Break the geometry + 2D appearance paradigm?
Multi-videos 3D modelling

Challenges (some)

• Representations: Deep learning, especially CNNs, is well adapted to data in regular grids. 3D data are usually not organized that way.
Multi-videos 3D modelling

Challenges (some)

• Representations

• 3D Modeling: Where and how deep learning can contribute in the modeling pipeline?
Multi-videos 3D modelling

Challenges (some)

• Representations

• 3D Modeling: Where and how deep learning can contribute in the modeling pipeline?

• Datasets/Training: Ground Truth, training 3D tasks with 2D images.
3D Shape Modeling

Multi-View Stereo (MVS) dominant strategy:
- Depth map from each viewpoint using photoconsistency.
- Spatial depth map integration with TSDF.
- Surface reconstruction (Poisson, CVT, …).
3D Shape Modeling

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3D Shape Modeling

DTU Dataset: 80 scenes, each with 49-64 calibrated images and a reference 3D model.
3D Shape Modeling

Feature based vs Learning based

Leroy, Franco, Boyer ECCV’18
Adaptive Mesh Texture for Multi-View Appearance Modeling
Representation

3D geometry

3D-2D

Texture charts
Representation

3D geometry

3D-2D

Texture charts

Geometry + appearance rendering
Representation

3D geometry

3D-2D

Texture charts

Geometry + appearance rendering Close-up view
Representation

3D geometry

Texture charts
Representation

3D geometry + colors

Texture charts

Geometry + appearance rendering
Representation

Store color samples within each triangle
Based on *Mesh colors*, Yuksel, Keyser, House in ACM ToG 2010
Representation

Image Texture

Mesh Texture

Color samples
Interpolated appearance

Adaptive Mesh Texture for Multi-View Appearance Modeling
Armando, Franco, Boyer, 3DV 2019
Adaptive Mesh Texture for Multi-View Appearance Modeling
Armando, Franco, Boyer, 3DV 2019
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3D Shape Modeling

Going further:

- Learning material, appearance, ..
3D Shape Modeling

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- Learning material, appearance, ...
- Considering information over time
3D Shape Modeling

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3D Shape Modeling

http://morpheo.inrialpes.fr