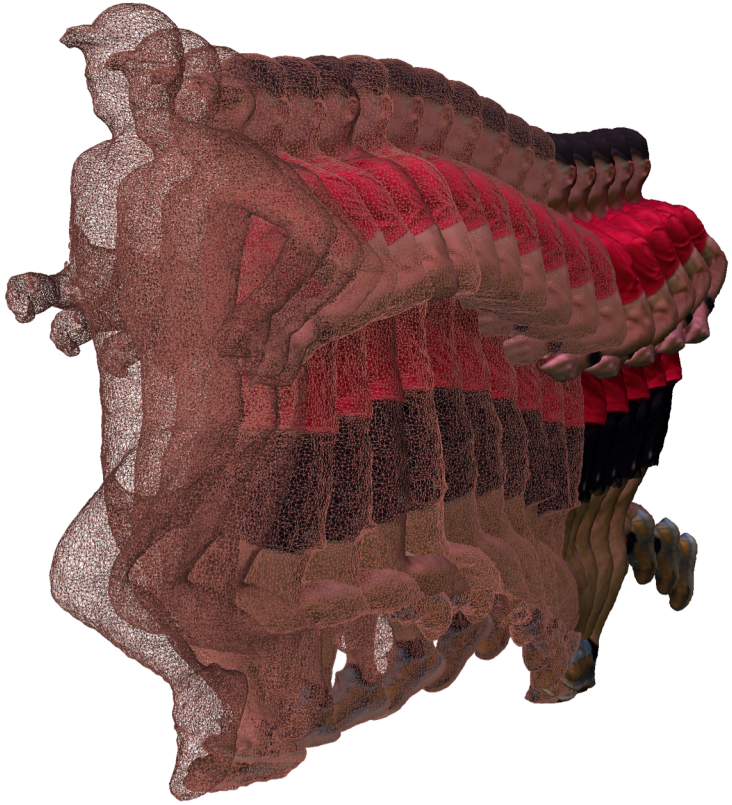
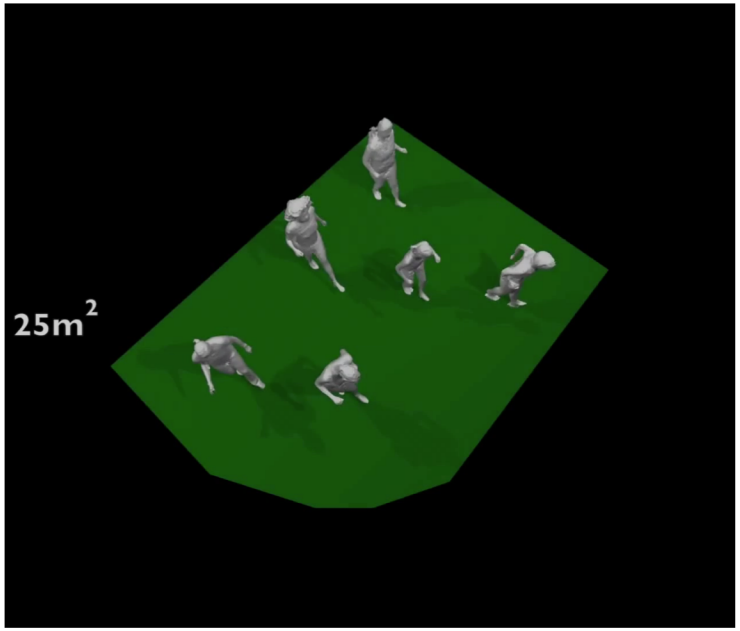


Edmond Boyer

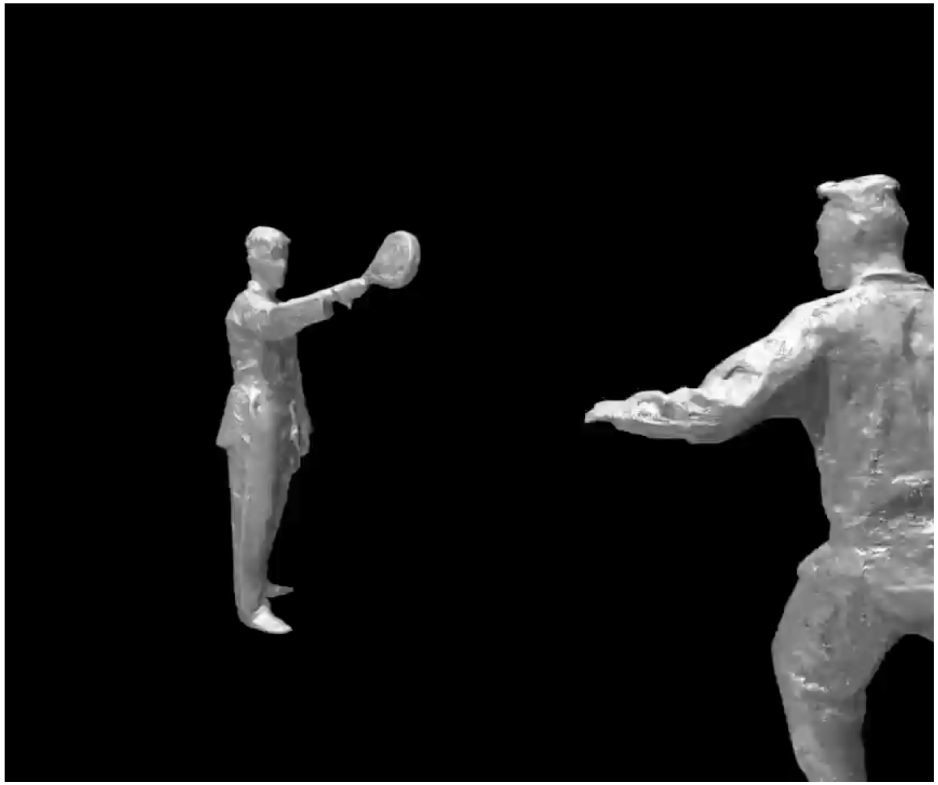
MORPHEO-INRIA Grenoble

# Multi-videos 3D modelling




Kinovis platform@inria (68 cameras)

# Multi-videos 3D modelling



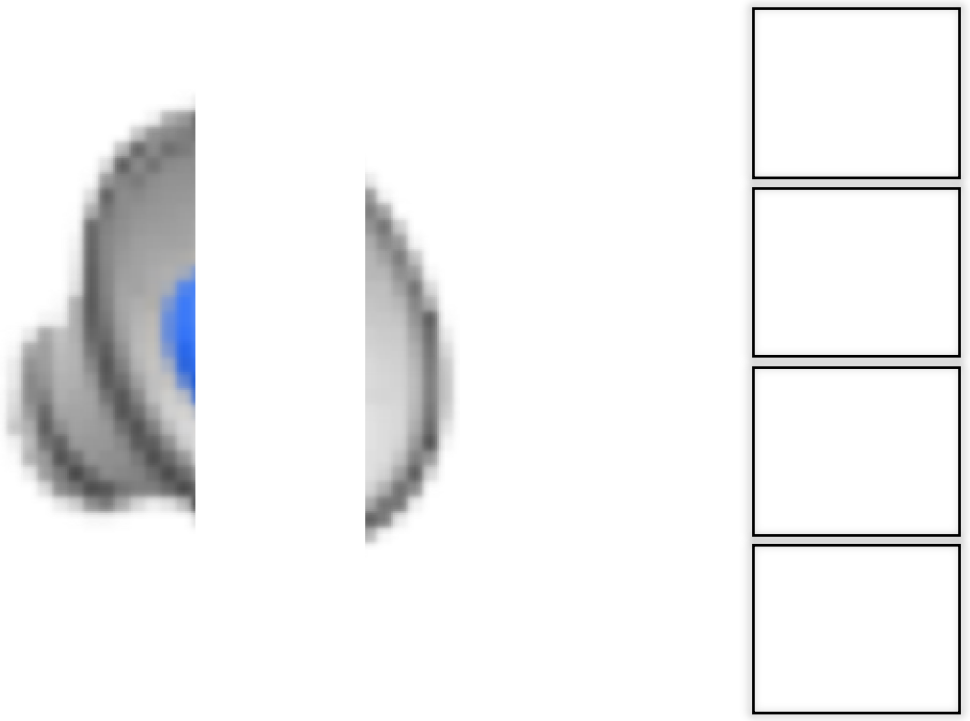
Build precise models of both shape and appearance

# Multi-videos 3D modelling

Multi-videos | Shapes | Appearances | Models

Traditionnal Modeling Pipeline

# Multi-videos 3D modelling



Multi-videos Shapes Appearances Models

Models still have limited precision and poor material and dynamic properties

# Multi-videos 3D modelling

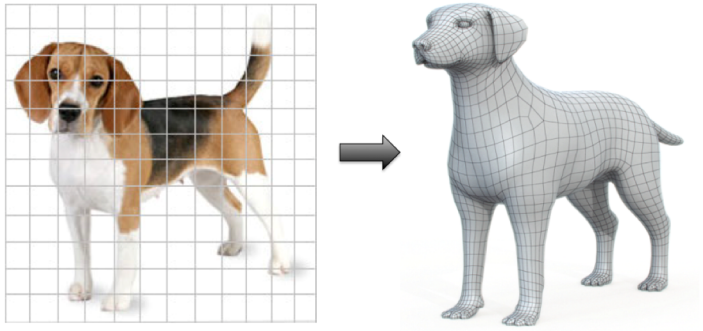
## Challenges (some)

- Representations: Break the geometry + 2D appearance paradigm ?

# Multi-videos 3D modelling

## Challenges (some)

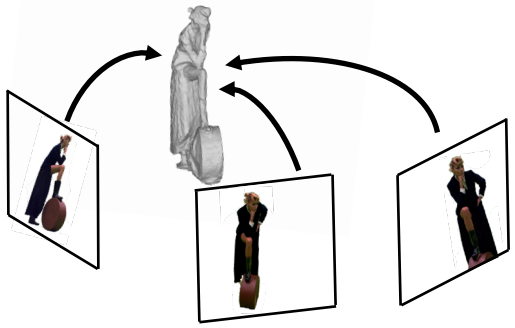
- Representations: Deep learning, especially CNNs, is well adapted to data in regular grids. 3D data  are usually not organized that way.



# Multi-videos 3D modelling

## Challenges (some)

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

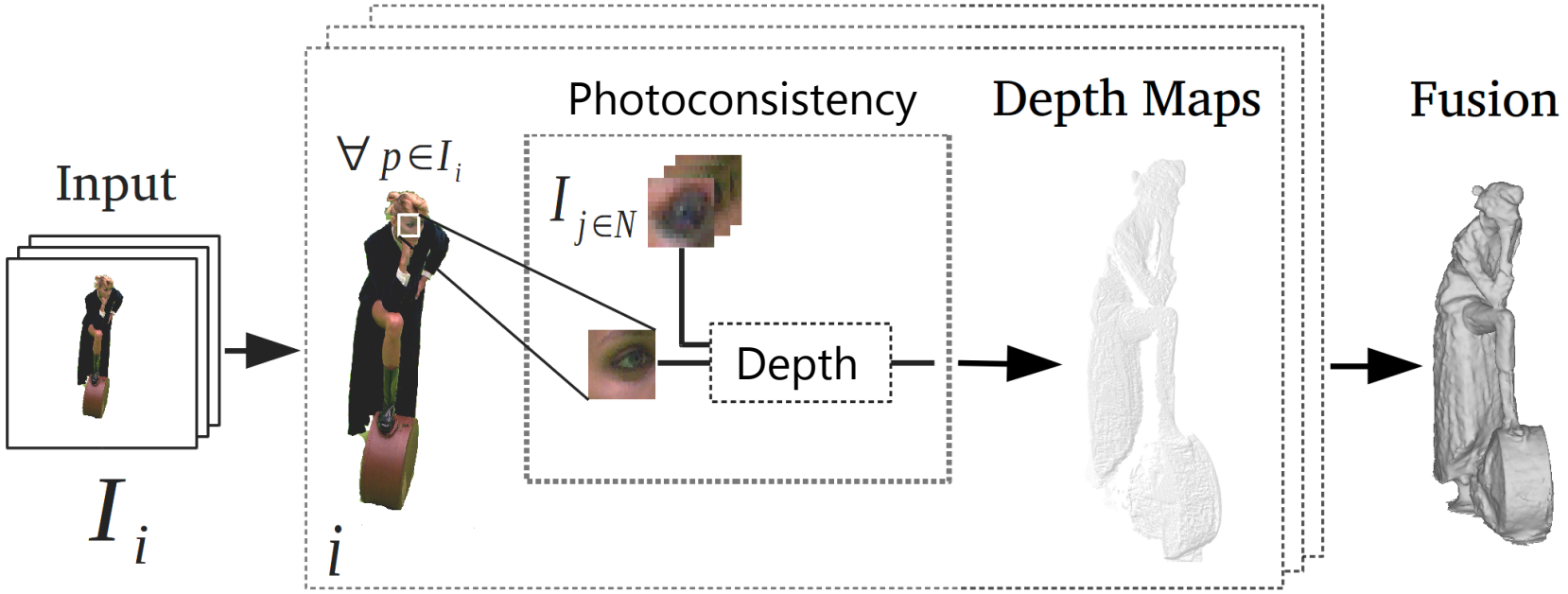


# Multi-videos 3D modelling

## 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.

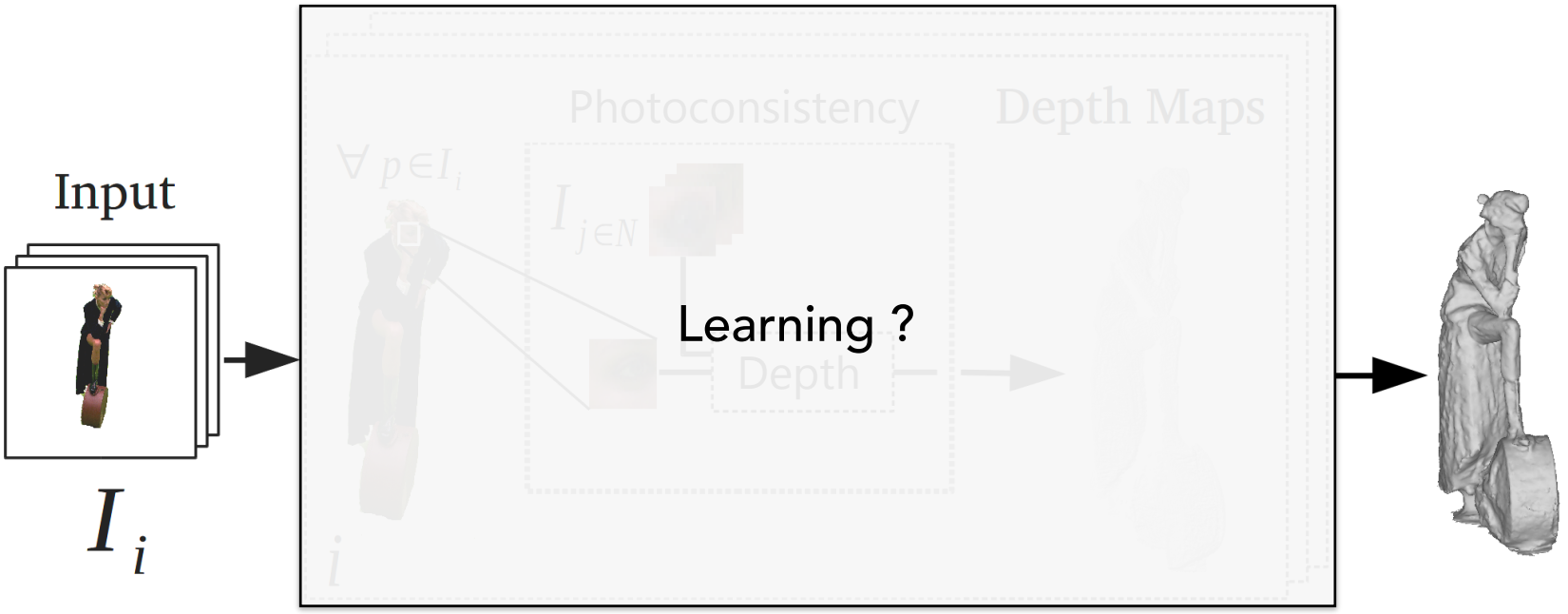
# 3D Shape Modeling




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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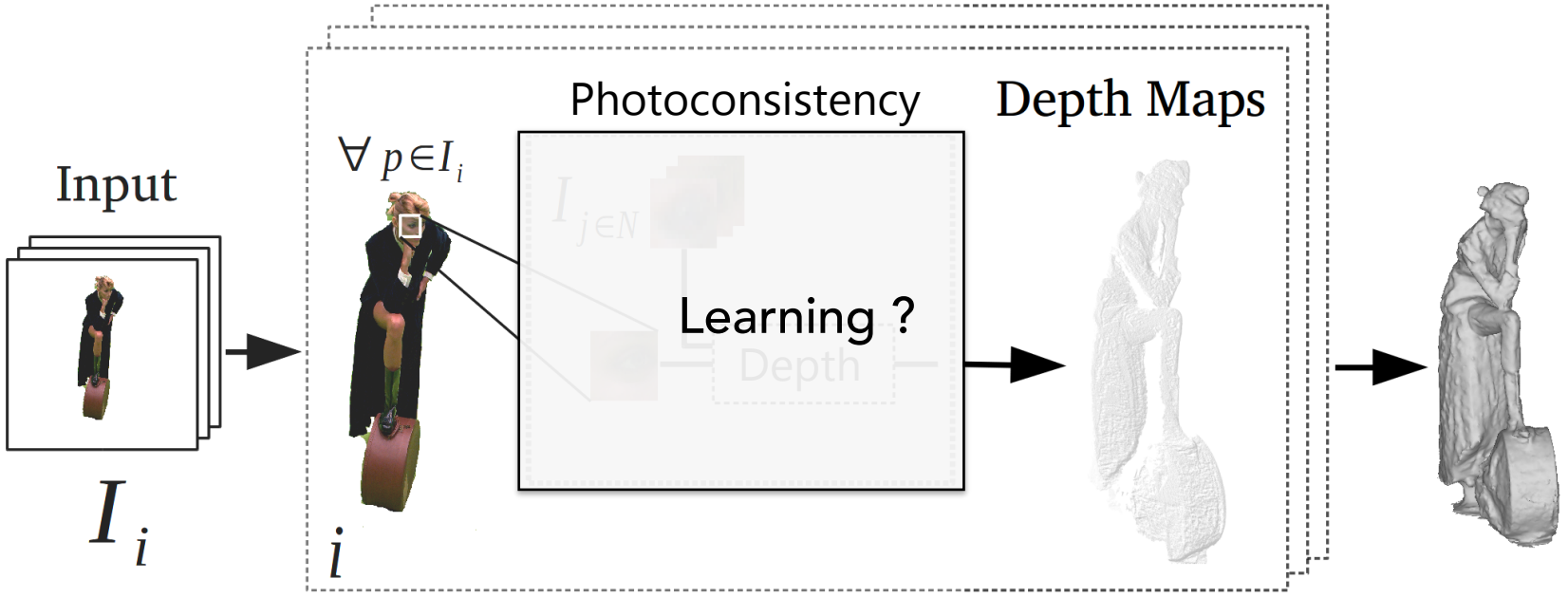
# 3D Shape Modeling

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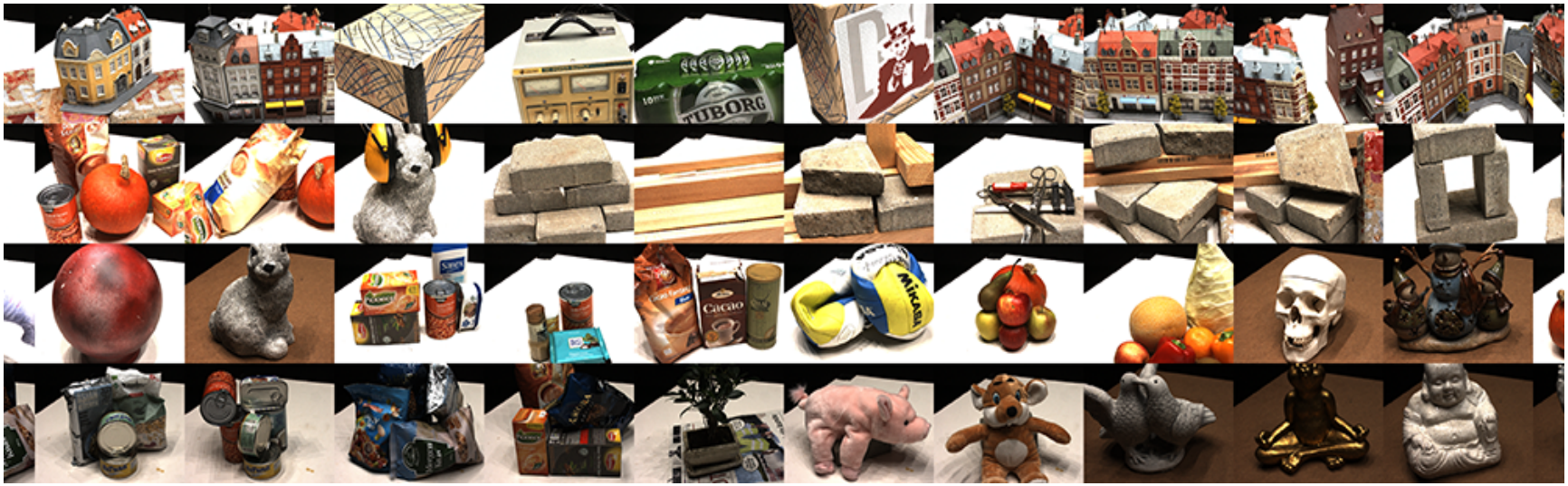
# 3D Shape Modeling



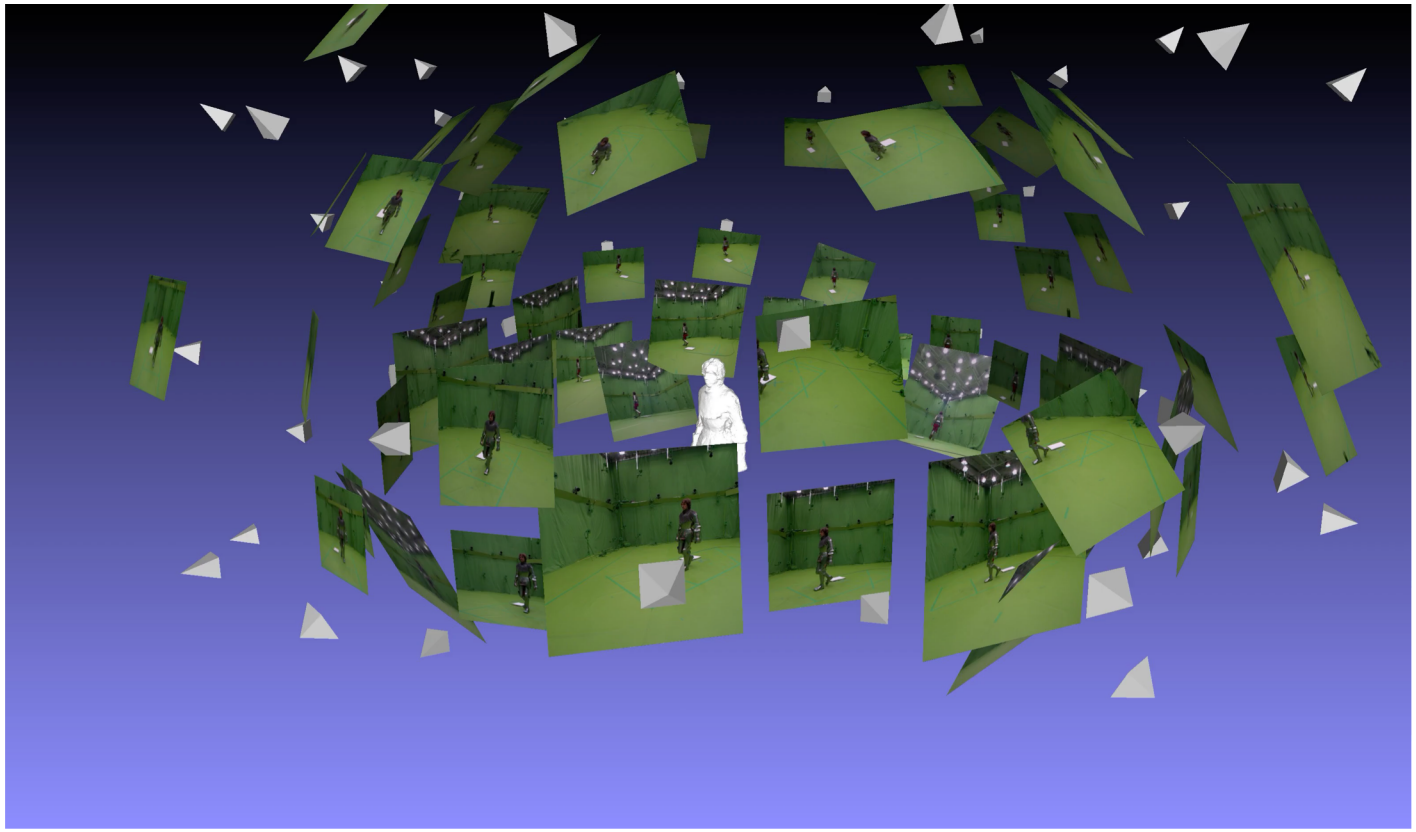

DTU Dataset: 80 scenes, each with 49-64 calibrated images and a reference 3D model.

# 3D Shape Modeling

Feature based

Learning based

# Representation



Adaptive Mesh Texture for Multi-View Appearance Modeling

# Representation

3D geometry

3D-2D

Texture charts

# Representation

3D-2D

3D geometry

Texture charts

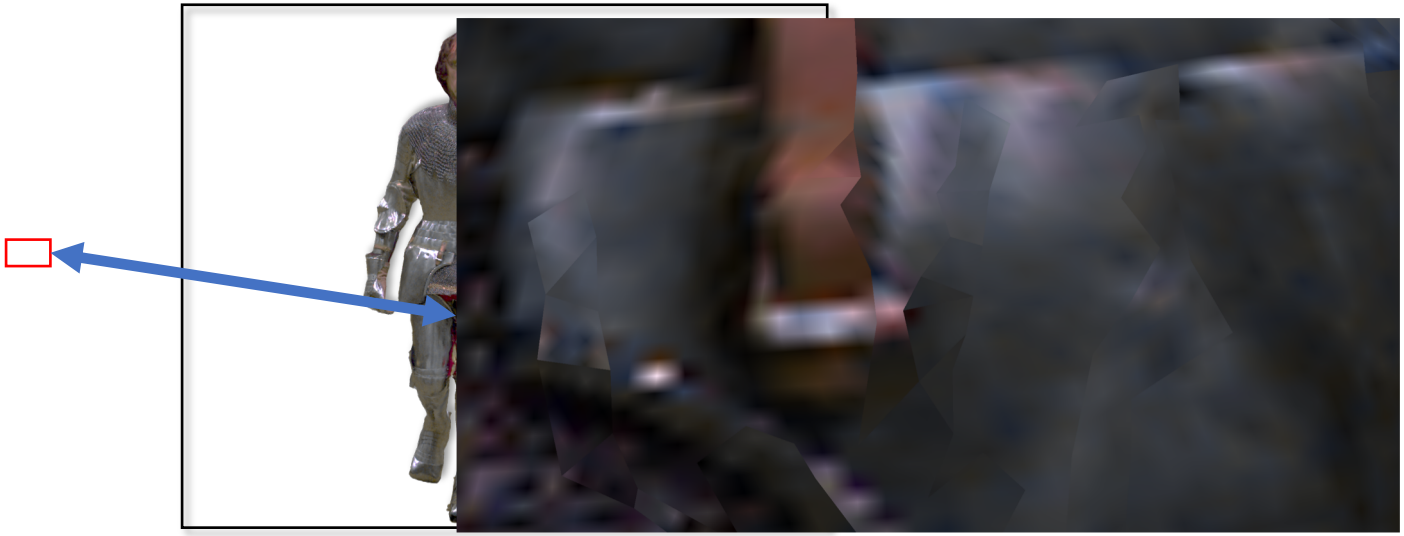
Geometry + appearance rendering

# Representation

3D-2D

3D geometry

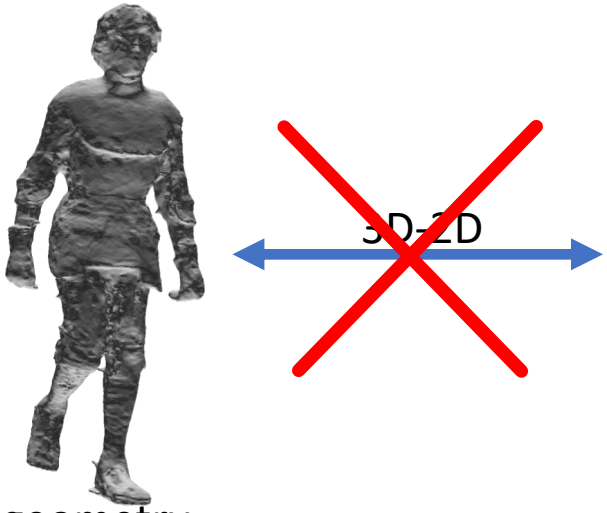
Texture charts



Geometry + appearance rendering

Close-up view

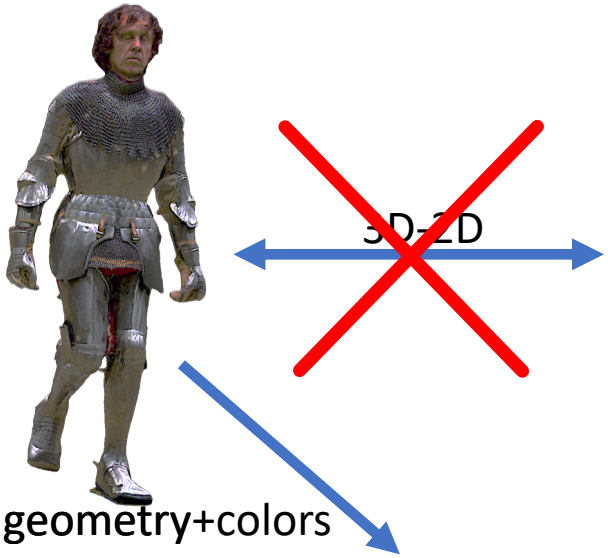
# Representation




3D geometry

Texture charts

# Representation

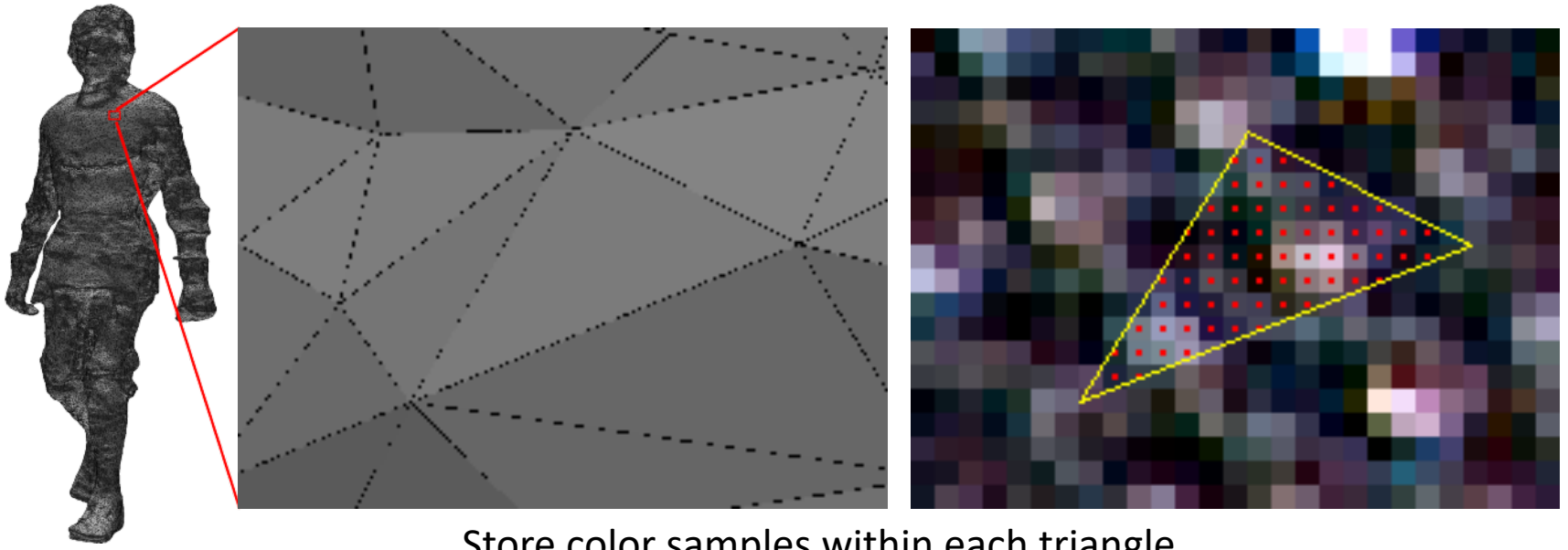



3D geometry+colors

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

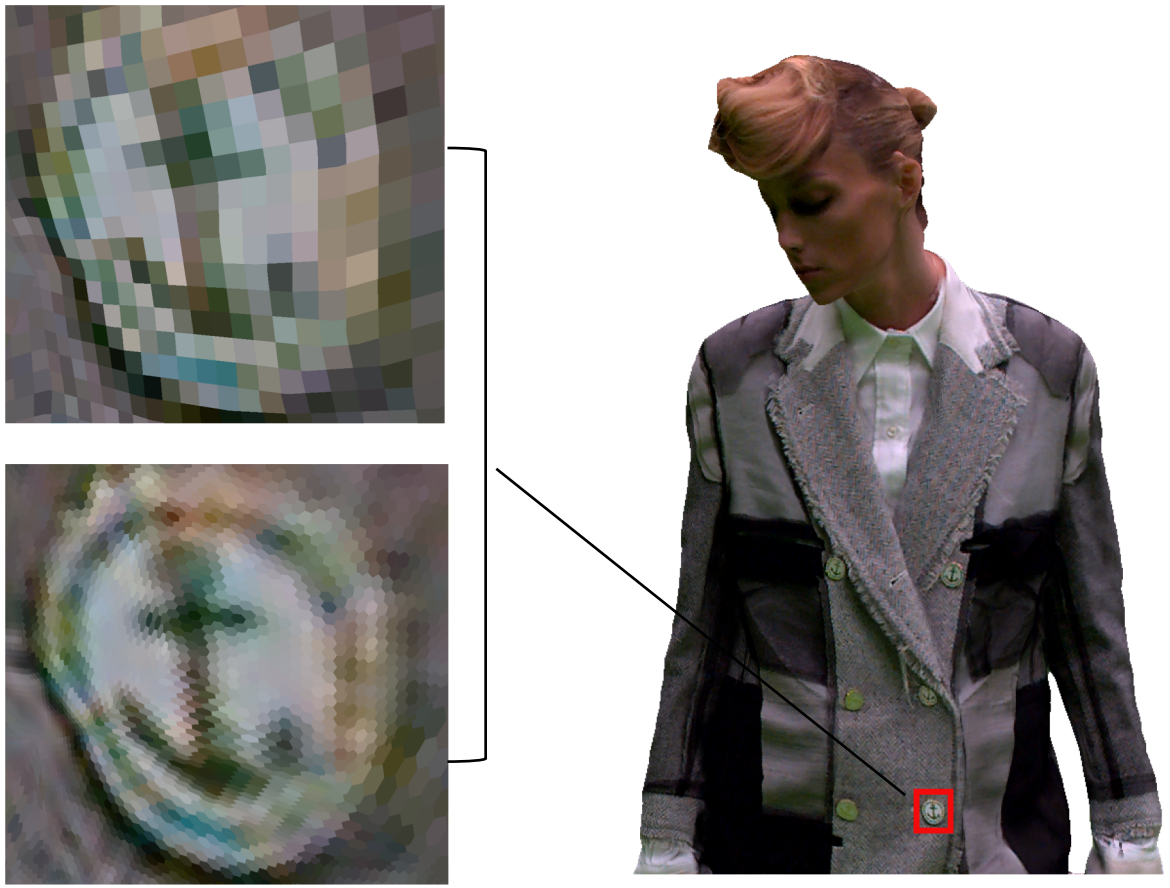
Interpolated appearance

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

# Representation

Image Texture

Mesh Texture



Color samples

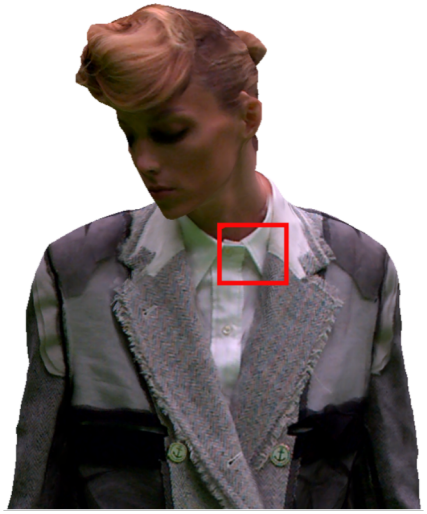
Adaptive Mesh Texture for Multi-View Appearance Modeling
Armando, Franco, Boyer, 3DV 2019

# Representation

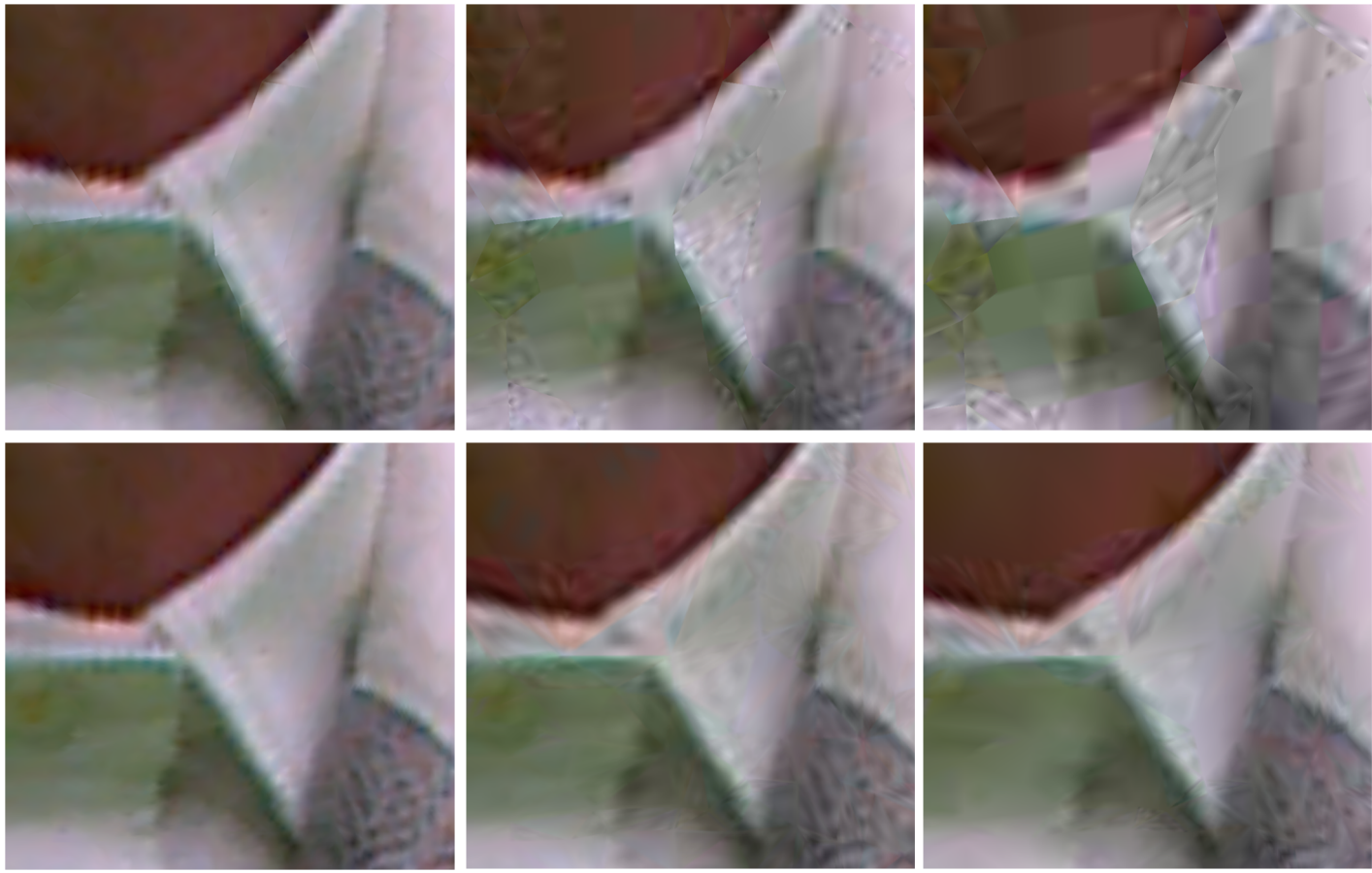
## Compression

Uncompressed (5.3 MB) | 590 KB | 331 KB

Image texture



Mesh texture



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

# 3D Shape Modeling

Going further:

- Learning material, appearance, ..

# 3D Shape Modeling

Going further:

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- Considering information over time

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Going further:

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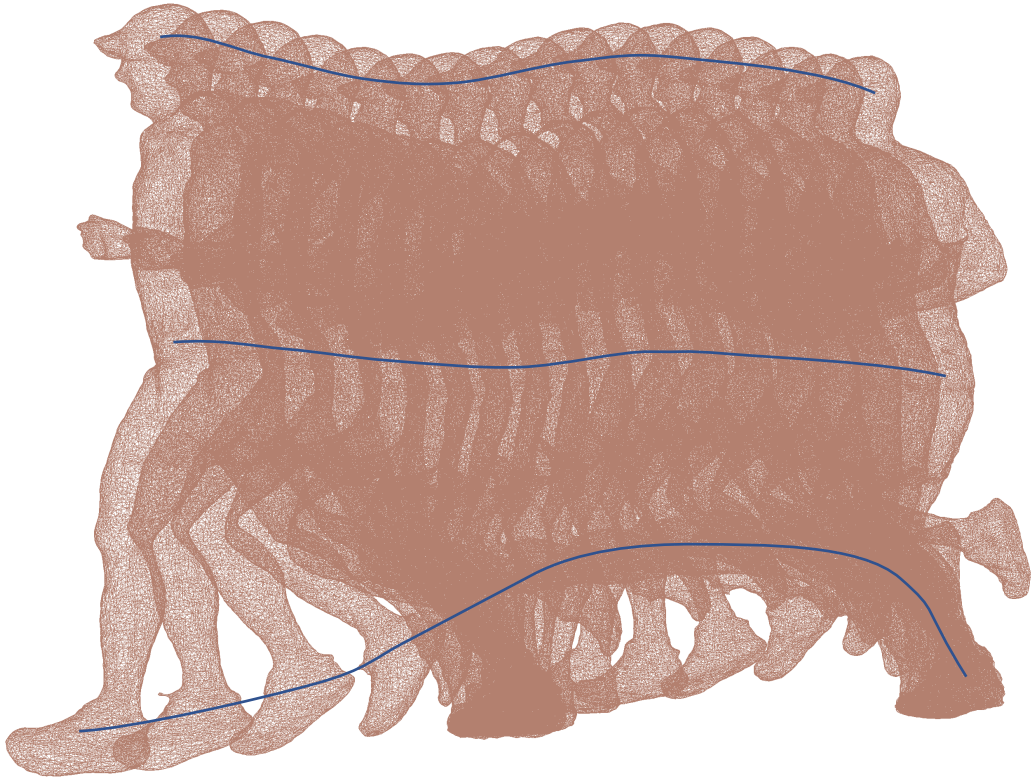

# 3D Shape Modeling


http://morpheo.inrialpes.fr