

Welcome to the

# ADVANCED COMPUTER SCIENCE APPLICATIONS FOR CULTURAL HERITAGE

Laboratory

CA' FOSCARI UNIVERSITY

# The RePAIR Project



# Objectives

1. Reconstruct accurate 3D model of broken frescoes
2. Develop algorithms to virtually align the broken pieces to solve the puzzle
3. Build and configure a robotic arm to assemble the broken parts

# 3D Reconstruction



---

Polyga H3 Scanner

Sony Alpha 7c Camera

# Questions?

- Is it possible to scan the complete surface of an object without moving it?
- What are the advantages of having a scanner (or a camera)? Which one would you choose?

# 3D Scanning



# Raw Data: Top Part

[Front view](#) [Back view](#)

---



# Raw Data: Bottom Part

[Front view](#) [Back view](#)

---



# Processed Data

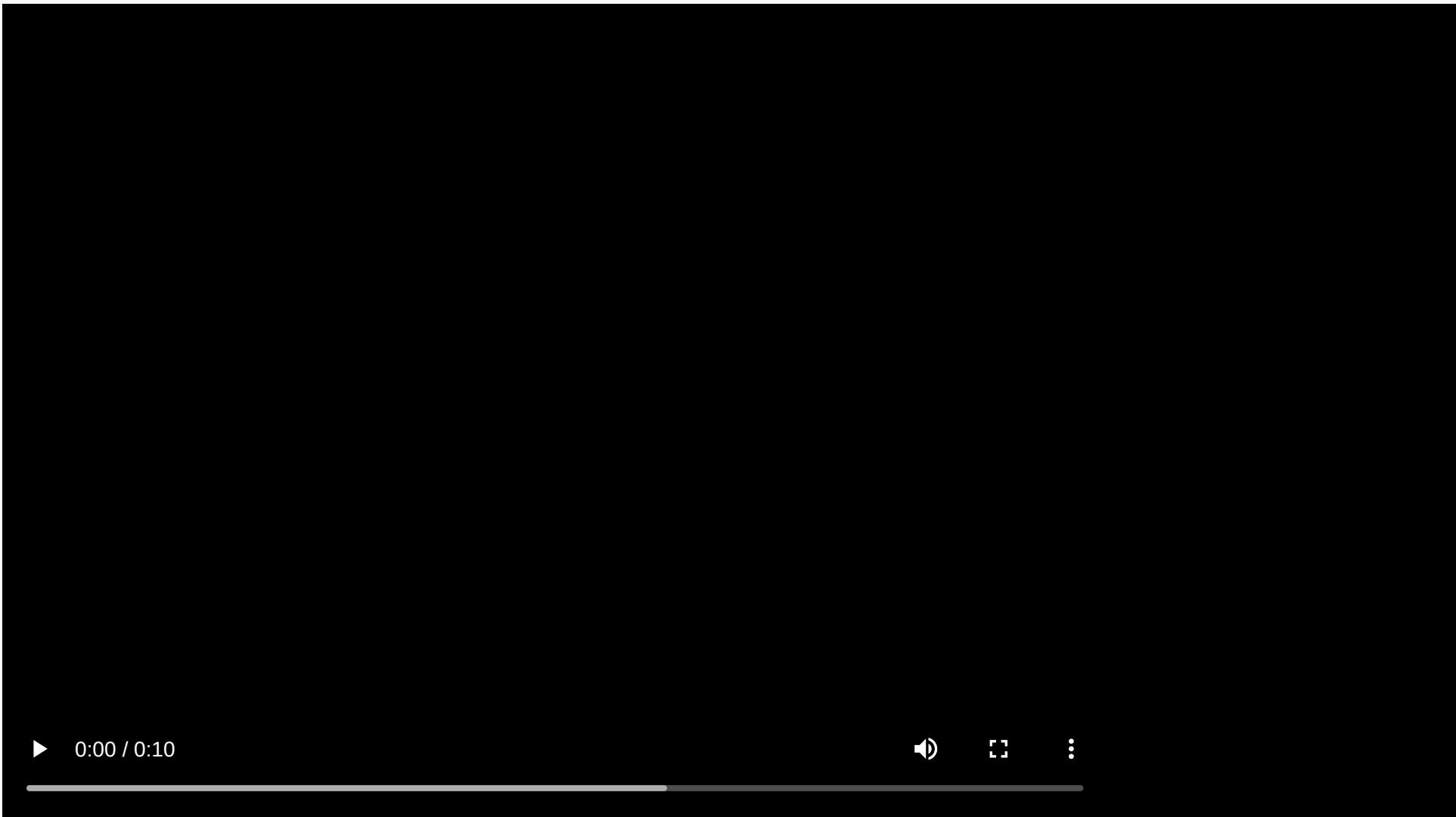
..

# Scanning with a camera





# Input Video



# Input Images

.....

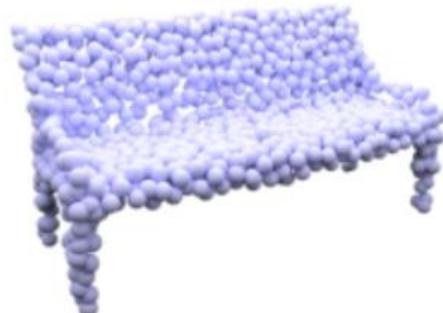


# 3D Data

What kind of format is used for 3D data?



(a) Voxel

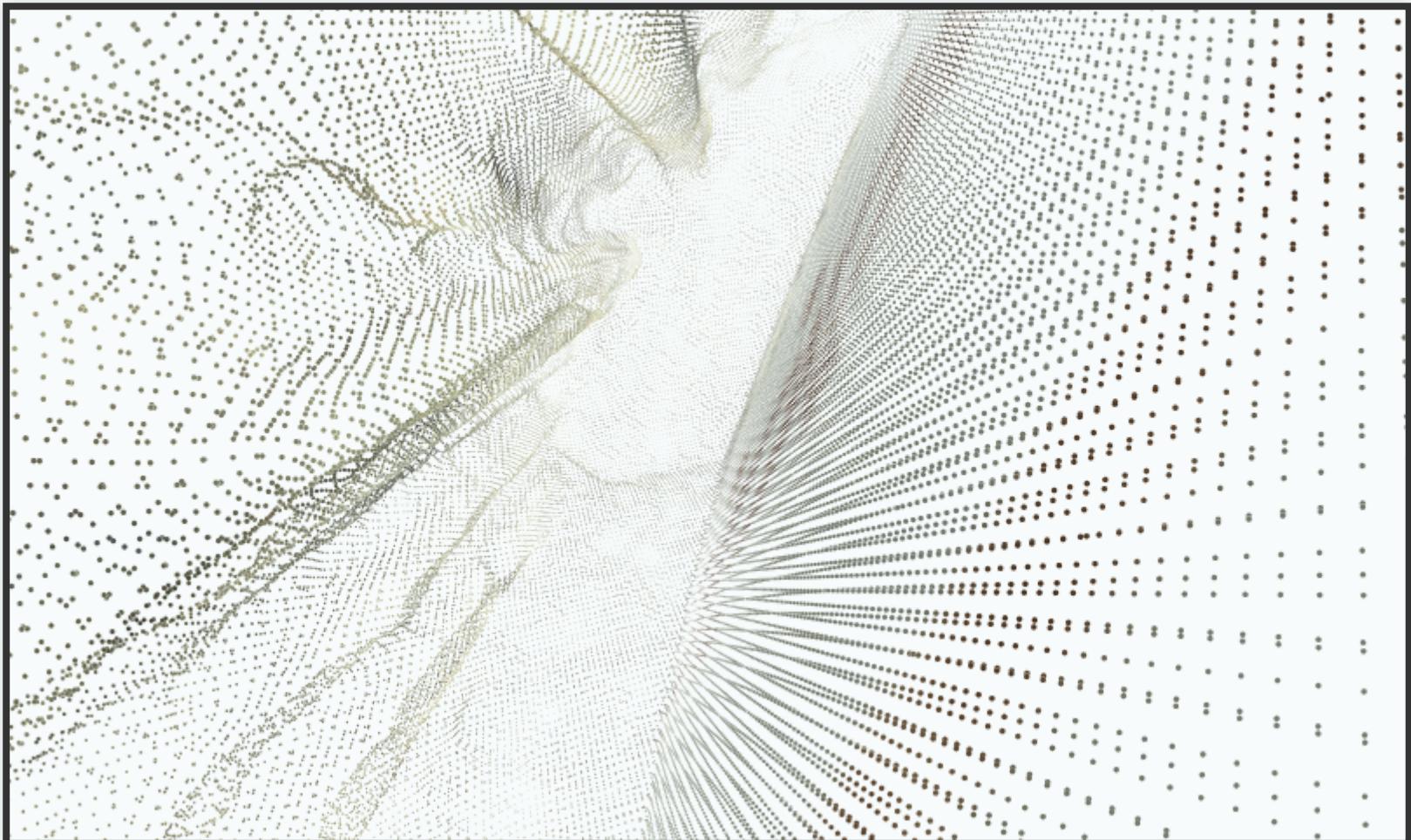


(b) Point

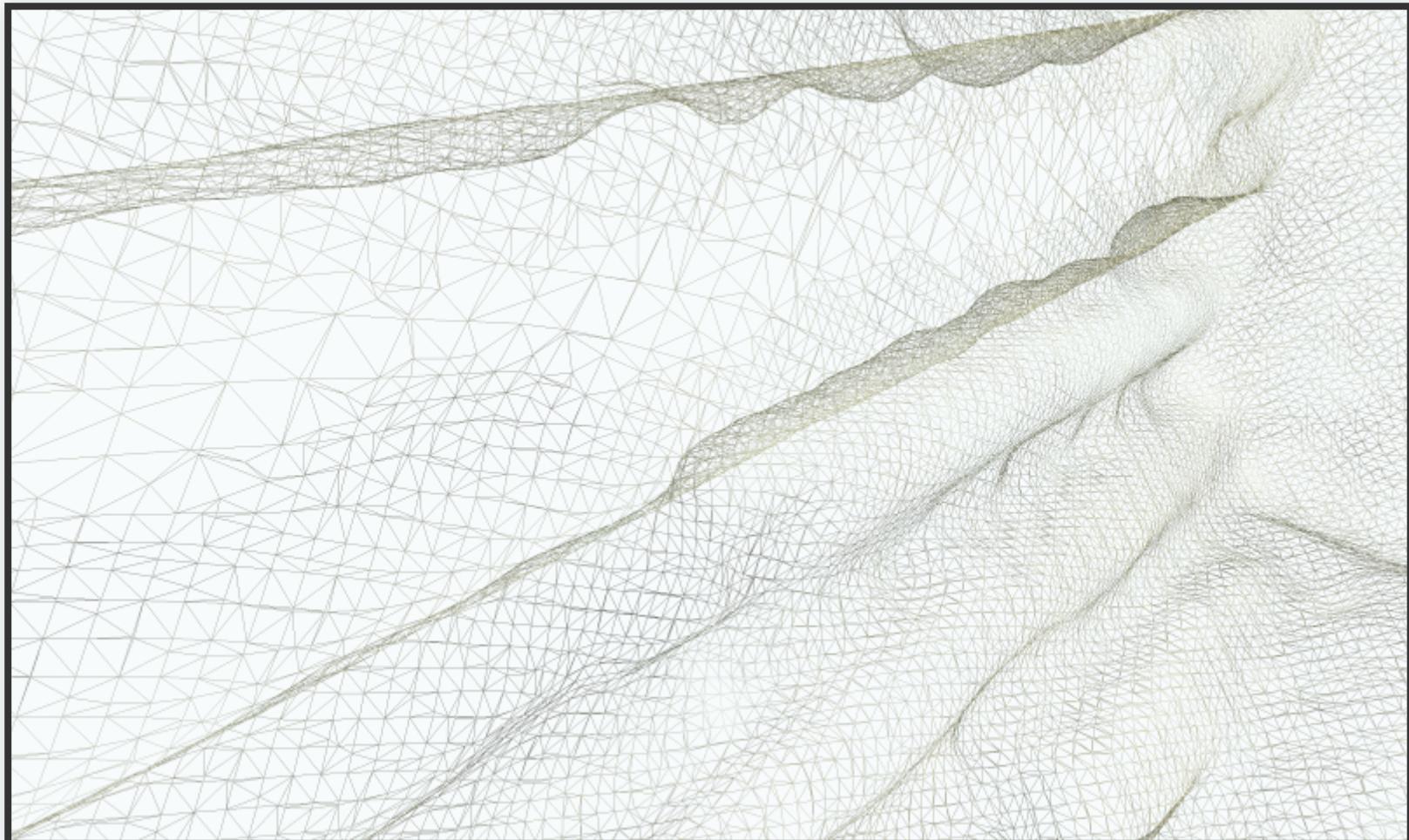


(c) Mesh

# Point Clouds



# Meshes



# **Compression for 3D data?**

# Road to our 3D scene

Step	Task	Tool
Acquisition	capturing images	Camera or Phone
3D Reconstruction	estimating 3D geometry from images	Meshroom
3D Scene Modelling	preparing the scene and refining objects	Blender
3D Scene Compression	scaling down the scene for usage	Meshlab

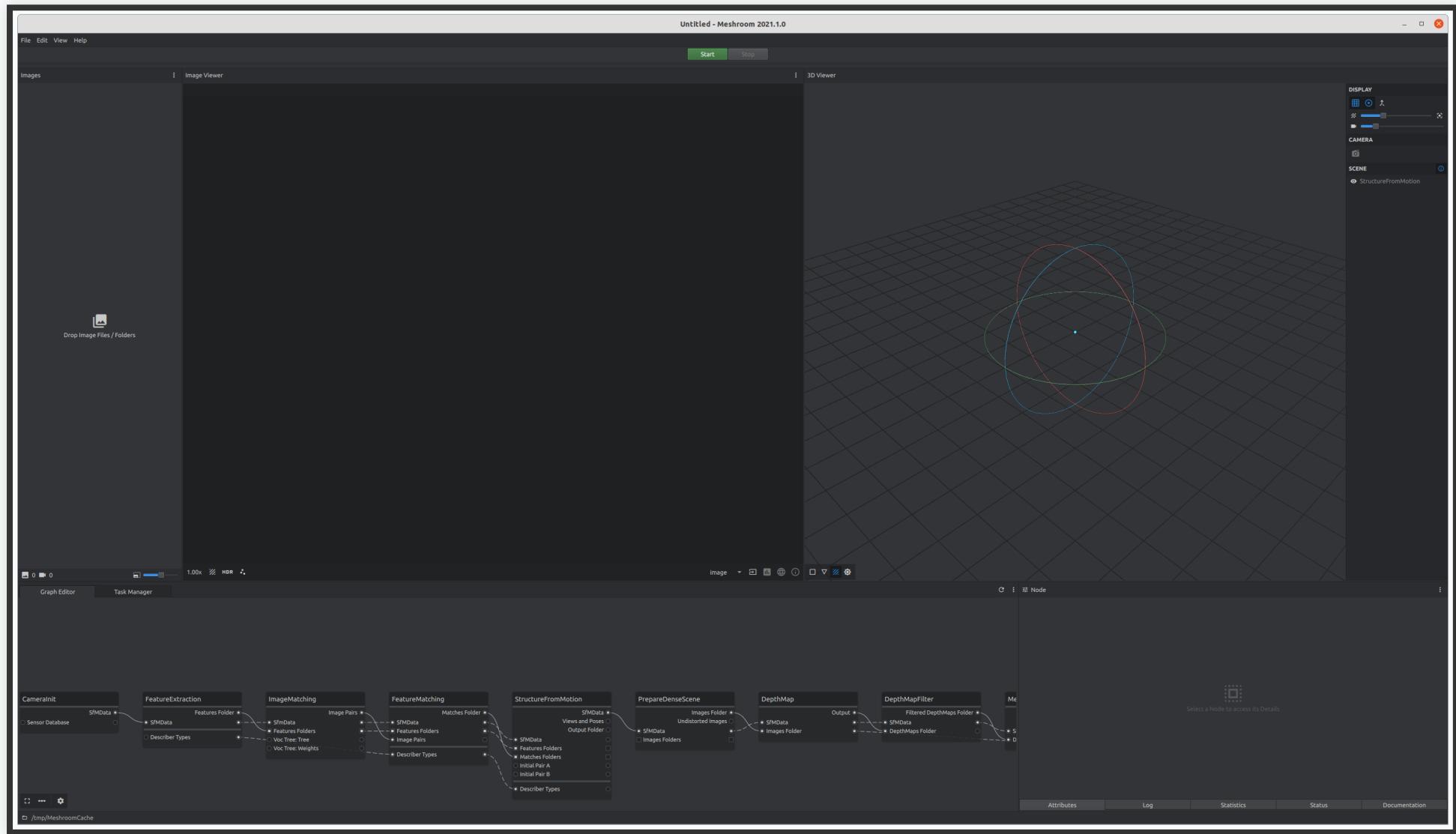
# Acquisition

# Capturing the scene

- Trying to capture the object or the scene from every perspective.
- Ensure simultaneously enough overlapping and difference between images.
- Try to have similar light conditions across pictures.
- Around 50 picture can be a good standard.

# **3D Reconstruction**

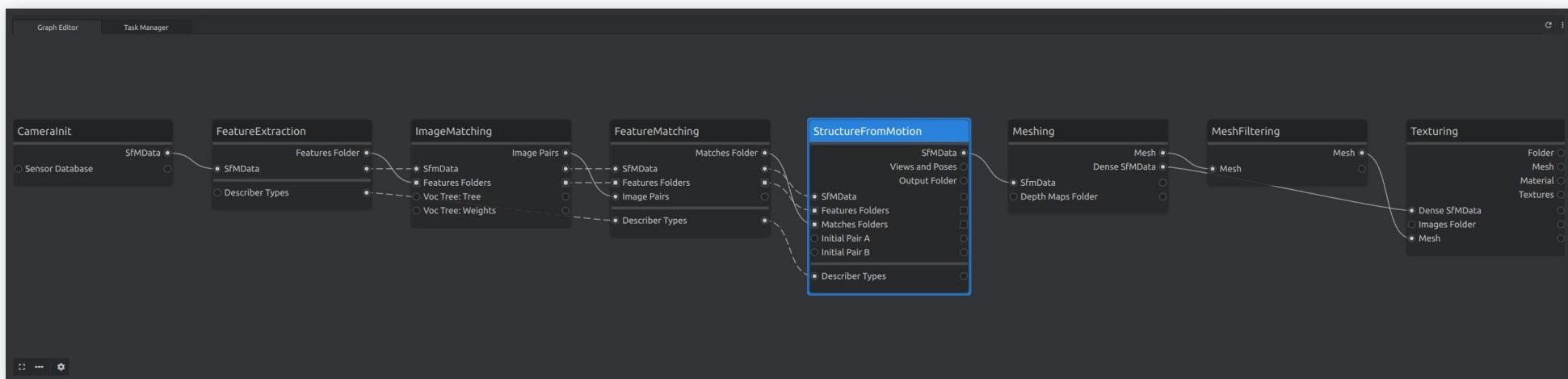
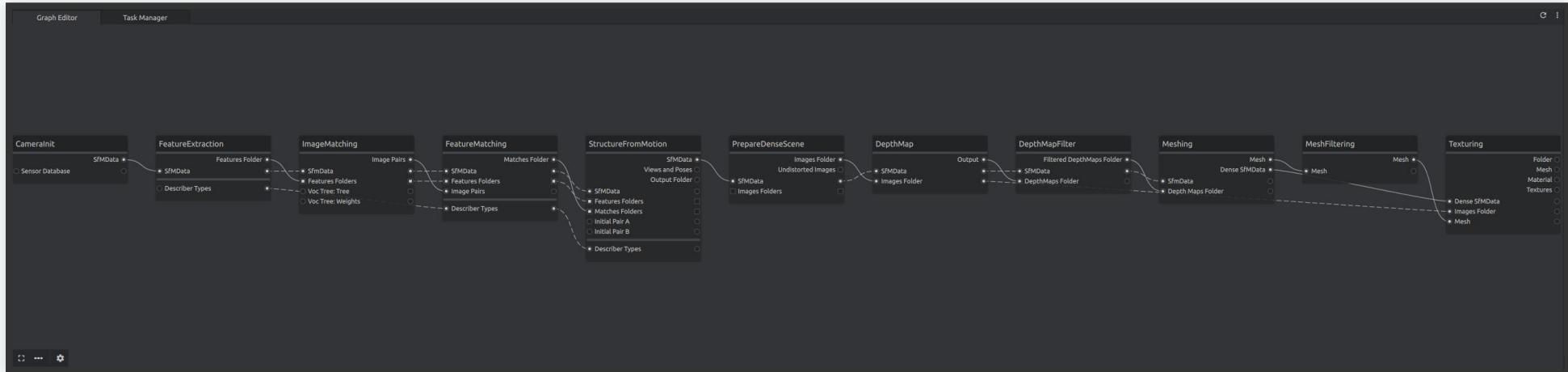
# Meshroom



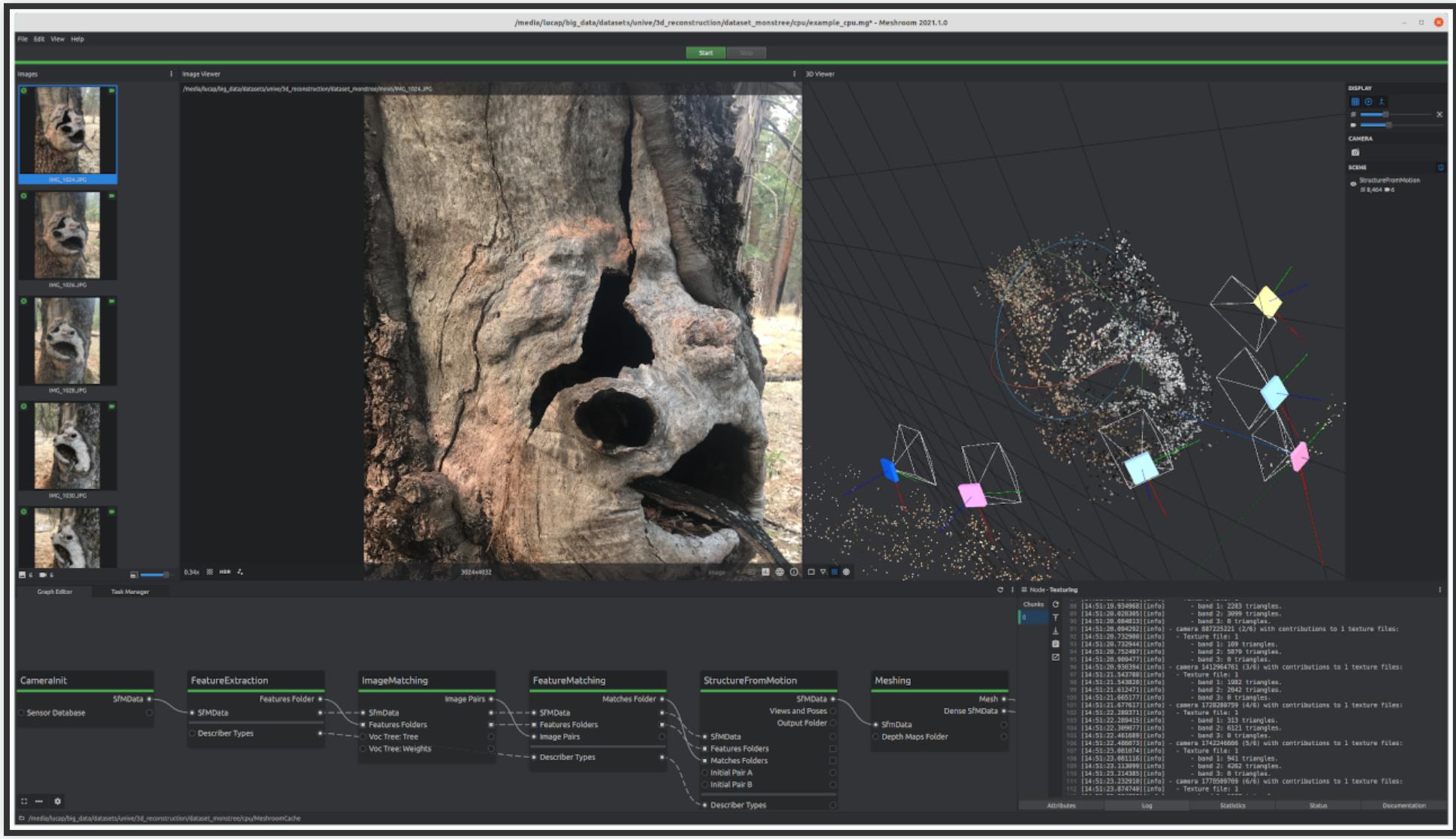
# Troubleshooting

- Discussion
- Windows Media Feature Pack
- VC Code dependency
- download old versions

# Simplified workflow (no GPU)



# Example Workflow

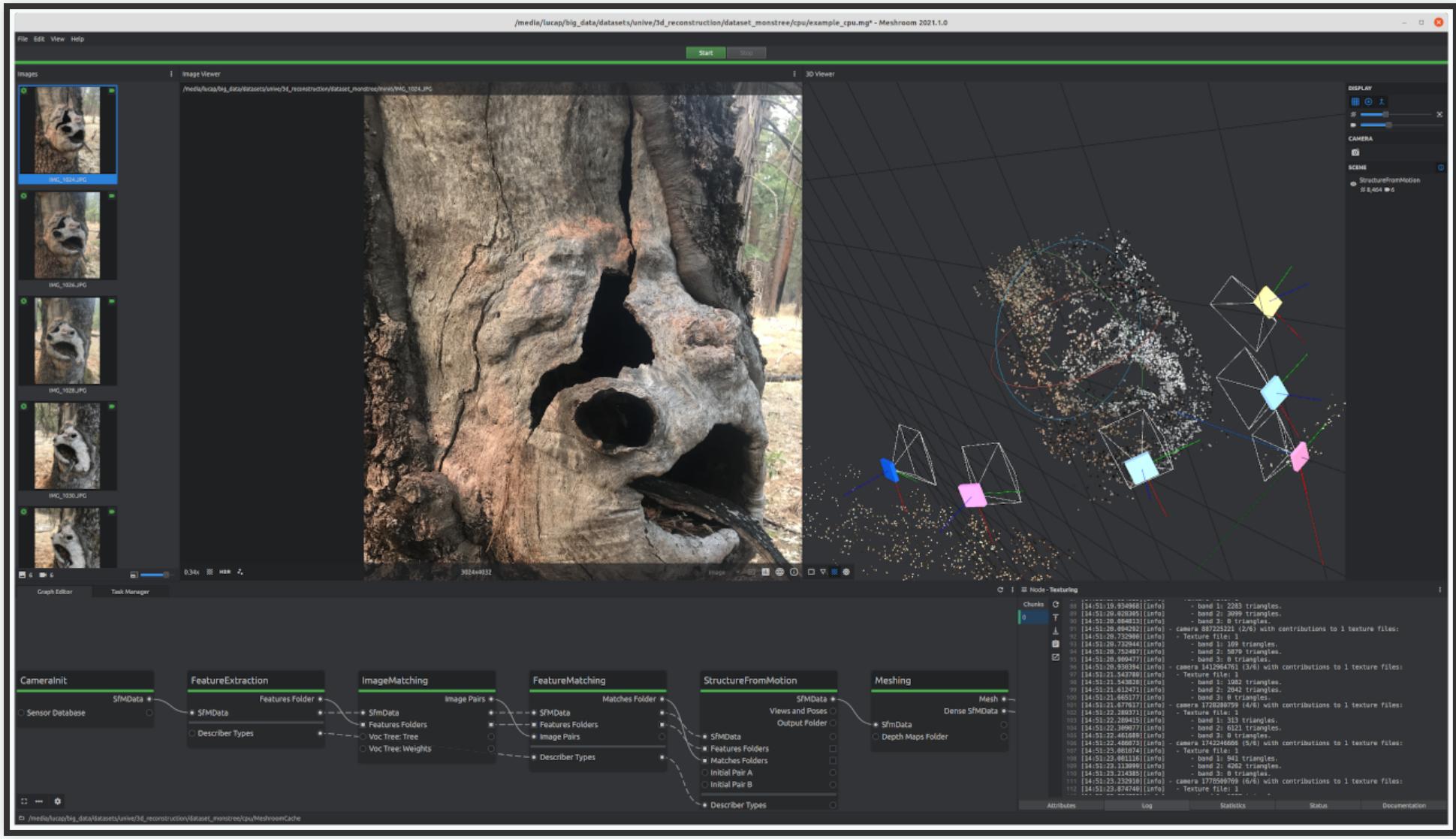


# Results

▪ ▪

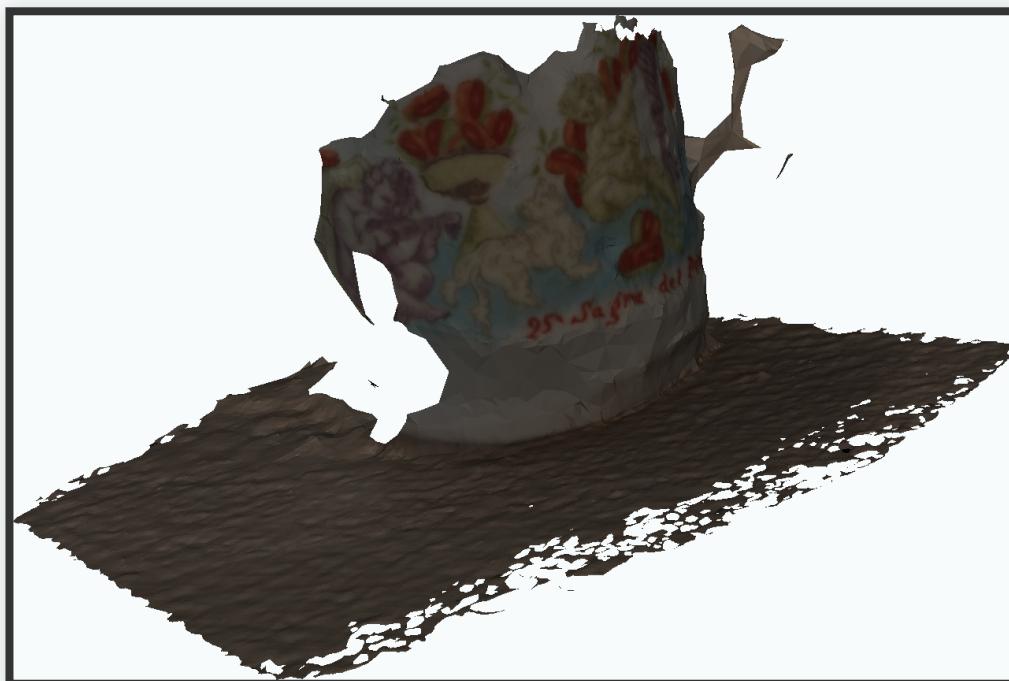


# Example Workflow



# Failure Case

.....



## For the next time

- install [Blender](#) for 3D modelling
- create an account on [Sketchfab](#)
- choose one object and one scene, either yours or from sketchfab