Immagini e 3D: problematiche e idee

Lezione 16: 10 Maggio 2012

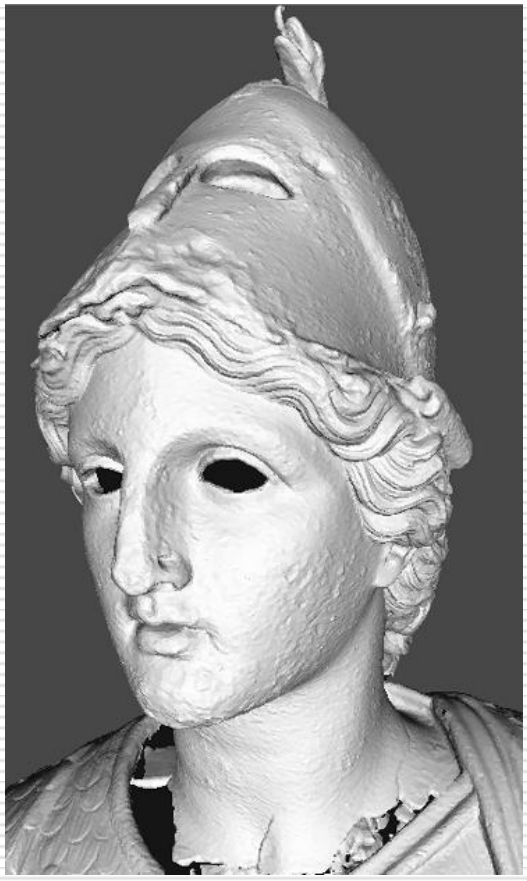
The importance of color information

Precision vs. Perception

3D scanned geometry

Photo

Color and appearance



Pure geometry

“Pure” color

Rendering of material properties

Can an image be “in 3D”?

So images can be useful to describe a 3D scene, but they could not be “transferred” to the geometry. Why?

- Images describe a precise moment (i.e. peculiar illumination)
- Images do not describe reality (i.e. old photographs, drawings)
- Geometry is poor or non existent (i.e. noisy point clouds)

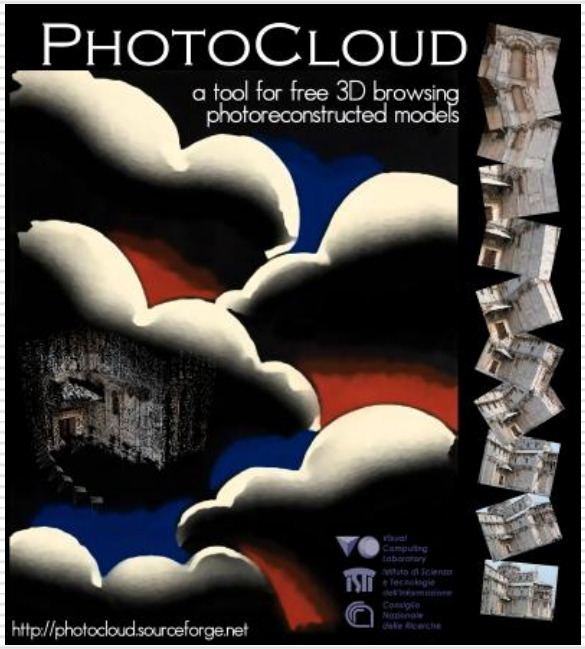
Can the images co-exist with 3D models?

Can an image be “in 3D”?

Photo Tourism

- *Having a set of (even etherogeneous) images, you can navigate the photo collection in a “spatially coherent” way. It evolved into PhotoSynth.*

Calibrated Cameras: what you can do with them



PhotoCloud

http://vcg.isti.cnr.it/photocloud/

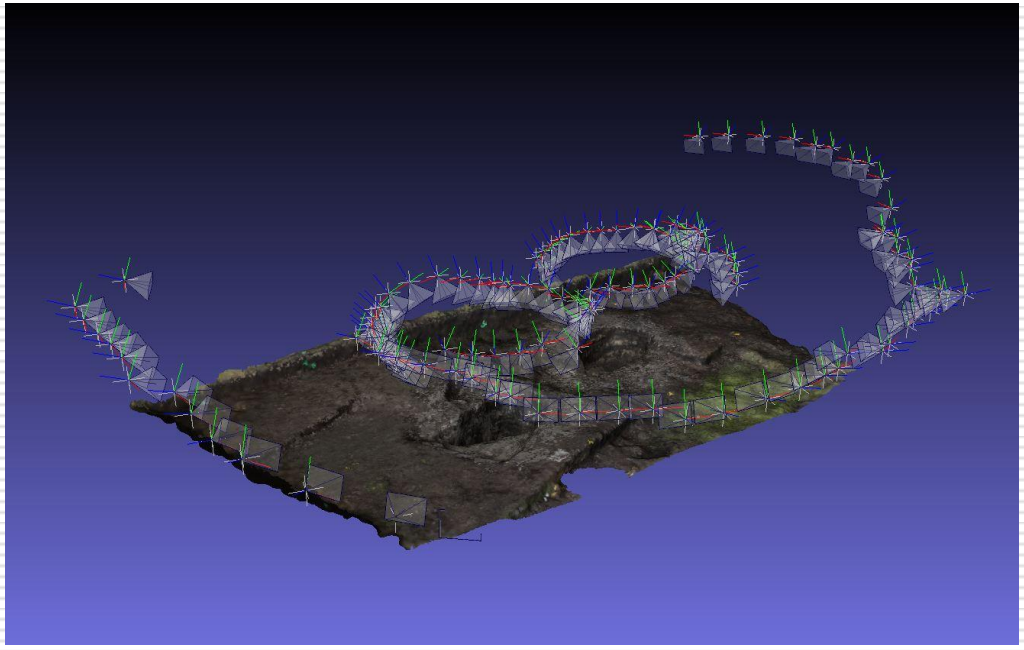
- *The ISTI alternative, similar in concepts, but the idea is to integrate even high detail 3D models.*

Raster layers in MeshLab

- The last couple of release introduced a new kind of layer, the Raster layer

A shot

+ « Planes »



- Rasters are saved in the mlp file as well

Raster layers in MeshLab

What can you do with a raster?

- Use images (tomorrow…)
- Integrate dense stereo matching stuff
- Define and save points of view
- Use your imagination!

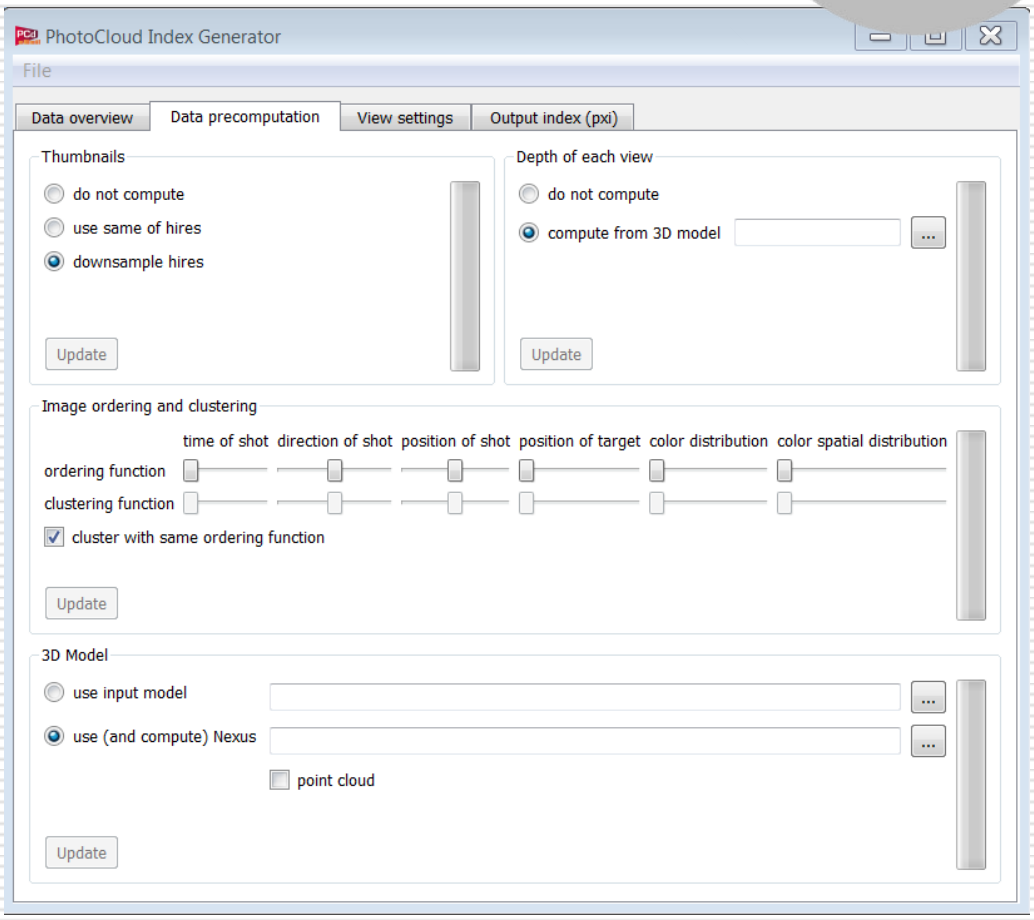
From MeshLab to Photocloud

A promising thing is the fact that any .mlp file can be transformed in .pxi (Photocloud) file.

How?

Using the Photocloud index generator.

Instructions can be found on the website



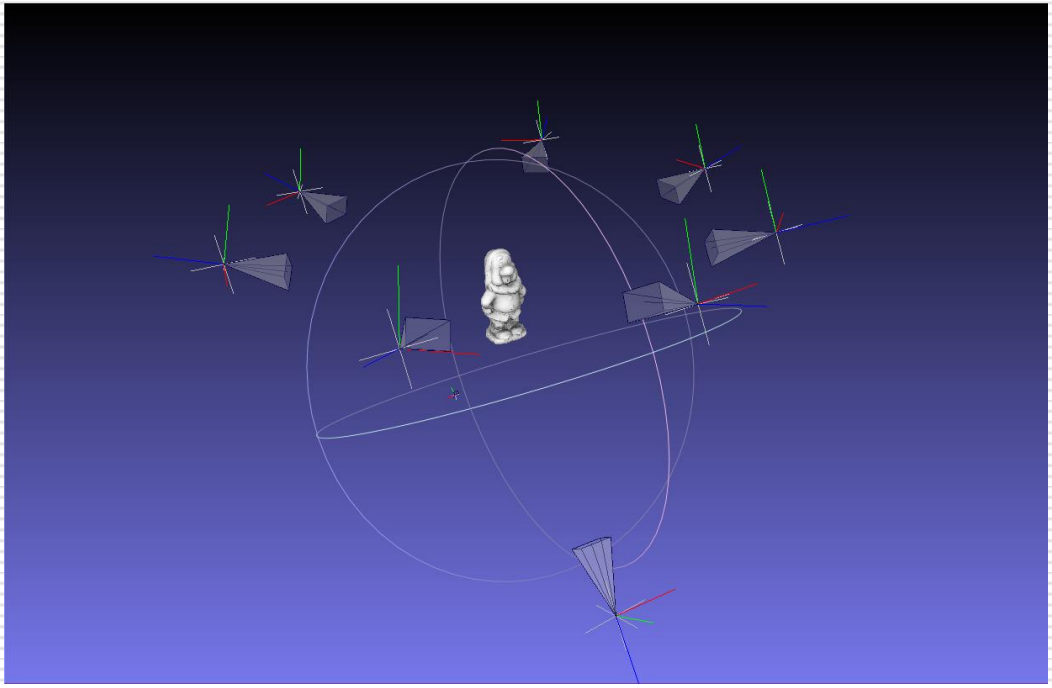
From MeshLab to Photocloud: idea 1

You can align a set of photos manually to a model.

How?

Using the image alignment or aligning manually the images.

Tomorrow we'll see how.

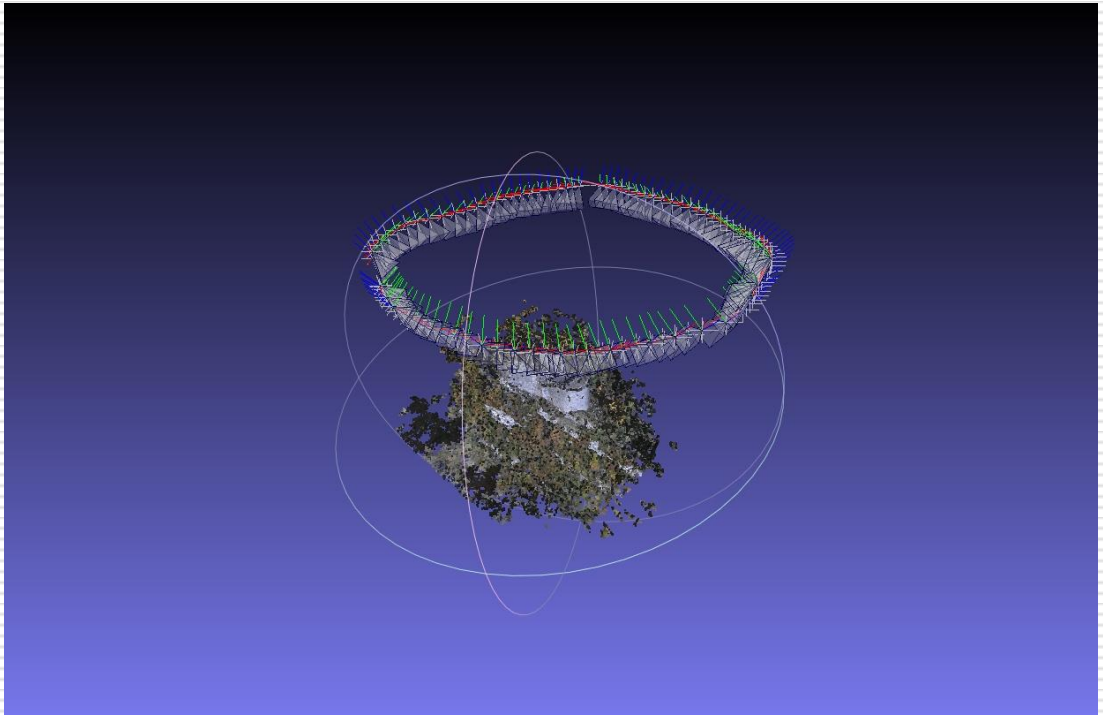


From MeshLab to Photocloud: idea 2

You can use the reconstruction provided by Photosynth Toolkit

How?

Importing the Photosynth recostruction and integrating the pmvs



From MeshLab to Photocloud: idea 2

Step 1: Import the Photosynth reconstruction.

Filters->Create new mesh layer -> Import Photosynth data

IMPORTANT: the images are downloaded only as thumbnails. But if you replace them with the high resolution versions (same place and same name!) the cameras are still valid.

IMPORTANT: the model is not saved on disk. Remember to save it before saving the project!

From MeshLab to Photocloud: idea 2

Step 2: Integrate the pmvs reconstruction.

- Import the file
- Filters->Normals,Curvatures and Orientation-> Flip and/or swap Axis
- Flip Z Axis and Swap Y-Z Axis ->Apply
- Save the model
- Save a new project (remove the Photosynth cloud)

IMPORTANT: You can also import the processed pmvs (triangulated model) but DO NOT scale the model

From MeshLab to Photocloud: idea 2

Step 3: Scale to real measures.

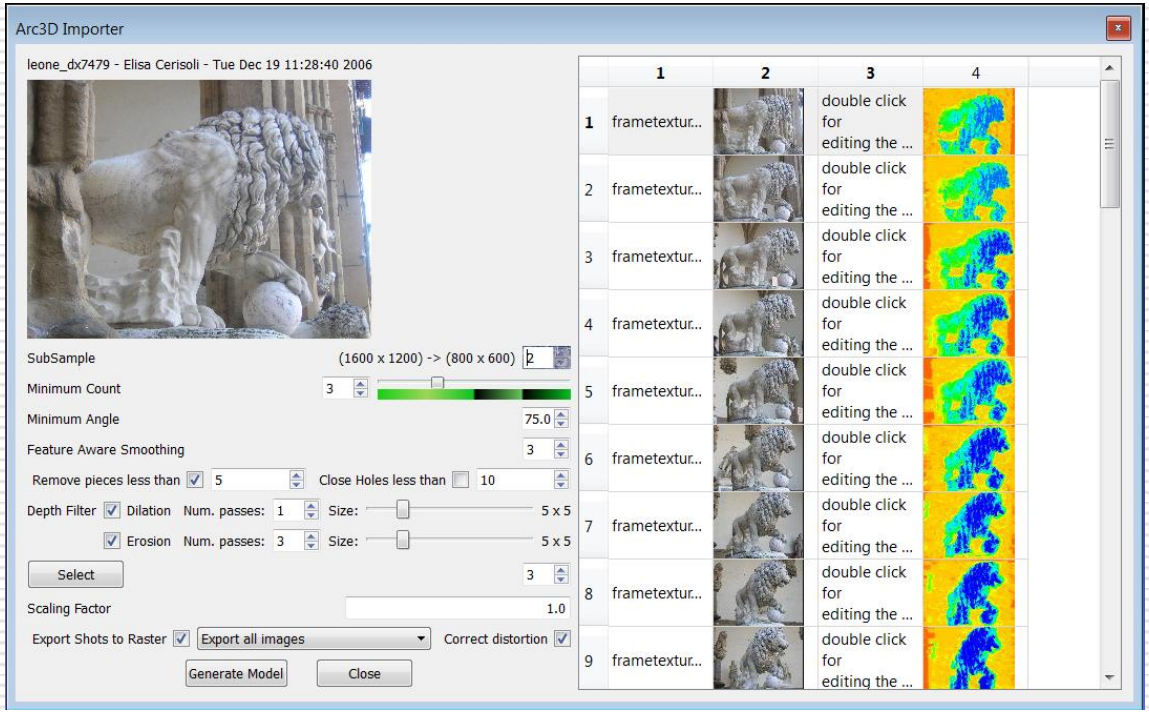
- Find the scaling factor
- Filters->Camera -> Transform: scale camera or set of cameras
- Apply this to all raster and models
- Save the model
- Save the project

From MeshLab to Photocloud: idea 3

You can use the reconstruction provided by Arc3D

How?

Using the Arc3D importer in MeshLab!

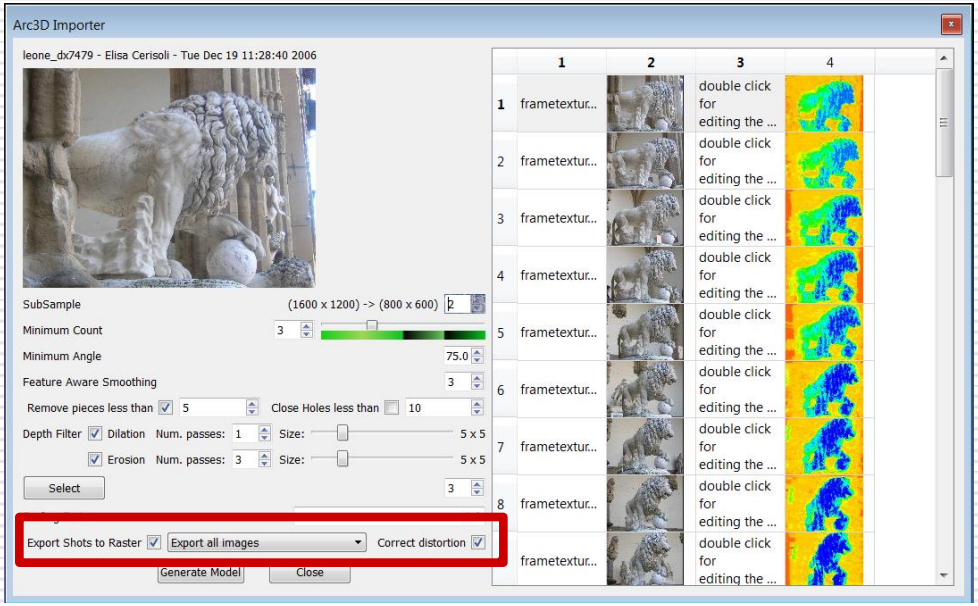


From MeshLab to Photocloud: idea 3

Step 1: Create the model but also import the images

You can import only the images used for reconstrution or all the images

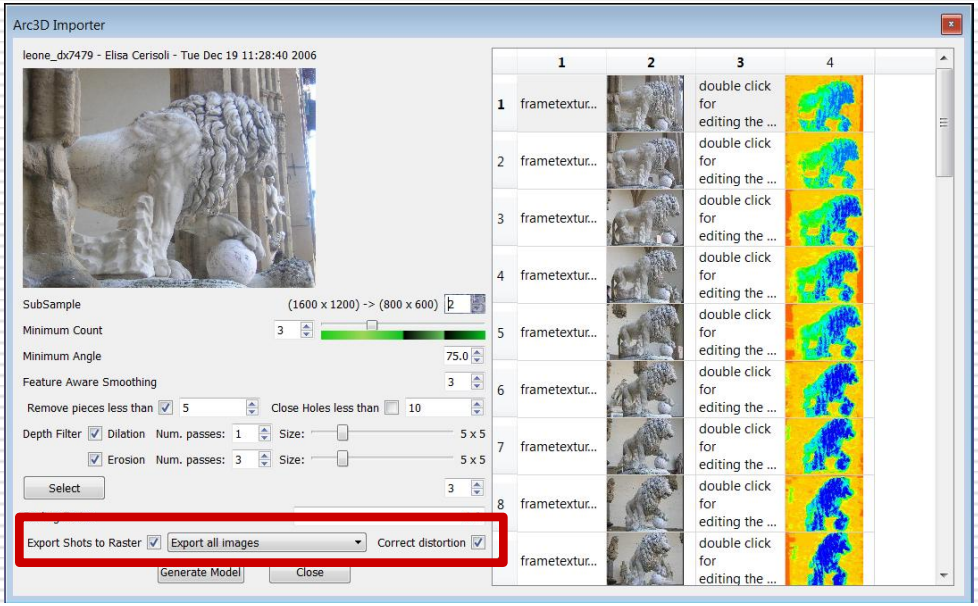
You can correct the distortion



From MeshLab to Photocloud: idea 3

Step 2: Generate the 3D model

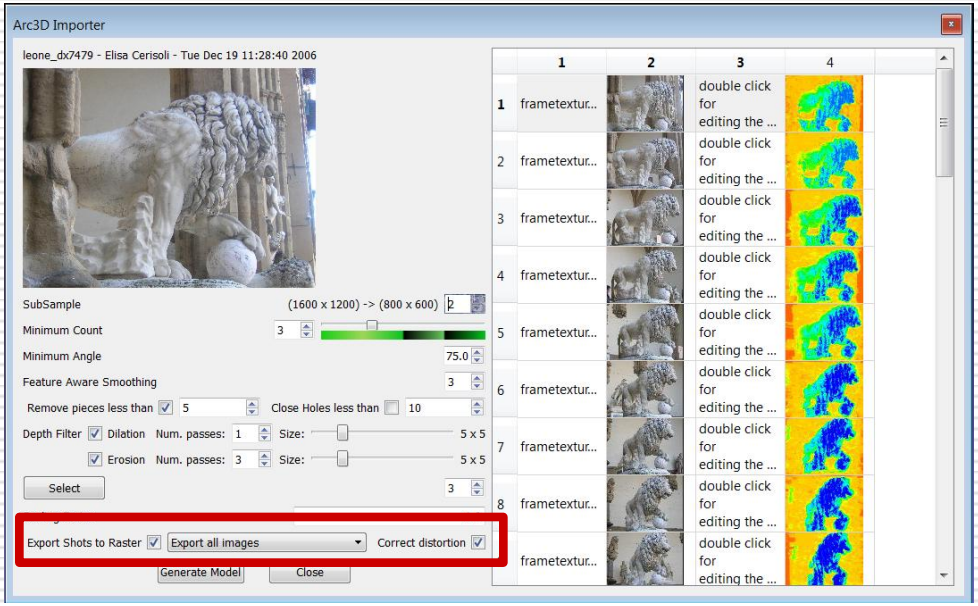
IMPORTANT: the final scaling must be done on both the 3D model and the images!



From MeshLab to Photocloud: idea 3

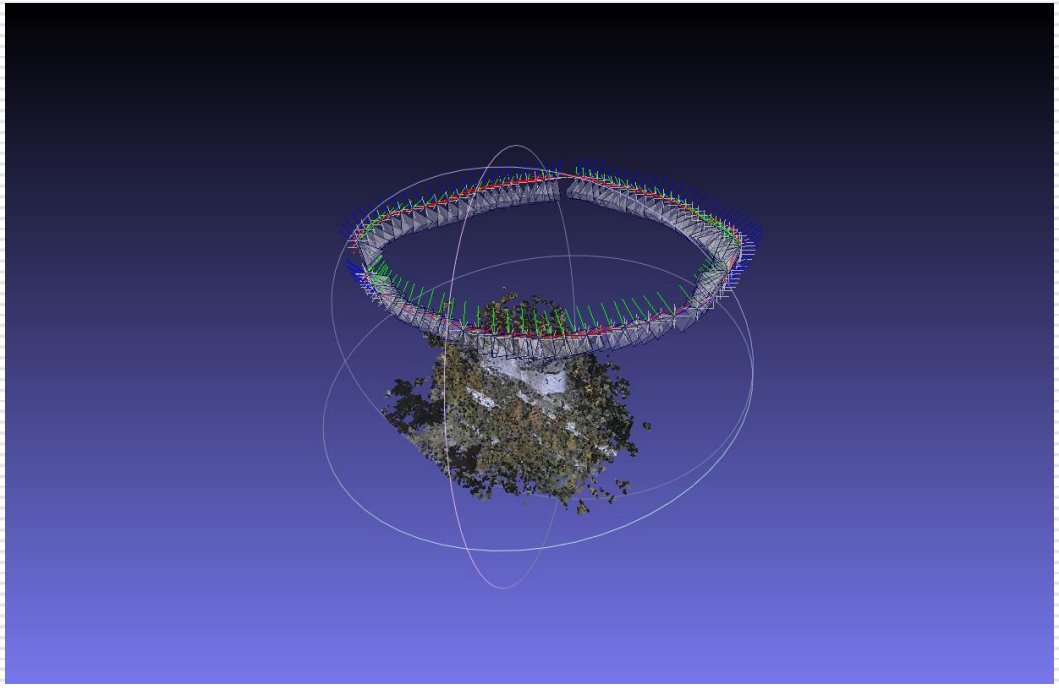
Step 3: Save the mlp

IMPORTANT: remember to save the model before!



From MeshLab to Photocloud: idea 4

You can use the reconstruction provided by Bundler, which is a .out format



How?

.out stuff can be opened as a project in MeshLab, then the procedure is the same as idea 2

From MeshLab to Photocloud: idea 5

You can add other images, even not photos (i.e. drawings, compositions etc etc)

How?

Aligning the image by hand

From MeshLab to Photocloud: idea 5

Step 1: Import the raster

The raster is imported with a arbitrary camera associated

If exif is present, it’s used

From MeshLab to Photocloud: idea 5

Step 2: Align by hand

You don’t need to be extremely accurate, if the goal is to use Photocloud

From MeshLab to Photocloud: idea 5

Step 3: Assign the camera

- Filters->Camera->Set raster camera
- Get Shot from trackball
- Apply

When you save the project, the camera will be assigned to the image.

From MeshLab to Photocloud: idea 6

YOUR IDEA!

Next in line…

Next lesson:

- Color projection using images

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