

Photogrammetric modeling startup tutorial

PART 2: Agisoft Metashape (formerly Photoscan)

0. Installation

- Free 1-month full trial license (NOT the demo version) at

www.agisoft.com

The free-trial license is a fully functional version, and different from the “demo version” that does not allow you to save any result. See this page for installation details.

“How to try full Metashape functionality before buying” in FAQ page

<https://agisoft.freshdesk.com/support/solutions/articles/31000135259-how-to-try-full-metashape-functionality-before-buying>

From the Metashape download page:

“Note that both Standard and Professional editions of Metashape allow to run the fully functional trial from the Activate Product dialog without a need of requesting trial key. The option Start a free 30-day trial should be selected in the Activation dialog. The dialog window appears upon the first start of the application on your machine or can be accessed from Help>Activate Product menu.”

- If you like to purchase to use the software beyond 30 days, a student license is \$59
- If your computer has a GPU, after installation, turn them on at Tools>Preference>GPU (However, if Metashape crashes while working on Build Mesh/Texture, disable this GPU option.)

1. Photos

For your learning initially, it is recommended to keep the number of photos to 30-70. (Using more than 100 photos will noticeably slow down the process, although you can work with 1000's of photos if you have a good computer with high-end GPU.)

2. Menu: **Workflow >add photos** (find select all photo files to import)

** Alternatively, you can select and drag the photo files from desktop to Metashape workspace column.*

Before you add photos, view each photo carefully and eliminate obviously bad ones (blurred, unfocused, too bright/dark, etc.). One bad photo can screw up everything. Alternatively, after adding photos, you can either remove the bad photos or disable them by right-clicking on the photo name in the list of added photos.

3. Menu: **Workflow >align photo**

Use HIGH setting (This should not increase processing time much.)

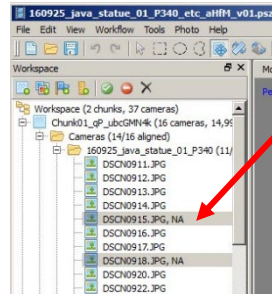
Turn on **Generic Pair-preselection** to speed up the process. For a set of 50 or less 2k photos, this should take no more than 20 min.

After the process finishes, you will see a model consisting of small number of point clouds, labeled as **Tie Points** in the Workspace column. Check if each camera is aligned. See the illustrations below. Enabling the **camera display icon** shows the aligned cameras in the viewport. In the Workspace column, the photos not aligned are indicated as NA. If only a small number of

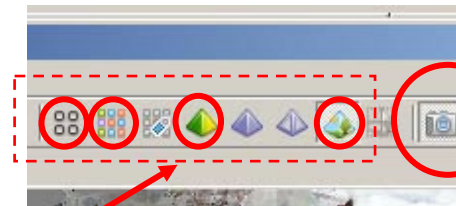
photos are left un-aligned there, you may ignore them or try selecting and right-click on them to use **align photo** sub-menu to see they can be quickly fixed.

If the result is still not good or many photos have problem aligning, try **workflow>align photo** again with **Generic Pair-preselection** disabled and **Reset Current Alignment** option enabled. Disabling **Generic Pair-preselection** slows down the process, but is likely to align photos better.

Z



NA means the photo is not aligned



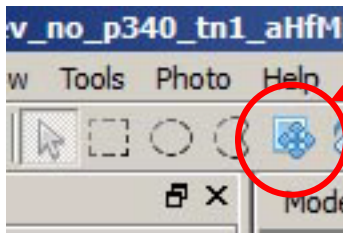
Toggle camera display

From left to right: **Tie Point Model**, **Dense Cloud Model**, **Shaded Model**, and **Textured Model**

4. Menu: **Workflow > Build Dense Cloud**

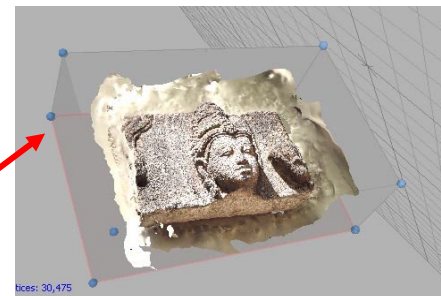
Next, it is recommended to do a quick test with the **Lowest Quality setting** here.

This quickly creates a model consisting of point clouds denser than the previous **Tie Points**, labeled as **Dense Cloud** in the Workspace column. Think of this as a preview of the meshed model. Switch the viewing mode (**Tie Points/Dense Cloud**) using the icons in the illustration shown above.



Resize/scale/rotate **bounding box**

You can also drag each corner of the **bounding box** for resizing it.



- After you get the low-quality dense cloud, resize the bounding box so that it just includes the area you want (See the image above for the Resize/Scale/Rotate tool of the **bounding box**). The bounding box initially made by the software is usually not appropriate because it includes the context around your target. This context only helps for the initial photo alignment, but will slow down your process of mesh generation after the photos are aligned.
- Make a meshed model next.
Method 1 below is the older, slower process. Method 2 is a newer integrated algorithm, most likely faster and with better quality. Use of **Method 2 is recommended**, (but if it has a problem, try Method 1).

[method 1: Perform another Dense Cloud and Build Mesh]

Menu: **Workflow > Build Dense Cloud** again but use **Medium Quality** this time.

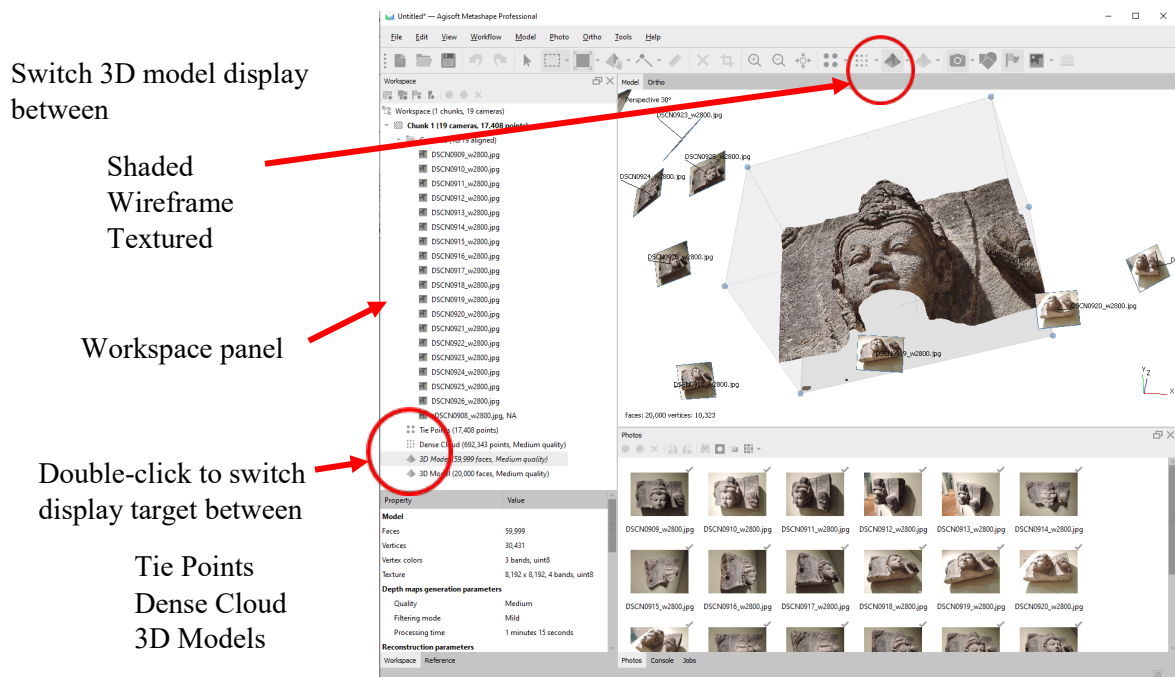
This will take longer than before but produces much better result. Then, mesh the model.

Menu: **Workflow > Build Mesh**: Use **Dense Cloud** for Source data
 Use medium mesh count. Going higher will likely to cause memory error for an ordinary computer.

[method 2: Skip Dense Cloud process, and directly perform Build Mesh.]

Menu: **Workflow > Build Mesh**: Use **Depth Maps** for Source data
 Use medium quality (or low quality if you want quick feedback) and medium mesh count.

To see the meshed model, use the **Shaded Model** icon above the viewport (See the illustration below), or go to the Workspace panel in the left and double click 3D Model.



7. Menu: **Workflow > Build Texture**

Blending mode: Mosaic (slower but better quality) or Average (faster and likely to produce seams, so recommended only for testing.)

Recommended texture size at this point is 8192 x 1 (This large size retains good details.)

8. Next, we will make a lighter model appropriate for online distribution. This model will have less mesh count and smaller texture file size for online distribution. But first, it is a good idea to make a duplicate of the current model as a backup, just in case you make some mistake while editing thee model later.

(select the current 3D Model in the Workspace panel) > (Right-click and select Duplicate)

You can also rename each model by right-clicking on it and selecting Rename.

(select the copied 3D Model in the Workspace panel) > tools > Mesh > Decimate mesh

Now, you can select a portion of the object surfaces if you want to reduce the density of the mesh (that is, decimate) only for that portion while keeping the details of other portions intact. (Use CTRL-key for incrementally adding selection, and SHIFT-key for incrementally removing selection). Otherwise, you can decimate the whole object down to an appropriate size.

For using your model on Design Heritage platform, the recommended target face count is: between 5,000 and 150,000.

*The max. count allowed for uploading our website is 180,000, but a model of that size requires a fast computer and network.

After hitting OK for decimation, you are asked whether to replace default model or not. Because Metashape (as of 2021) has no UNDO function for decimation, you can choose not to decimate the original and make a new low mesh count model. By doing a few trial and error operations with different degrees of decimation, you will end up with multiple models. You can switch between these models for viewing by double clicking one in the Workspace panel. To check the mesh of these models, select the MODEL WIREFRAME icon above the viewport. (See the image above.)

9. Menu: **Workflow > Build Texture**

The decimated model loses texture, so you need to rebuild texture again on the model.

For using your model on Design Heritage platform, the recommended texture image size is: 2048x2048 or 4096x4096 (and just 1 image per model)

* Max. allowed for Design Heritage platform is 8192x8192

10. Finally, export the mode with texture

(right-click 3D Model in the Workspace panel) > export model (use obj format with jpg texture)

*** Make sure the exporting filename you specify does NOT include any space, as some software has problem importing such a file.

The obj file can then be uploaded onto the Design Heritage platform.

Addendum 1.

Menu: Workflow > Batch Process

You can do the above steps automatically by adding each one to this batch list and execute it.

Addendum 2.

If needed, further edit your mesh model by importing it into Recap photo or 3DSMax, before importing to Design Heritage platform.

Addendum 3.

Some useful UI tips for model viewport.

- Camera icon in the icon row: turns on/off camera display. Pull-down menu can turn on/off photo images showing with the cameras.
- SHIFT-key and middle mouse wheel: changes the size of camera icon in viewport.

- CTRL-key and middle mouse wheel: changes the camera's field of view. If you make it to all the way to zero, you get orthographic (no perspective) view which is sometimes useful to rotate/resize operation.
- Double clicking a point on a model: changes the camera target. The point becomes the rotation center for the view. Also, useful if the target is too close to the camera and mouse middle wheel does not let you move forward anymore (beyond the target point).