

Agisoft PhotoScan Tutorial

Agisoft PhotoScan is a photogrammetry software that allows you to build 3D models from digital photographs. Photogrammetry requires a series of photographs of an object from different angles with some overlap between each photo. Agisoft PhotoScan then recreates the geometry of an objects and digitally generates a 3D copy within the program.

The following is a step by step guide to using and understanding Agisoft PhotoScan. Here I am referring to the standard educational license version of Agisoft PhotoScan. Much of this guide references information provided by Professor Robin at the University of Edinburgh.

Installation

Agisoft PhotoScan offers a free 30-day trial of the Professional Edition of their software. Go to the following link to request a trial.

<http://www.agisoft.com/downloads/request-trial/>

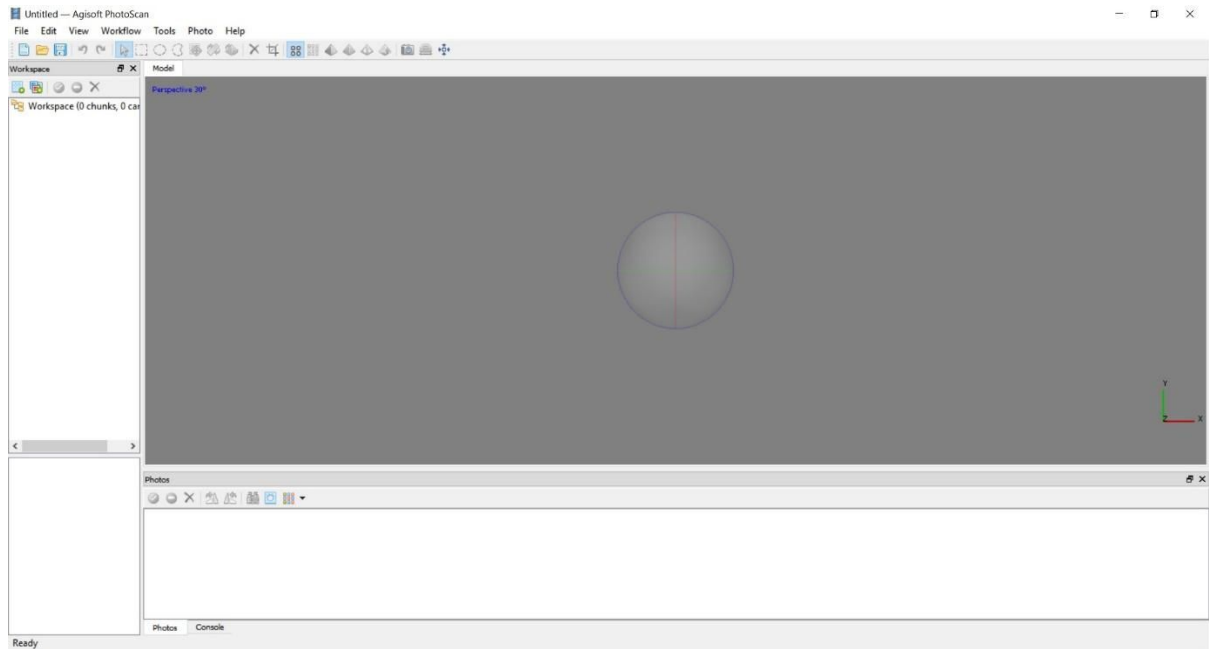
Once your trial license is sent to the email you entered on this page you can download the version of Agisoft PhotoScan that works for your computer by going to the following page.

<http://www.agisoft.com/downloads/installer/>

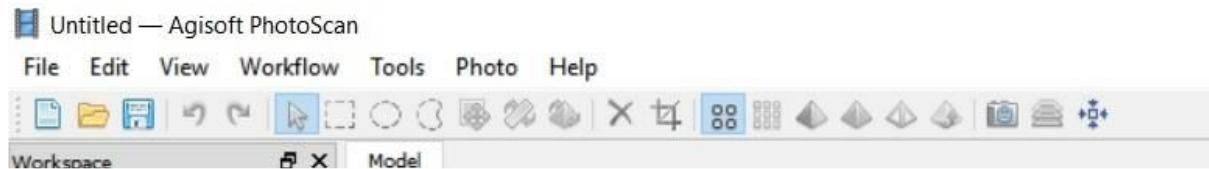
Once you download and install the program you can proceed with the following guidelines.

Interface and Navigation

Below is what will appear when you first open the software.



From here it is important to familiarize yourself with your workspace.



At the top of your screen is your **toolbar**. Here you change your selection tool rotate and adjust the region your object resides in, delete and crop sections, as well as switch between different views of your model. These views will unlock as you move through the workflow.

The next area is your **workspace** which shows all of the technical data and numbers pertaining to your model including point counts and polygon faces. It is located below the toolbar on the left. Here you can also organize your chunks. Agisoft allows you to work with your model in sections to work with separately and possibly combine later. In this case having multiple chunks is primarily used for combining two halves (like a top and a bottom) of an object that could not be completely captured from one position. For our purposes we will not be worrying about this section and will be only working with your single default chunk.

Along the bottom is where your **photos** will appear when you upload them.

On this same pane you can switch the tab to **console** if you were interested in the coding side of things. We will also not be worrying about this feature.

The gray area that takes up the majority of your screen is your **model** pane. Here you can view your model, rotate it, and make selections.

Navigating your model

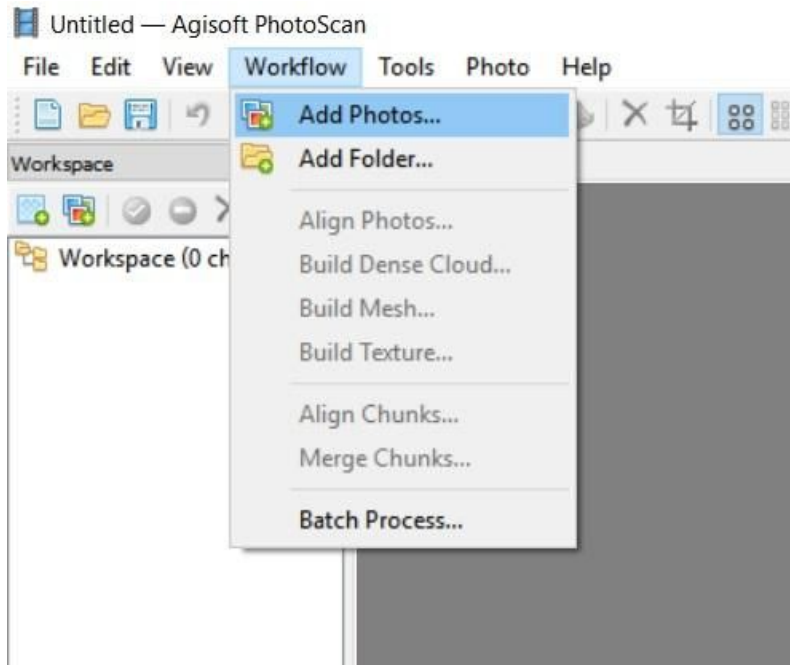
Click and drag the ball in the center to rotate your object. Click on one of the three colored lines along the ball to change the angle.

To move your object around without rotating it, or **to pan**, you can click and drag while holding down the **Ctrl key**.

To zoom in on your object, hold down the **Shift key** while you click and drag. Alternatively, you can also use the **mouse wheel** to zoom in and out.

Section 1: Uploading Photos

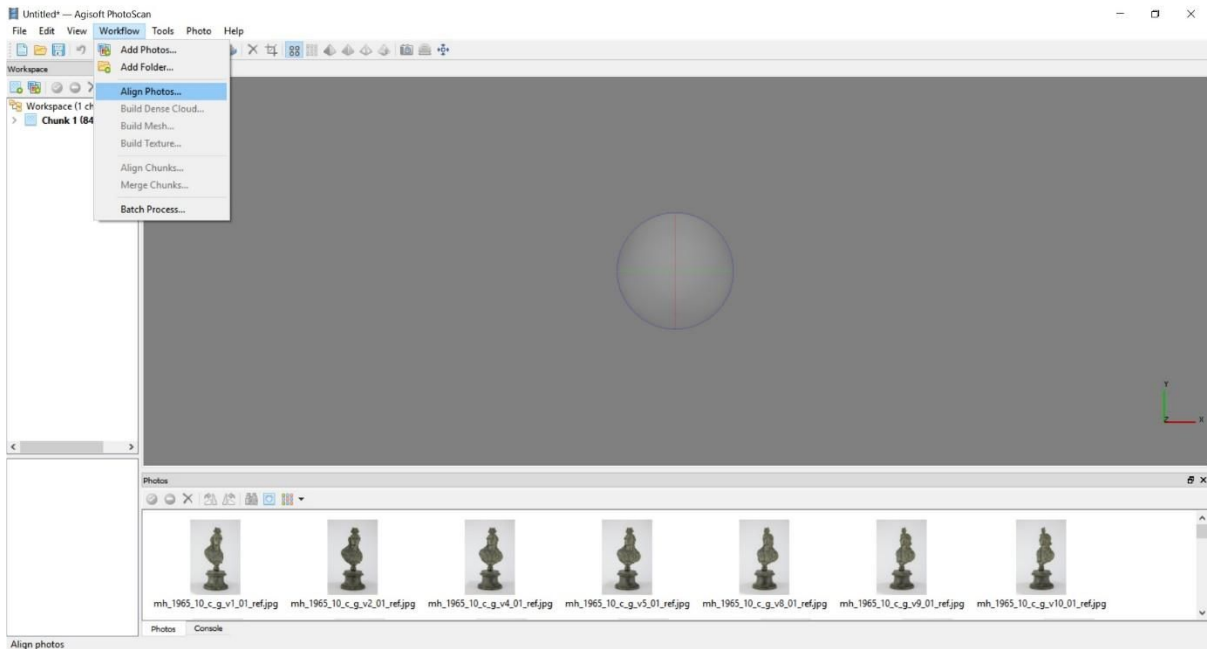
Be sure that you have plenty of space on your hard drive. The program will run much more smoothly if it isn't competing with a lot of other programs.



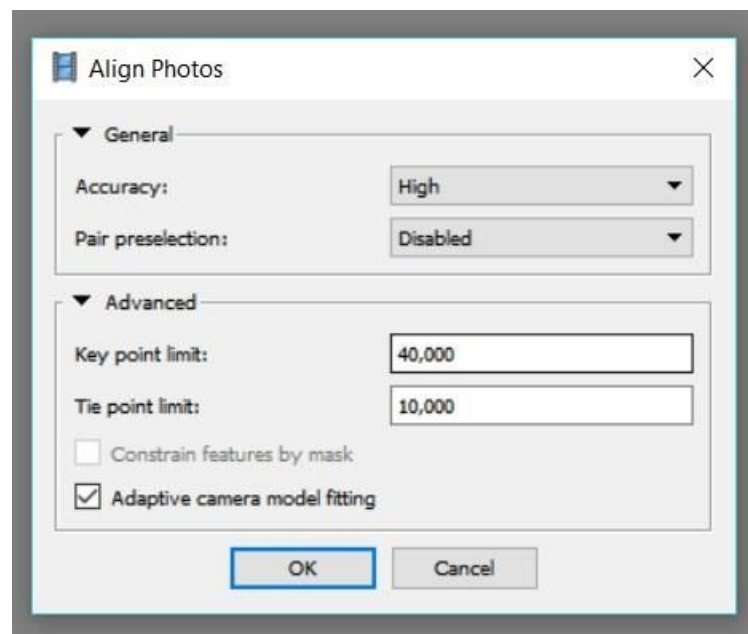
1. Select **Workflow > Add Photos...**
2. This will then open a dialog where you can select your photos that you have previously uploaded to your computer. I suggest beforehand moving all of your photos to a single file somewhere easy to find on your computer. Then at this stage locating that file in the dialog and **Shift+clicking** to select all of the photos you want to use.
3. Click **Open** and all of your photos will be uploaded to Agisoft.
4. ALWAYS **SAVE**. I would suggest saving your model before you perform another step in the workflow to prevent later headaches. It is also a good idea to even **Save As** at each workflow step in case later down the line you need to fix a particular stage.

Section 2: Aligning Photos

Now that all of your photos are uploaded to your program it is time to have the program align them.

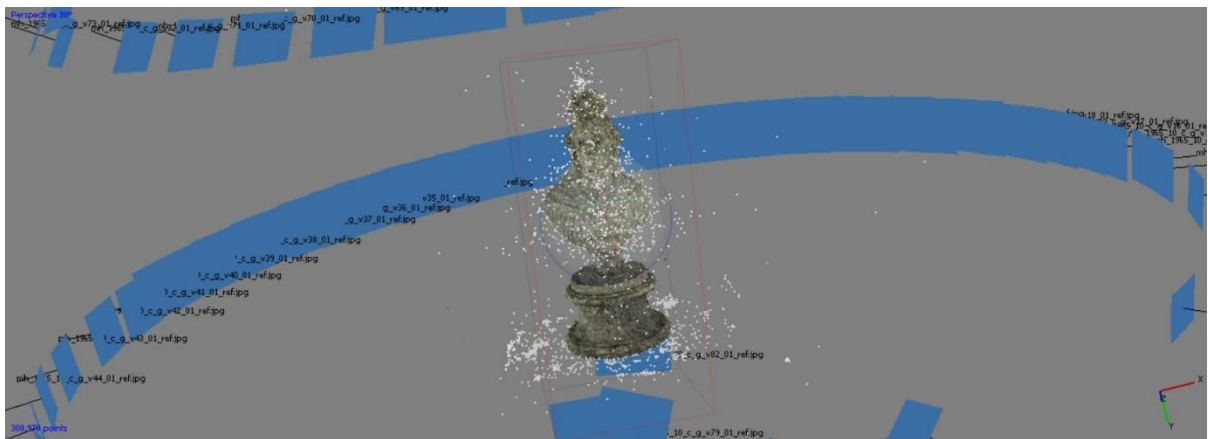


1. Select **Workflow > Align Photos...**



2. You will be presented with the Align Photos dialog.
 - a. **Accuracy** is how accurate and fine-tuned the camera position estimate is. The higher the accuracy the more accurate the camera position, but it takes longer to process. Lower accuracy can be used to get a rough camera position and takes far less time. I suggest keeping this at **High**.
 - b. **Pair preselection** tells the program to spend more time seeing which photos overlap. This is usually **Disabled** but if later down the line your model is being difficult, try aligning your model with this on Generic.
 - c. Open the Advanced drop-down tab.

- d. **Key point limit** tells the program how detailed you would like each photo to be read. The higher this is the more features will be better aligned but with a longer processing time. If you have a powerful computer, you can type a 0 here which means unlimited. For the average computer I would use **40000**.
 - e. **Tie point limit** is the number of points that connects your photos. As with the key point limit you can enter a 0 here for unlimited but I would otherwise suggest using **10000**.
3. Click **Ok** and start the photo alignment. This could take as little as five minutes to several hours depending on how high or low your settings were. Once your alignment is done you should get something that looks like this:



This is your **light point cloud**. As you can see there is some noise around my model. Depending on how your settings were your model may appear sparser rather than dense like this. If you did not have a solid background the program may have also picked up aspects of the surrounding area This can be cropped out later. The **blue squares** that appear around your model are the different camera angles the program is reading from. You can toggle these on and off by clicking the camera icon on your toolbar.

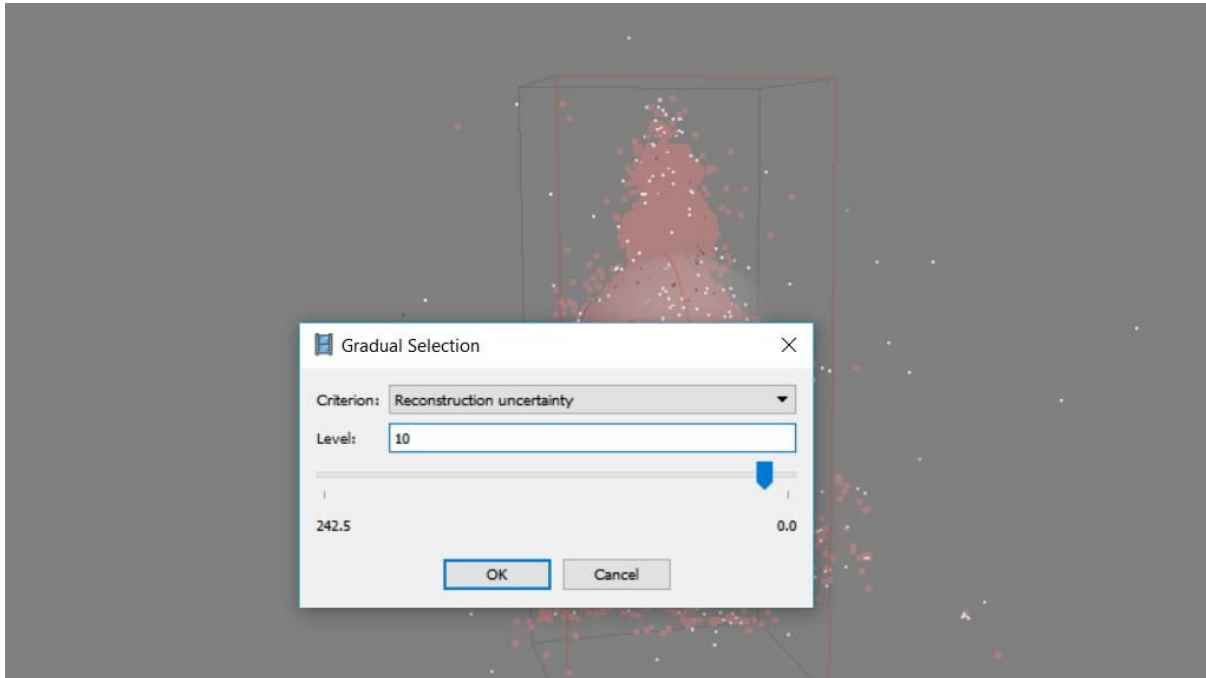
4. Your model will most likely be upside down so rotate it upright using the navigation tools mentioned earlier.
5. **SAVE** your model again

OPTIONAL: After photo alignment is finished, you can refine bounding box position and orientation to fit the object. This step is optional since Agisoft PhotoScan automatically calculates the bounding box dimensions and location. But it is recommended to check if any correction is needed because the geometry reconstruction step deals only with the point cloud inside the volume. The bounding box can be resized and rotating using the **Resize Region** and **Rotate Region** tools from the toolbar.

Section 3: Optimize Aligned Photos

If you are hoping to get just a quick and dirty model, then you can skip this section. Otherwise continue on with the following steps.

1. Select **Edit > Gradual selection**
2. A dialog box will appear. On the **Criterion** drop down menu select **Reconstruction uncertainty**. You will see a slider between a number in the hundreds and zero. In **Level** type **10**.



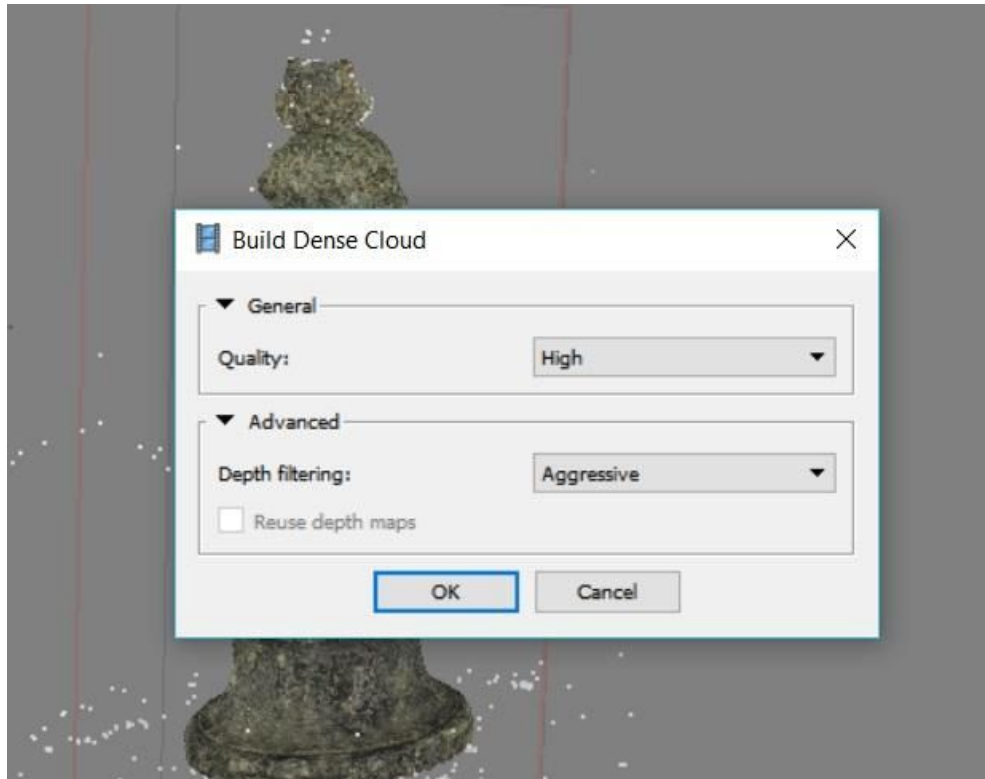
3. Click **Ok**. You will see parts of your model turn pink, these points have been selected.
4. **Delete** this selection by clicking the **X** on your toolbar. This will clear up your model some.
5. Repeat Steps 1-4 within this section. This will clear up more noise. But if this completely deletes the majority of your model you may need to start over with different settings in previous sections.
6. Select **Tools > Optimize cameras**
7. Select all of the boxes that appear in the dialog except the last.
8. Click **Edit > Gradual selection** again but this time select **Reprojection Error** from this drop down menu.
9. By **Level** you should put **1** or if your model is already pretty close to 1 but below then you can leave it.
10. Click **Ok** and **Delete** the selected points. Understandably this gets repetitive.
11. Click **Edit > Gradual selection** again and now select **Projection Accuracy** from this drop down menu.
12. By **Level** you should enter **10**, Click **Ok**, and **Delete**.
13. If you see any obvious random points manually select them and delete them out.
14. **SAVE**

Section 4: Dense Point Cloud

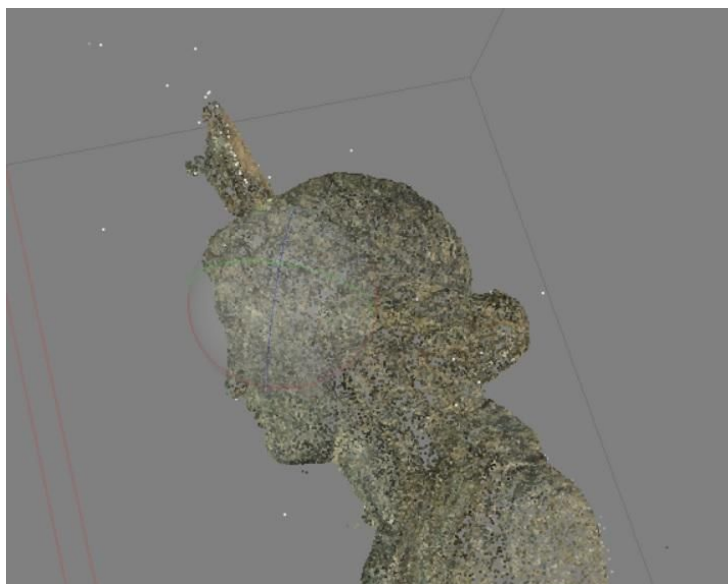
Now it is time to finally move on to the next workflow step.

1. Select **Workflow > Build Dense Cloud...**

2. This will open the Build Dense Cloud dialog
 - a. **Quality** should be set to **High**. Higher levels require more computational resources. If your computer does not have the best processing power, then you should select **Medium** here.
 - b. Under **Advanced** options, the **Depth filtering** should be **Aggressive**.



3. Click **Ok**. This will take quite a while depending on your selections.



4. Once your Dense Point Cloud is built, you will want to go in and to some editing. There may be some stray dots around your figure that doesn't correspond with your model. **Select** those points and **delete** them. Your model may also be attached to the

table it was photographed on. You can carefully delete way the extra information so that you just have your model.

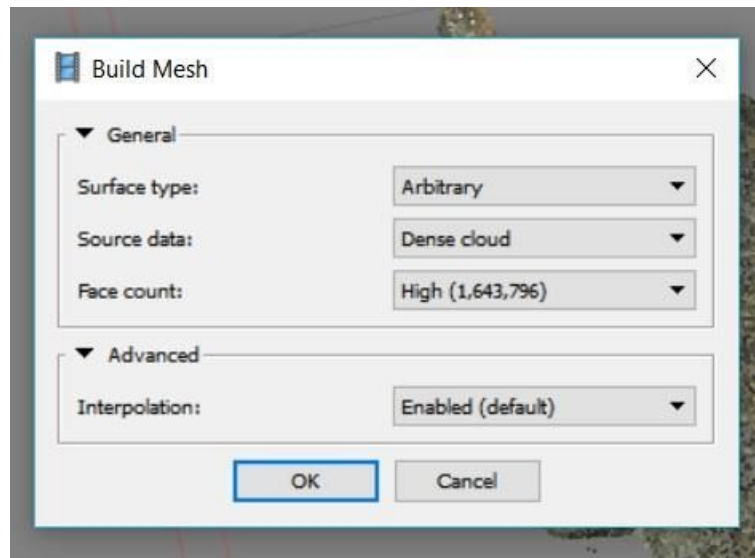
5. **SAVE**

Section 5: Mesh

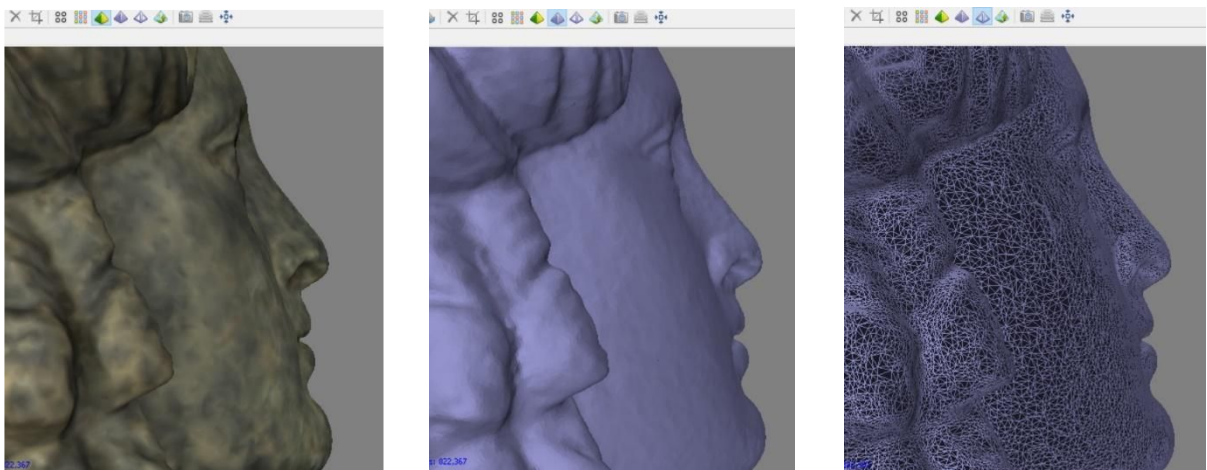
It's time to build the solid base of your model – the mesh.

1. Select **Workflow > Build Mesh...**

2. The Build Mesh dialog will appear, select the following settings
 - a. **Surface type:** Arbitrary
 - b. **Source data:** Dense cloud
 - c. **Polygon count:** High (The values indicated next to High/Medium/Low preset labels are based on the number of points in the dense cloud.) Depending on how high or low this setting is determines how detailed of a surface your model will have.
 - d. **Interpolation:** Enabled



3. Click **Ok** to begin the geometry reconstruction of your object. Once this is complete you will be able to view your object's mesh shaded, solid, and wireframe.



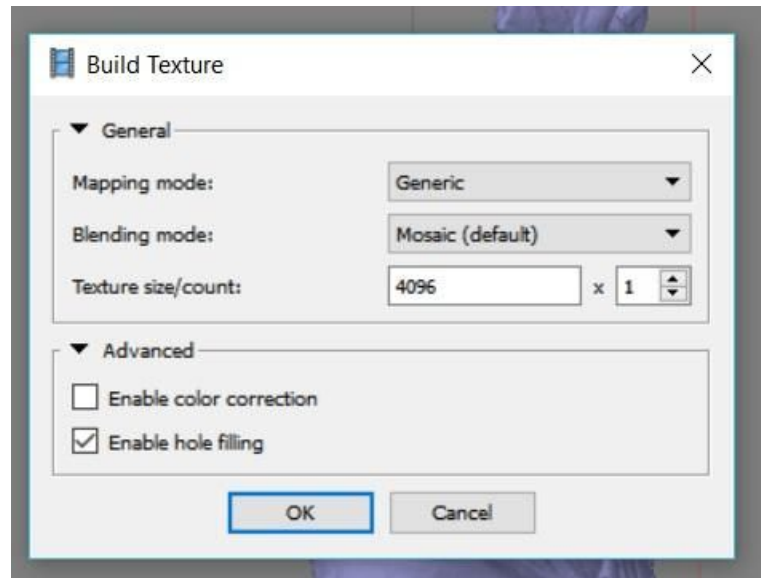
4. At this point you will be able to clearly see if you need to clean up your model in an external program. Say there is an area that needs to be smooth but is very rough. At this point you will need to turn to one of the TAs for extra help. Please contact me, Emily (lanki22e@mtholyoke.edu) if you need to edit your mesh.
5. **SAVE**

Section 6: Texture

This is the final step in creating your 3D model in Agisoft.

1. Select Workflow > Build Texture...

2. This will open the Build dialog, select the following options:
 - a. **Mapping mode:** Generic
 - b. **Blending mode:** Mosaic (default)
 - c. **Texture size/count:** 4096 x 1
 - d. **Enable color correction:** disabled



3. Click **OK**.
4. **SAVE**
5. Now your model is ready to upload! Please see the next tutorial on how to upload your model to Sketchfab.