
Instructions for Decimated Portraiture

Introduction:

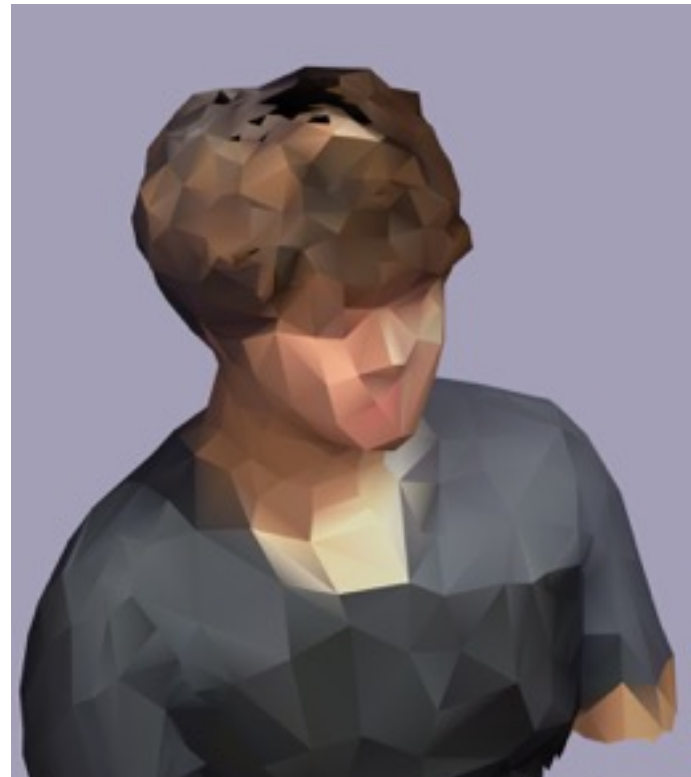
The following instructions explain how to create portraits using 3D scanning and Blender 3D. The portraits are unique because while the 3D scanning captures an individual over a particular series of moments in time, the decimation process then reduces the millions of data points into a simplified and barely recognizable figure, but one that is still different from every other. The polygonal and flat shading style recommended in the tutorial was a popular aesthetic in the period between 2014-2015.

Tools needed:

- a 3D scanning system - I have tried this project with the Skanect software and an Asus x-motion device and also with the Structure scanner and an iPad. Photogrammetry tools like Photoscan (free for 30 days) could also create the needed scans using a camera phone.
- Blender 3D - while you could use other 3D software packages, these instructions will focus on using the free and openSource software Blander, available here: <https://www.blender.org/download/>
- A script for converting UV textures into vertex colors. This will allow the colors to properly blend as the model is decimated. Download it here: https://github.com/sambler/myblenderaddons/blob/master/uv_bake_texture_to_vcols.py

Step One:

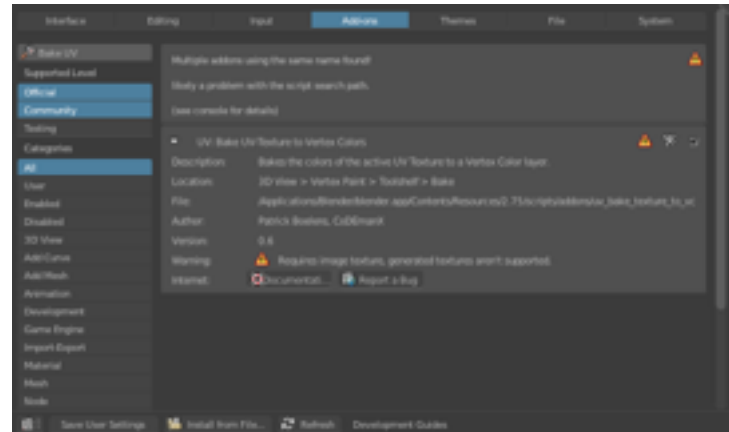
Capture your subject. Almost as a throwback to early photography, this step requires the subject to remain still for upwards of a minute while the scanner is moved up and down and in a 360 degree orbit of the subject. The movements must be made slowly and methodically to keep tracking intact, almost as if one is doing a sort of scanning Tai Chi. The more fluid your scanning motion and the more angles you achieve, the better the results. When you have a scan you are happy with, export your model as a .ply or .obj with color information.



Instructions for Decimated Portraiture (cont.)

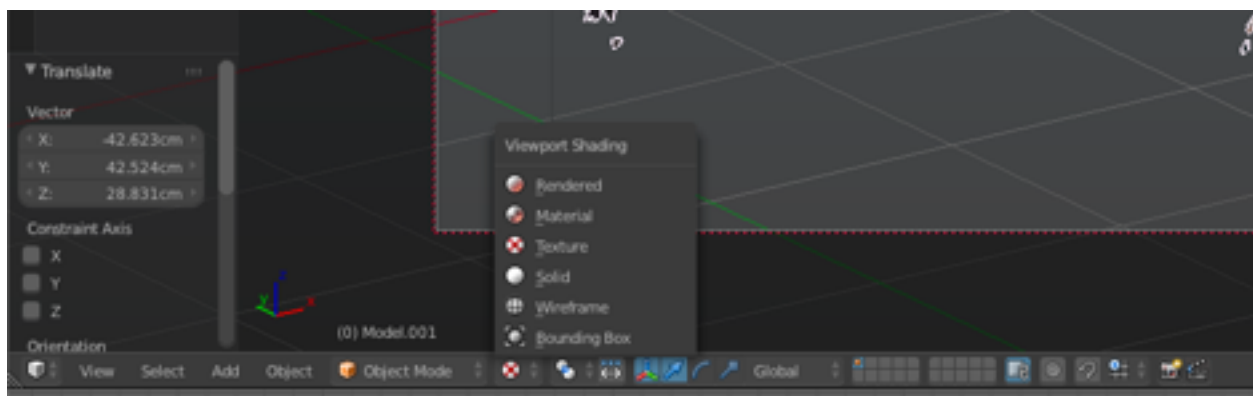
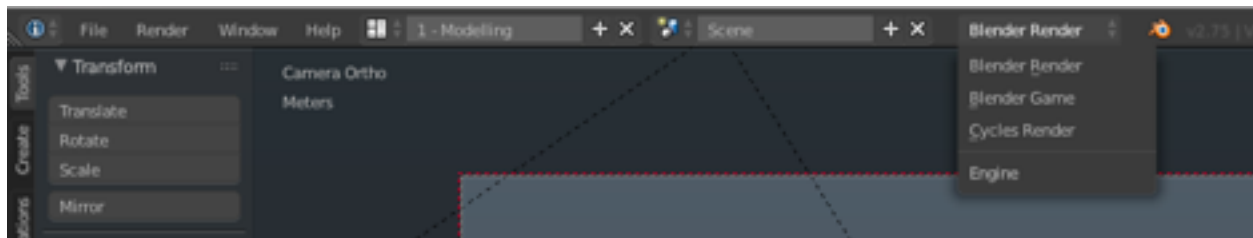
Step Two:

Open Blender 3D. (Note that nearly all 3D modeling programs require a 3 button mouse.) Install the UV texture to Vertex Colors script by going to File->User Preferences. Then click on the Add-ons Tab and click the "Install from File" button at the bottom of the window then select the .py file you downloaded. Then, in the search bar, type "Bake UV" to see the newly installed add-on and click the checkbox to turn it on. Open the example file here: <https://github.com/digitalcoleman/polyPortrait>



Step Three:

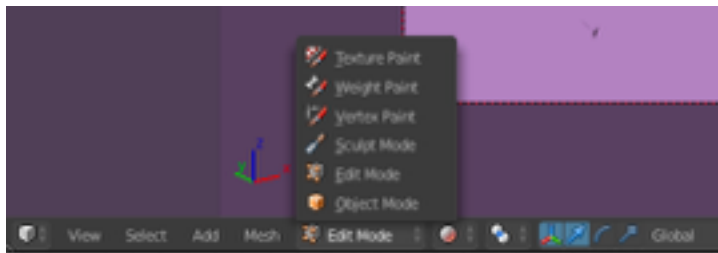
Import your model. If you are new to Blender then you should start with the example file and just hide or erase the example model. Otherwise you should go thru some of the many tutorials online and understand the basics of getting around in Blender. (the basics are r=rotate, s = scale, and g = grab(or move)) Goto File-> Import and choose your file type. Remember that we want to either have a model that already has the colors applied to the vertices like some ply files, or a file type like obj that comes with a material file. You can test the import of your material by switching to the Blender Renderer (fig.1) and then show Texture view (fig.2)



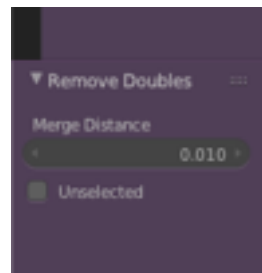
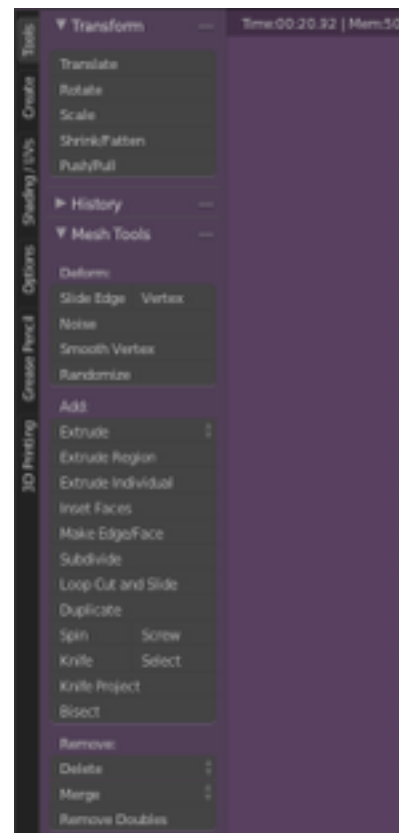
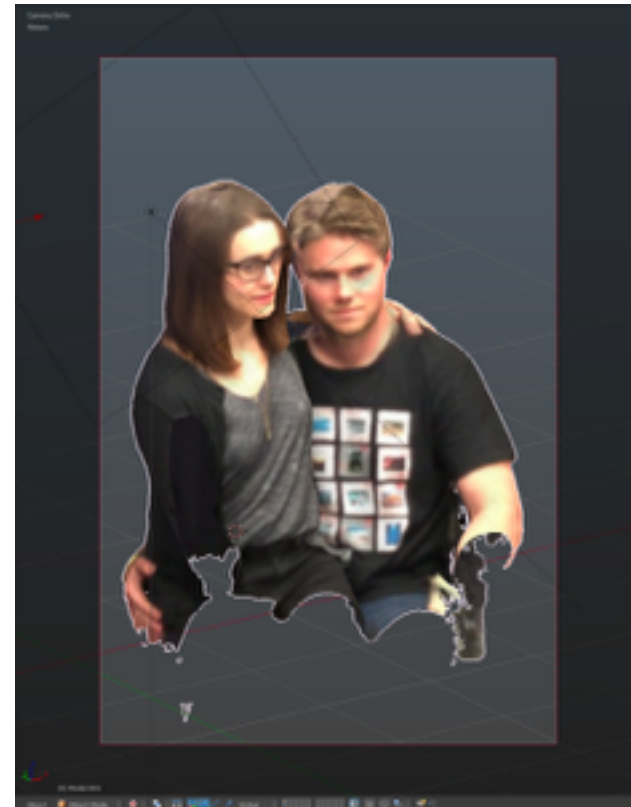
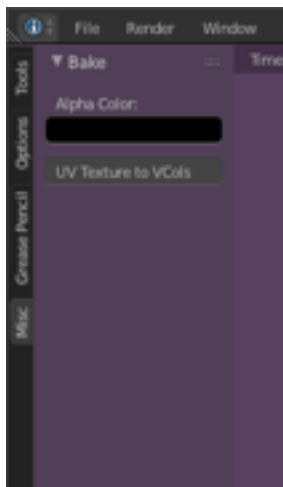
Instructions for Decimated Portraiture (cont.)

Step Four:

Convert the material to vertex colors. If your model already has vertex colors you can skip this step. Here you see the typical results of a textured scan upon importing it (this was an obj with a mtl file.) First you will likely need to Remove Doubles to reduce the number of points and connect the polygons from the scan. Right click on the model and then hit the "Tab" key. All the vertices on the model should be highlighted, but if they are not, press "a." On the left hand side of the interface you should see a button for "Remove Doubles" at the bottom. You might consider increasing the distance for points to be merged by entering a larger number like 0.01 in the Remove Doubles menu. This will start to simplify the model and help prevent errors when we apply colors to the Vertices. Next we switch from Object Mode to Vertex Paint Mode.



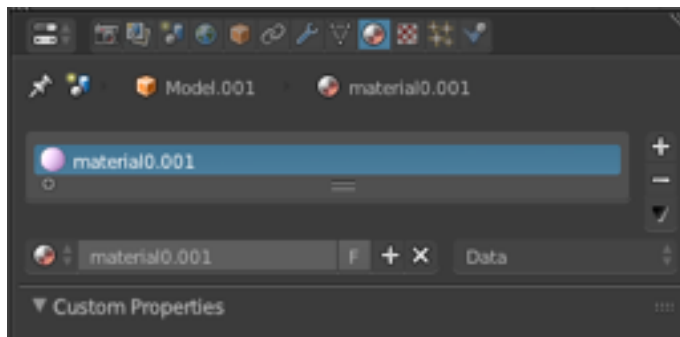
This will reveal the menu for the script we added, under the "Misc" tab on the far left, under "Bake." You can then press the "UV Texture to VCols" button and wait for it to process.



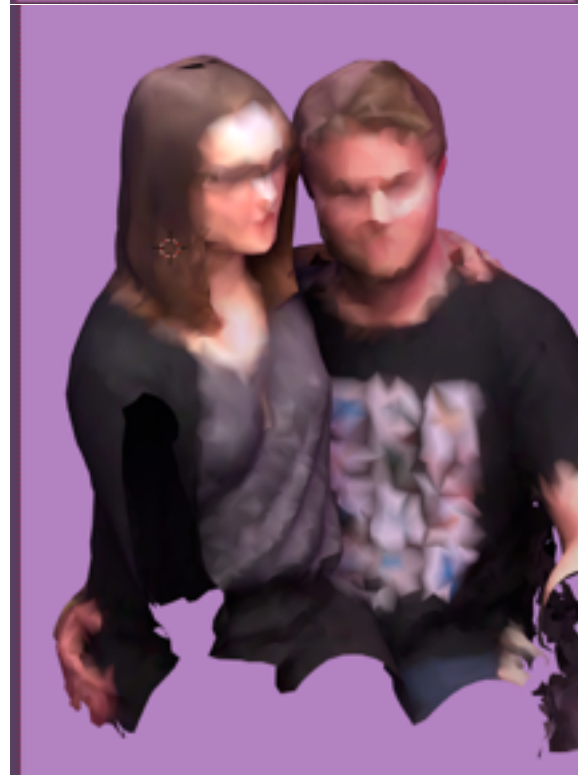
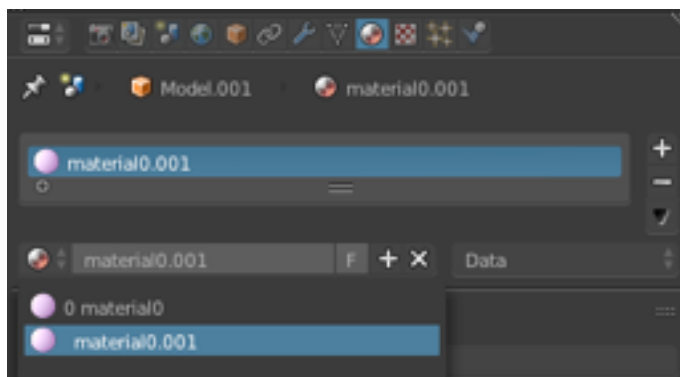
Instructions for Decimated Portraiture (cont.)

Step Five:

To see the results, first change back to Object Mode, then turn on the the Cycles Renderer in the top middle menu (instead of the Blender Renderer), and then select "Rendered" view in the menu just below the 3D viewer window where we previously selected "Texture." At first this will show a nice white render with some ambient occlusion like shading. (see pic.) Now we need to switch to the Material created by the script that connects the Vertex Colors to the diffuse color of the model. On the far right side, hit the Material Tab.



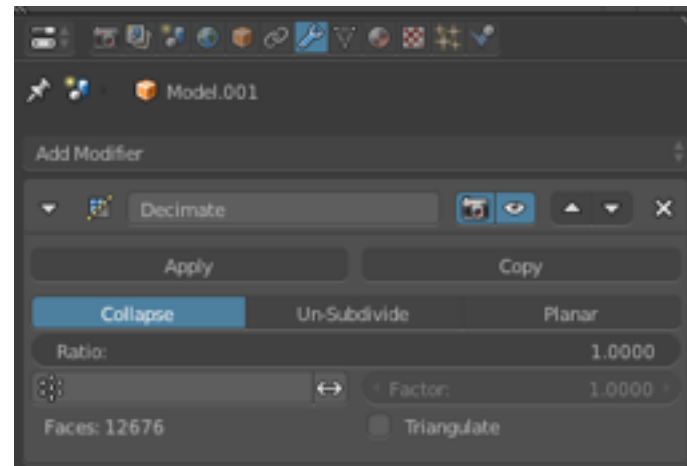
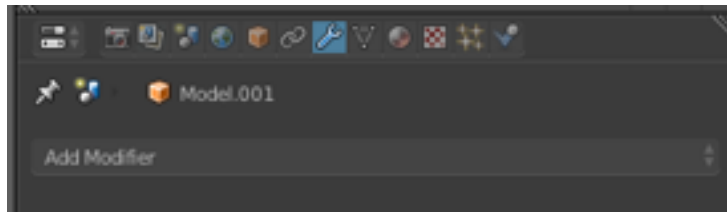
Then on the second listing of material0.001, click and change the material to 0 material0. Now you should see the color applied to the model.



Instructions for Decimated Portraiture (cont.)

Step Six:

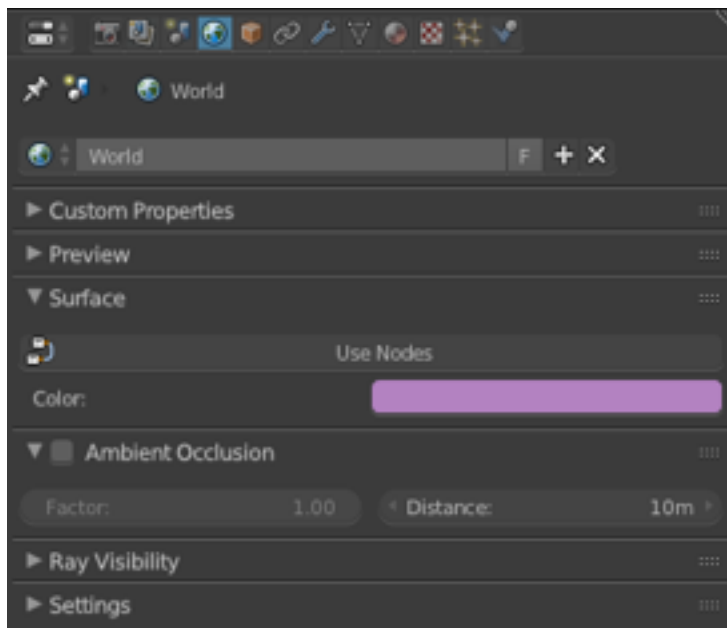
Decimate the model. Now we can apply a Decimate modifier to reduce the faces of the model and destroy more information for our desired polygon style. Go to the right hand menu and switch from "Materials" to "Modifiers."



Hit "Add Modifier" and choose "Decimate." The Ratio input field is where you want to change what percentage of points you want to keep, for example 0.1 will decimate 90% of the vertices. Tune this to your desired look and level of detail.

Step Seven:

Set your background color. I have found that using a non default background color can set the mood for the portrait. The color is set in the "World" tab in the right hand menu. Here you see it as a violet color.



Instructions for Decimated Portraiture (cont.)

Step Eight:

Render and save the image. In the right hand menu, switch to the "Scene" tab. Under Output, choose a file type, a filename, and location. Under dimensions you can change the size of the rendered image. Hit the Render button, wait, and Viola, you should have your portrait. There are many other options and variations that are possible, but perhaps this will give you a start to Decimated Portraiture. Note that while not 3D print ready, these models could also be exported and printed in as single color forms or even in full 3D color.

