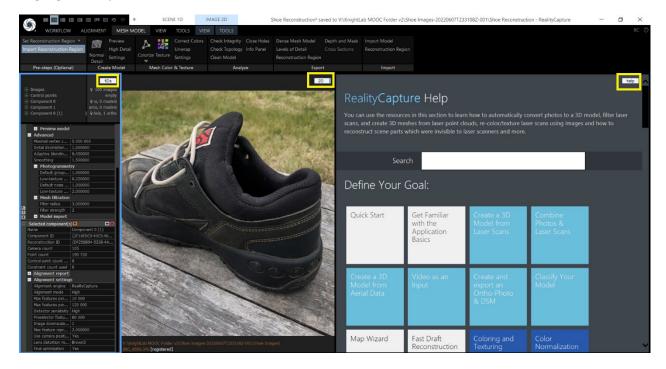
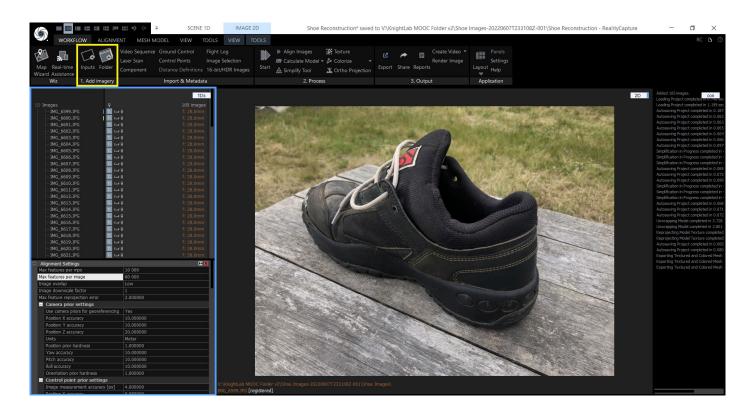
RealityCapture How-To Guide for Photogrammetric Image Processing

Note: RealityCapture has a very useful 'RealityCapture Help' feature inside the program, which I recommend using for in-depth information and help with software settings. You can access 'RealityCapture Help" from the white drop-down menus (highlighted in yellow).



Step 1: Import Your Images into RealityCapture



Step 2: Align the Images

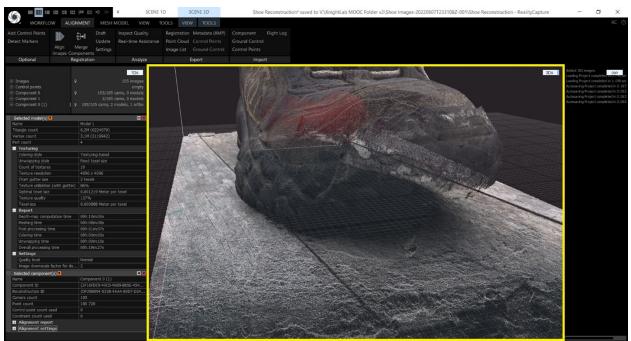
	= = = =		9 9 9 10 10 10 9 9 9		₹ SCENE 1D		IE 1D	D SCENE 3D			Shoe Reconstruction		
	WORKFLO	w	ALIGNMENT	MESH N	NODEL	VIEW	TOC	OLS	VIEW	TOOLS			
Add Cont			> ∄ •∥	Draft	Inspect					Metadata (XM		Component	Flight Log
Detect M	arkers	~~~	_	Update	Real-tim	ne Assistano	ce	Point C	Cloud (Control Points	; (Ground Control	
		Aligr	n Merge	Settings				Image	List (Ground Contr	ol (Control Points	
		Imag	es Component										
Opt	ional		Registration	า	A	nalyze			Ð	port		Impo	rt

I recommend using my 'Alignment Settings' seen here. I usually set my 'Max features per image' to 60,000 (60k) and my 'Preselector features' to 30,000 (30k) when running the alignment step.

The 'Max features per image' is always double that of 'Preselector features'. In the case of processing this shoe at the 60k/30k setting, I had two images not align into a component, so I increased the setting to 120k/60k, and had complete alignment. Two images not aligning is not going to be a problem assuming you have thoroughly captured your subject. You will run into problems if high numbers of your image are not aligning. I generally try to have at least 95% of my images align. When I don't hit the 95% threshold then I increase 'Max features per image'/'Preselector features' to a maximum of 120k/60k. Raising these numbers greatly increases the workload for the computer. If you still don't reach 95% image alignment then you should capture more images of your subject.

When alignment is finished you will have a point cloud, as seen below.

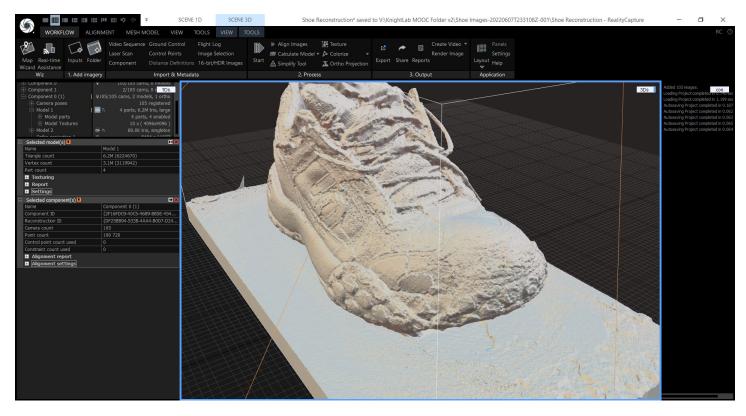
Alignment Settings	
Max features per mpx	10 000
Max features per image	60 000
Image overlap	Low
Image downscale factor	1
Max feature reprojection error	2.000000
Camera prior settings	
Use camera priors for georeferencing	Yes
Position X accuracy	10.000000
Position Y accuracy	10.000000
Position Z accuracy	20.000000
Units	Meter
Position prior hardness	1.000000
Yaw accuracy	10.000000
Pitch accuracy	10.000000
Roll accuracy	10.000000
Orientation prior hardness	1.000000
Control point prior settings	
Image measurement accuracy [px]	4.000000
Position X accuracy	0.050000
Position Y accuracy	0.050000
Position Z accuracy	0.100000
Defined distance accuracy	0.001000
Units	Meter
Draft mode	
Image overlap	Low
Image downscale factor	1
Final model optimization	No
Advanced	
Add a reconstruction region after ali	Yes
Enable measurements suggestions	Enable
Force component rematch	No
Background feature detection	No
Background thread priority	Normal
Preselector features	30 000
Detector sensitivity	High
Merge georeferenced components	No
Distortion model	Brown3
Use mosaic images as feature sourc	Yes



Step 3: Create the 3D Mesh

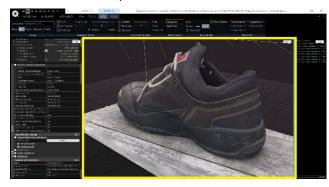


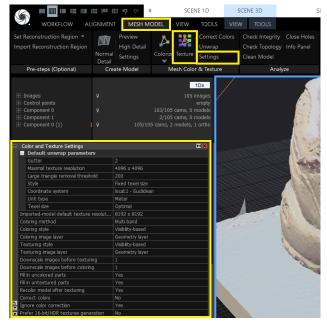
I use the default settings, and simply click on 'Calculate Model' to begin the process. When the process is complete you will have an off-white 3D mesh of your object, as seen below.





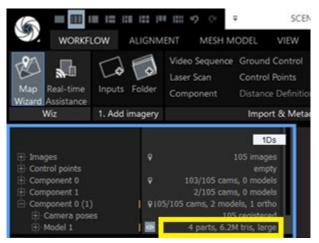
Before opening the 'MESH MODEL' menu and clicking 'Texture' I suggest opening the 'Mesh Color & Texture' 'Settings' and using the 'Default unwrap parameters' values I show here in the screenshot. After using these settings, when you click 'Texture' the software will unwrap the model and start to create the texture. The result is your textured mesh.

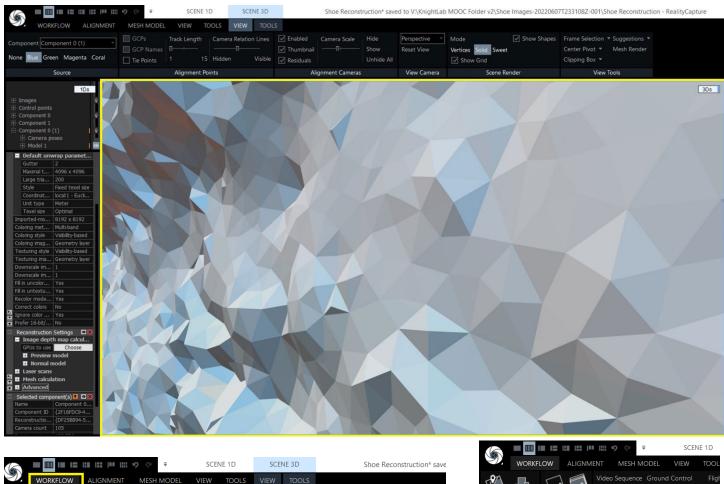




Step 5: Simplification

Think of simplification (also known as decimation) as the process of lowering the resolution of a photograph, but instead of reducing the number of pixels you are reducing the number of polygons in a 3D mesh. Looking at 'Model 1' I can see that my shoe 3D mesh consists of 6.2 million 'tris' triangles, or polygons. That's a lot of triangles! You can see the individual triangles when zooming into the untextured 'Solid' mesh.





Texture

Colorize

T Ortho P

 \mathbb{D}

A Si

Calculate Model

To simplify the mesh, first click on the 'WORKFLOW' menu and then the 'Simplify Tool' where you can set a 'Target triangle count' based on the limitations of where you will export and use the 3D model. In my case, I want to upload the shoe online to Sketchfab and Mozilla Hubs, and so I set the 'Target triangle count' to 80,000. After setting your 'Target triangle count' click the 'simplify' button.

Image Selection

16-bit/HDR Images

Sequence Grou

1. Add imagery

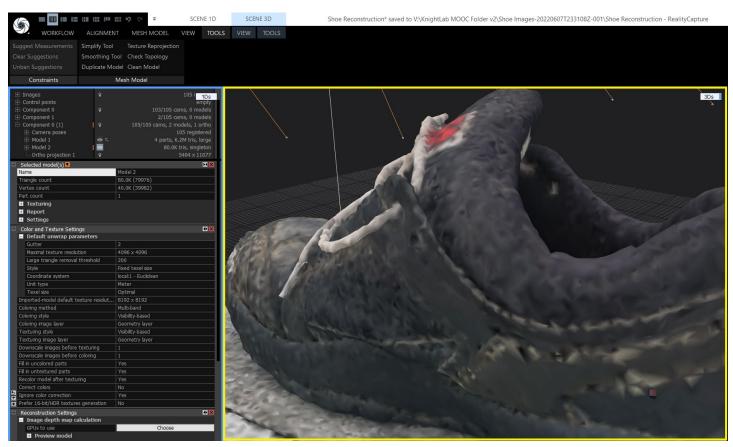
Control Points

Import & Metadata

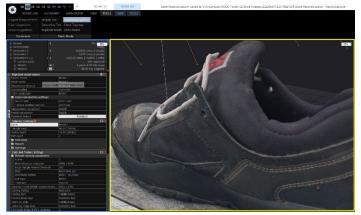
WORKF			IIII 🧐 🖓 🤫	, ODEL V	SCENE 1	1D		
Map Real-time Wizard Assistance Wiz	Inputs Fold	der (/ideo Sequence .aser Scan Component	Control Po Distance D	ints	Fli <u>c</u> Ima 16 a		
⊡ Images ⊕ Control points		Ŷ		:	1Ds 105 images empty	3		
Component 0 Component 1 Component 0 (1) Component 0 (1) Comera pose		₽ ₽ Ф.Т.	103/105 cams, 0 models 2/105 cams, 0 models 105/105 cams, 2 models, 1 ortho 105 registered 4 parts, 6.2M tris, large					
Simplify Tool Type			Absolute	4 parts, 0.26	n uns, large			
Target triangle cou Minimal edge lengt Coordinate system Unit type			80 000 0.000000 local:1 - Euclidean Meter					
Part merging Border decimation Color reprojection			Enable Simplify border Disable					
Normal reprojection Unwrap paran Simplify			Disable	simplify		1		

Step 6: Reapplying Your Mesh

After using simplification your 3D model will have a texture that looks low-quality.



To re-use the high-quality texture that you had before using the 'Simplify Tool' open the 'TOOLS' menu and select 'Texture Reprojection'. Set your 'Source model' to the high triangle count model ('Model 1' for me) and the 'Result model' to your decimated/simplified 80.0K tris version ('Model 2' for me). When you click the 'Reproject' button, RealityCapture will transfer the high-quality texture from 'Model 1' to 'Model 2'. Click 'Yes' when the RealityCapture pop-up asks if you "wish to create Unwrap with current Unwrap configuration?" The software will use the same 'Unwrap' settings that we used in Step 4 when first texturing the 3D mesh. When reprojection finishes you will have a high-quality texture on your low-poly mesh.



	:8 :: **	III 19 (° ∓	SCENE 1D					
WORKFLOW	ALIGNMEN	IT MESH MODEL	VIEW TOOL					
Suggest Measurements	Simplify Tool	Texture Reprojection	on					
Clear Suggestions	Smoothing T	ool Check Topology						
Unban Suggestions	Duplicate Mo	odel Clean Model						
Constraints		Mesh Model						
Constraints		Mesh Model						
🕀 Images	Ŷ		105 i 1Ds					
E Control points			empty					
E Component 0	Ŷ	103/105 cams, 0 models						
Component 1 Component 0 (1)	0	2/105 cams, 0 models						
E Component 0 (1)	l v	105/105 cams, 2 models, 1 ortho 105 registered						
H Model 1	ΦT	4 parts, 6.2M tris, large						
Hodel 2		80.0K tris, singleton						
Ortho projection 1	Ŷ	9 540						
 Reproject model texture 			M X					
Source model		Model 1						
Result model		Model 2						
Reprojection distance		Automatic						
Supersampling		Automatic						
Color reprojection		Enable						
Color reprojection s	ettings							
Source layer		Color Layer						
Texture sampling met		Automatic						
Displacement reprojection		Disable						
b Normal reprojection		Disable						
💽 Reproject texture		Reprojec	t					

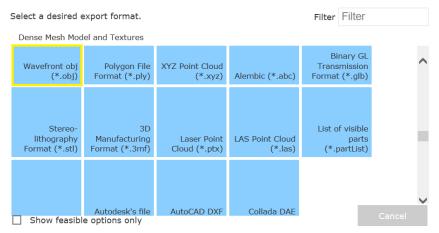
Step 7: Export the Textured 3D Model

To Export the 3D model, open the 'WORKFLOW' menu and click the 'Export' button.

		= .:	. 1:: 1**	III 9 0 ₹	SCENE	1D	SCEN	E 3D	Shoe Re	econstruction* saved	to V:\Kn	ightLab	MOOC	Folder v2\Shoe	Images-202206071
	WORKFL	.ow	ALIGNME	INT MESH MO	ODEL VIEW	TOOLS	VIEW	TOOLS							
Map	Real-time	Inputs	Folder	Video Sequence Laser Scan Component	Ground Control Control Points Distance Definition		election	Start	 Align Images Calculate Model • Simplify Tool 		Ľ Export	Share	Reports	Create Video 🝷 Render Image	Panels Settings Layout Help
	Assistance Wiz	1. Add i	imagery	Component	Import & Metad		IDK Images	,	2. Process	- ,		1	3. Outpu		 Application

Next, scroll down in the 'Export Your Creation' window until you see the 'Dense Mesh Model and Textures' file export options in blue squares. I suggest exporting as either a .obj or .fbx file.

Export Your Creation



When you click your desired filetype, a popup window will appear for you to name your file, saving it as a 'Wavefront obj (*.obj)' file. When you click 'Save' you will see an 'Export Model' window. I recommend the settings shown in the screenshot here. These settings will export your 3D mesh and texture in an accessible and portable 3D format. The resulting .obj export will include three files. The .obj files contains the 3D data; the .jpg includes the texture; and the .mtl file tells the 3D viewer how to combine the .jpg texture with the .obj 3D data for displaying the textured mesh.



3 items selected 9.62 MB



Shoe_Reconstruct ion_u0_v0

0	Export Model		×							
Expo	ort the model to an external mes	sh file.								
S	ettings:									
Ex	port an info file	No								
Sa	ve mesh by parts	No								
Fo	rmat version	Wavefront obj (*.obj)								
Ex	port vertex normals	No								
Ex	port vertex colors	Yes								
Nu	imber format									
	Texturing settings									
	Export textures	Yes								
	Export texture alpha	No								
	Export to a single texture file	Yes								
	Texture maximal side	4096								
	Use pow2 texture size	No								
	Texture file format	jpg								
	Texture pixel format	24-bit BGR								
	Cameras settings									
	Export cameras as a model part	No								
	Export transformation settings									
	Coordinate system	Grid plane								
	Transformation preset	Default								
	Scene transformation									
	Move X	0.000000								
	Move Y	0.000000								
	Move Z	0.000000								
	Rotate X	0.000000								
	Rotate Y	0.000000								
	Rotate Z	0.000000								
	Scale X	1.000000								
	Scale Y	1.000000								
	Scale Z	1.000000								
	Normal transformation									
	Space	Tangent (Mikktspace)								
	Range	0 to 1								
	Flip X coordinate	No								
t.	Flip Y coordinate	No								
± ±	Flip Z coordinate	No								
	ОК	Cancel								