

Photogrammetry exercise with 123D Catch and Meshmixer

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Requirements:

- digital camera (smart phone or tablet included)
- account on Autodesk (<https://www.123dapp.com/gopremium>, select the FREE option)
- 123D Catch
- Meshmixer

This workflow is optimised for windows desktop. If you have an Apple, Android or Windows phone or tablet, you can try 123D catch app. If you have a Mac desktop, please see our further suggestions.

Exercise:

1) Find an object that has some interesting features. Remember to avoid transparent and shiny surfaces, and look for something that has variation in shape and colour, for better results.

2) Follow the shooting tips given in the class:

Don't move the target

Have the target evenly lit

Have the target on focus in all pictures

Ensure at least 40% overlap, horizontally and vertically

Don't neglect occluded areas

Take about 30-40 pictures from different positions, drawing an imaginary circle around the object. Feel free to take more, but remember that the software we're using only processes up to 70 anyway. Before uploading the pictures, discard those that look too dark or blurry.

In 123D catch:

1) Open 123D catch and select "Create new project".

2) Log into your 123D catch account .

3) From the browsing window, select all the relevant pictures, then click "open".

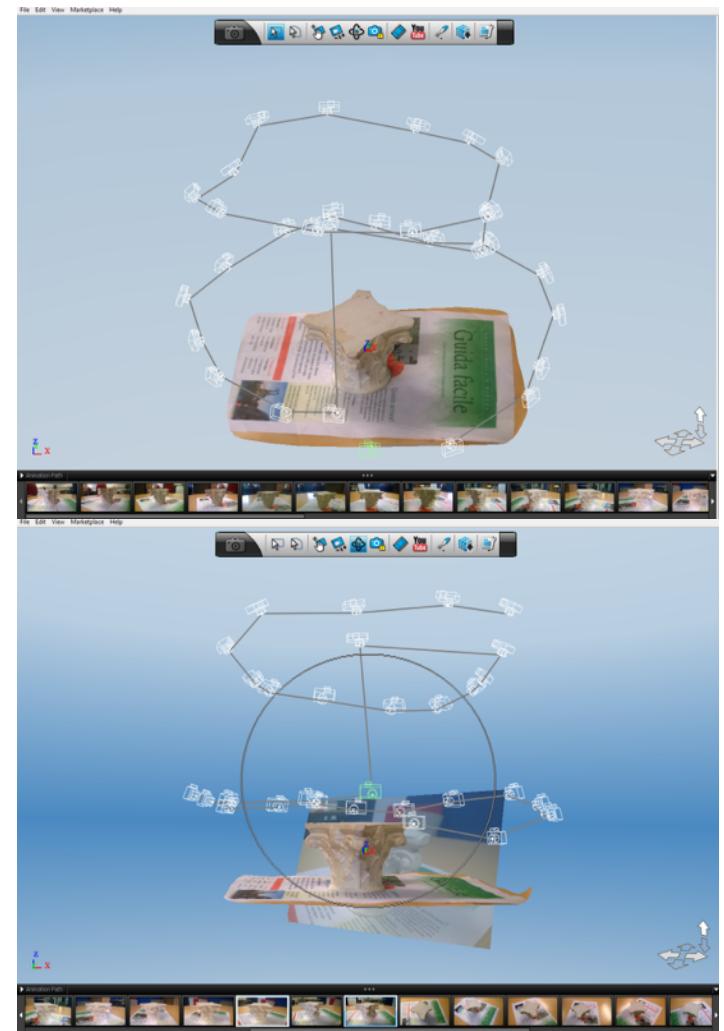
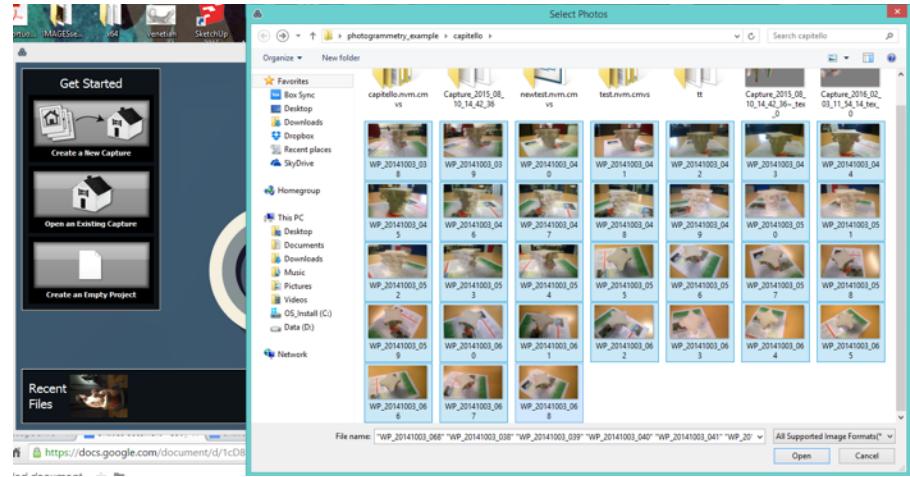


4) Now click the “Create project” button. A pop up window will ask you to enter tags for your capture. There is no way to skip this step, so, please, enter a category and a description. The file is still private, no one will see it unless you decide to publish it.

5) Click “create” on the description pop up, then wait until the upload is complete. After that, the processing of the capture will start automatically. It’s difficult to predict how long it will take. It usually spans between 5 and 20 minutes, but could take longer. It is very common that the process remains stuck for a long time (even at 0%), and then completes successfully in a couple of minutes.

6) When the process is complete, you will see a model of your capture in a new window. A graphic also shows position and angle of all the photos you’ve uploaded. If you put your cursor over any of the pictures thumbnails shown on the bottom of the window, you’ll see it in relationship to the model.

7) If your capture looks incomplete and not very satisfactory, it is likely that you’ll see a yellow triangular icon on some of the thumbnails of the pictures you uploaded. The software gives you the opportunity to identify the same reference points in different pictures. Give it a try, if you like, but this feature doesn’t work very well. If many of your photos shows with a yellow triangle, I suggest you try re-taking the pictures instead.



8) Your capture is automatically saved in your autodesk account, and you'll find it in your autodesk online gallery. If your capture crashed when it was nearly completed, it is likely that you'll be able to see it in your account anyway.

In Meshmixer:

1) Open meshmixer, and select the option “import from 123D”

2) You'll see a window with images from different galleries. Please, thick “flip z-y import” from the bottom left corner

3) Select “My projects”; you will be asked for your login again

4) Select a capture from your gallery and click “import”

5) You now have your model in Meshmixer's main window. If you see a box around your model, go to “view” and disable “show printer bed”.

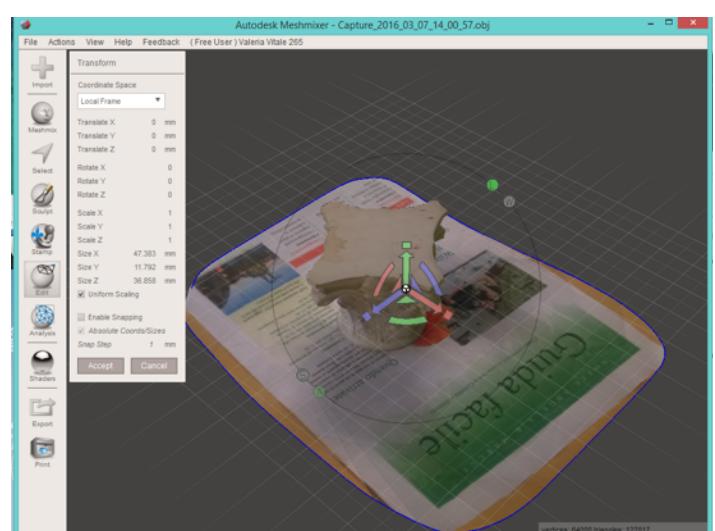
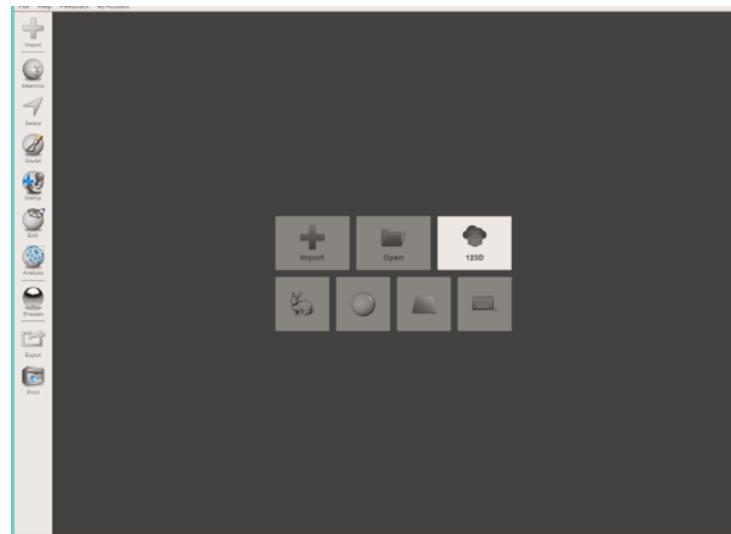
6) Remember, you can use the following shortcuts in Meshmixer:

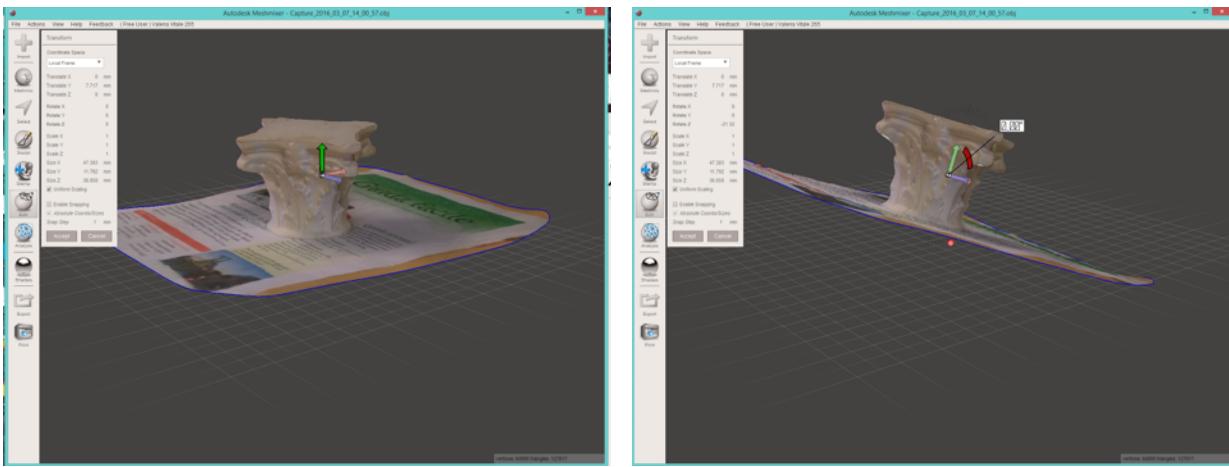
click the scroll wheel to pan

scroll to zoom

click right button to orbit

7) To move your model, select “edit” and you will see a complex gizmo with 3 coloured straight arrows and three coloured arches. The three different colours correspond to the 3 axes, x, y and z. To translate your object, click and drag on the relevant arrow. Likewise for rotating, click and move along the arch. If you don't see the arch or arrow you need, try changing the view slightly, orbiting. You can also manually enter the value for both translation and rotation, to achieve more precise results.

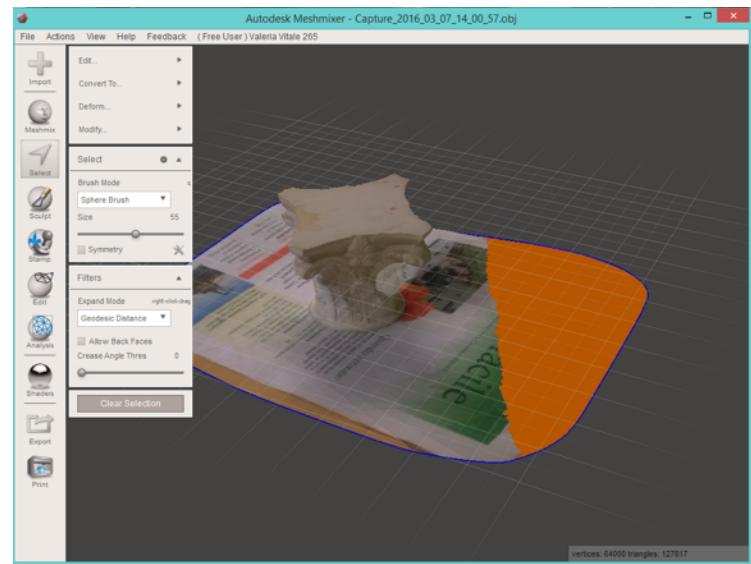




8) To delete parts of the model that you don't want, go to "select" and use the "brush" tool. You can change size and shape of the brush and proceed with your cleaning. When an area is selected it becomes orange, then you can hit delete. For larger areas, you can try using the "lasso" tool (next to the brush, on the main switch).

9) Experiment with the many Meshmixer tools to edit and touch up your capture, there are several tutorials online. You can also rely on their autorepair functions (from "analysis", select "inspector", and then "autorepair all").

10) If you want to 3D print your artefact, remember to make it solid first ("edit", then "make solid"). You'll notice that you will lose colour information, but that is not relevant anymore when you 3D print.



11) You can save your work in meshmixer, for further editing, or export it. Meshmixer allows export in the 3D exchange format "collada", that is read by almost all 3D software. If you're joining the 3D modelling class in SunoikisisDC next week, be sure to have a copy of your capture exported in collada, and ready to be imported in the 3D model we'll build then.

Suggestions for Mac users:

For photogrammetry:

Two main suggestions—(1) requires a bit more installation and familiarity with your operating system; (2) is a very simple install, but is only free for the first 30 days (after which it costs \$45 for an academic license).

VisualSFM <https://github.com/luckybulldozer/VisualSFM_OS_X_Installer>

Agisoft PhotoScan trial version <<http://www.agisoft.com/downloads/installer/>> (NB: the “demo” version of PhotoScan is free forever, but doesn’t allow export, so is not much use to us. With a “trial” license, in contrast, the software is free for 30 days only, but allows export and all other functionality for that time.)

For editing:

Meshlab <<http://meshlab.sourceforge.net/>>

If you’ve used VisualSFM to process your captures, you need to convert your point cloud into a 3D mesh in Meshlab. You can follow the workflow described in this paper <https://www.academia.edu/3649828/>

[Generating_a_Photogrammetric_model_using_VisualSFM_and_post-processing_with_Meshlab](#) or look for tutorials online.

If you’ve used Photoscan, you can perform some basic editing within the software (follow the instructions in the user’s manual http://downloads.agisoft.ru/pdf/photoscan-pro_1_0_0_en.pdf), or you can export your model as a mesh and edit it in another software such as Meshmixer or Meshlab.