ShellShaper user guide
Banded version

Jenny Larsson
jslarsson1@sheffield.ac.uk

2020-02-06

1 Preparation

- You need MATLAB (version 2018b or later) on your computer. Including the curve fitting toolbox, and image processing toolbox.
- The ShellShaper program files can be found here: `https://github.com/jslarsson/ShellShaper`
- Save this in a subfolder of the MATLAB folder.
- Prepare one folder with the shell photos, and one folder for the output.

2 Setup

1. Start MATLAB
2. Change directory to the folder where you saved the scripts and open the following file:

   `ShellShaperBands.m`

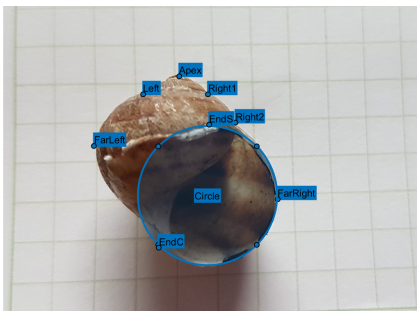
3. Change all paths of folders and files to ones that are correct for your file setup. All folders need to exist before running the program.
4. Make sure to not accidentally overwrite already existing files unless you want to. MATLAB will do this without asking for permission.

3 Running the program

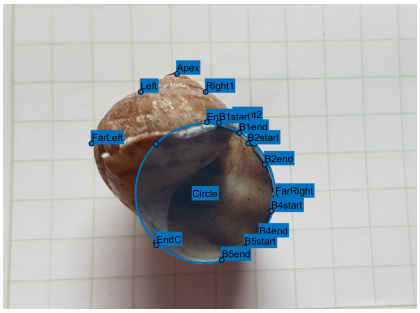
Run the program by either pressing F5 or the big green arrow button in the tool strip. Make sure to do the above setup first, and that the current directory is set to the folder containing the scripts.

1. First input is the maximum number of bands found on the shells of interest.
2. A new window opens containing an image from the selected image folder, and a dialogue box pops up asking you to select all band that are present in this specimen.
3. Click on the image to position the first point at the apex. Press enter when done.
4. Position the right and left extreme points of the latest whorls similar to figure 1b, enter will let you position the next one.
5. Position the circle, see figure 1b, press enter.
6. To get the scale correct, find a known distance using the line L, press enter, and input the value in the dialogue box, see figure 1d.
7. There will be a pink shell model on top of the image, as well as a second window opening with a grey shell model by itself. A dialogue window will open on top of the image asking if the model is good enough. You have 2 options:
    - Yes. This saves images of model and model on original image and the relevant parameters, go to next one.
    - No. This will let you reposition all the objects to find a better approximation. This will also let you rotate the model to inspect it further. Reposition until happy, when it looks good press yes in the pop-up instead.
8. The next image in the folder will open automatically, repeat procedure for this image.

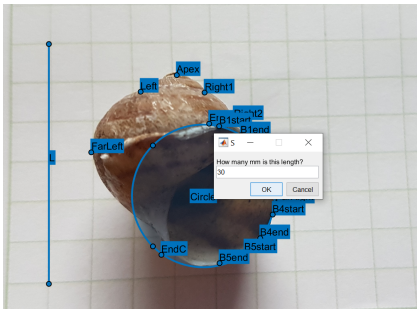
(a) Original image.



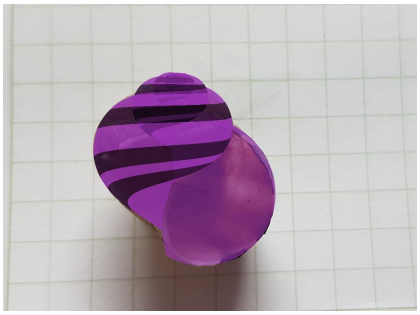
(b) Positioning the shape points.



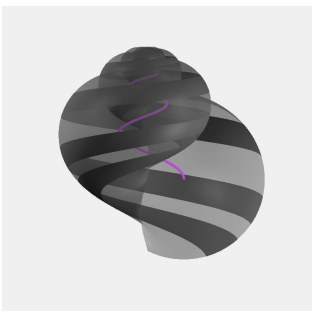
(c) Positioning the band points.



(d) Add length input.



(e) Model visualised on image.



(f) Semi-transparent model with internal spiral in pink.

Figure 1: Example of procedure. Input image (a), interactive positioning of objects (b)-(d), output images (e)-(f).