

SHERPA Quickstart Guide

The tool for “shape recognition, processing and analysis” (SHERPA) offers an image processing pipeline and workflow focused on object identification and measurement, building a foundation for extended morphometric analysis. Outlines of all depicted objects are detected and compared to a set of templates which characterize representative items. The results are ranked according to their chance of representing a relevant shape and can be exported along with a series of descriptors for further morphometric scrutiny.

SHERPA was developed with focus on analyzing micrographs of diatom valves, but the templates delivered along with it are the only analysis features specific to diatoms, so SHERPA can be used for a broad range of object classes. You will need to tailor a set of templates appropriate for your own problem, but for a quick start we will refer to diatom valves as an example.

Please note that the function for measuring costae distance is experimental, works only on few species, and is not recommended for routine use.

Please try the following to get a first impression on SHERPA’s workflow:

1. If you are unsure if somebody might have been fiddled around with the program settings, choose “Settings” from the main menu on the top and click “Reset all Settings to Defaults”. Beware, this will overwrite all custom settings already made!
2. Open “Templates” menu (top line to the left), choose “Load Folder + Subfolders” and select the directory containing the template data delivered with SHERPA (“Templates”), which depict shapes of diatom valves. Several hundred templates must be loaded, otherwise your choice was not correct.
3. Open menu “Images”, choose “Load Folder” and select the directory containing the sample data delivered with SHERPA (“Examples”).
4. Switch over to menu “Objects”. Check “Force Convexity” and click on “Analyze Contours” (big button on the right top). Analysis might take a few minutes depending on the speed of your computer.
5. When contour analysis has finished, click onto the “Show” button of the result list’s most top row. A new window will open showing a detected object (a diatom valve), its shape (highlighted red), its convex hull (highlighted blue) and its enclosing rectangle (drawn green).
6. Scroll through the results list by clicking onto “Next Contour”. Results having a “Ranking Index” (most right column of the results list) of zero to one usually are good results.

To start over with your own data, several steps have to be accomplished. This is still presuming you are analyzing diatom images, because otherwise you would have to supply your own templates and adapt validation and ranking settings according to your data, which is beyond the scope of this quickstart guide. Please refer to SHERPA’s manual and the “Guide to suitable Settings” (menu “Help”) on how to do this.

1. Choose "Adjust Micrometer Factor" from the "Settings" main menu and enter the amount of pixels corresponding to 100 μm in your image data.
2. Depending on your image data, set the appropriate type in the main menu "Images -> Configure Image Type". Brightfield (dark objects on bright background) is the default setting. If your data depicts bright objects on dark background, please switch over to "darkfield".
3. Load templates (see above). The templates delivered with SHERPA are optimized to our studies of diatom valves. To get good results for your own data, you will have to create appropriate templates (see below)!
4. Open menu "Images" and load your own valve images. Depending on how they are stored, you can load a selection of files, a complete folder or a folder plus its subfolders. Feasible image files are of formats TIF, JPG, BMP and PNG.
5. Switch over to "Objects". If you are interested in convex valves only, check "Force Convexity", otherwise uncheck "Force Convexity" as well as "Use Convexity". Click on "Analyze Contours" (big button on the right top).
6. You might have to adapt settings for contour validation (red area), otherwise valves too small will not be taken as a valid result. For accurate results, also settings concerning ranking calculation (green area) need to be optimized, but for a first impression you can work with the default values.
7. Take a deep breath, have a cup of coffee or a good lunch depending on the amount of image data you loaded.
8. Display the results by clicking on one of the "show" buttons (see above). The ranking might need improvement by defining new templates and refining the ranking parameters, please refer to the "Guide to suitable Settings" (menu "Help") on how to do this.