Radial Profile

Radial Profile Plugin Tutorial

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Python based plugin utilizing Napari in order to perform Radial Profile analysis on user-defined ROI's.

Purpose

Radial profiling refers to intensity measurements taken relative to a specified center point in an image. For each radius length, the intensity values within the ring of pixels formed at that radius are found and can be very useful for describing intensity localized around a point of interest.

Procedure

For each radius length, the ring of pixels found at that radius are binned together. Useful statistics such as Sum and Mean Intensity values can be derived from these binned pixels. Since this plugin was modeled off of the Radial Profile ImageJ plugin, the mean normalized intensity measurement at each radius is used. Effectively, this divides the sum of pixel intensities within the current ring by the number of pixels in that ring.

1. Plugin Setup

In order to run the plugin it is advised to install Anaconda or Miniconda on the desired machine. Follow the setup steps outlined on the GitHub page to properly set up a conda environment with all the necessary dependencies.

2. Running the Plugin

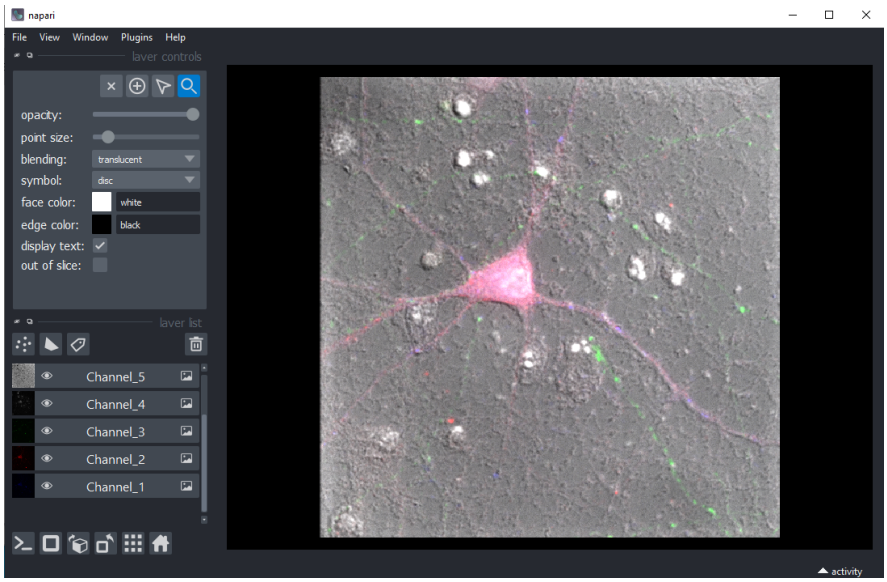
From the command line, navigate to the folder containing the plugin. Run the plugin with the command

python RunRadialProfile.py

This will open the GUI menu from which you should do each of the following:

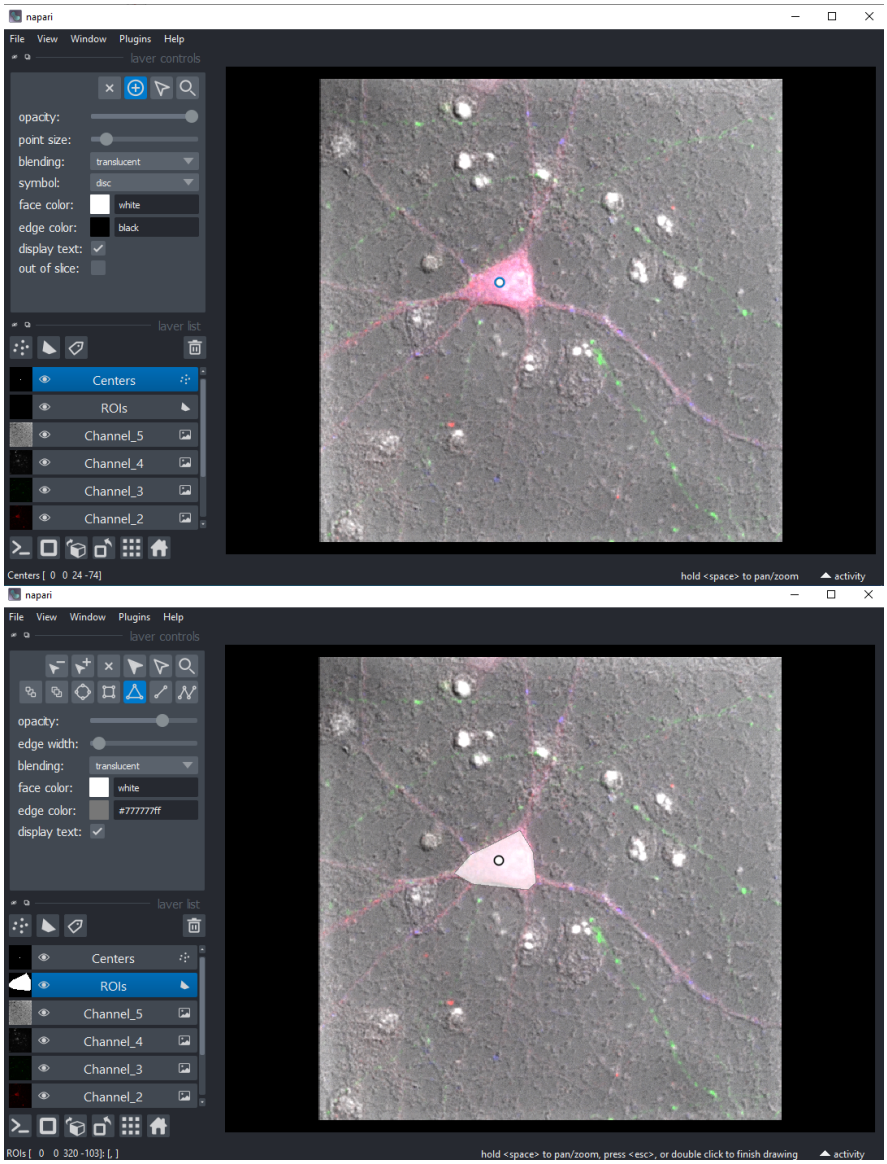
1. Specify the input image file.
2. Specify the output path. A folder named RadialProfiles containing all the generated data will be created at this path.
3. Select the samples/scenes you wish to analyze.
4. Select the channel the intensity values will be measure from.
5. Select any downstream analysis option you would like to run.
6. Click "Run" when ready. If "Run" is clicked and nothing happens, double check that all of the previous steps have been successfully finished.

Upon clicking "Run", a Napari viewer instance with the first sample/scene chosen will open.



Now you may start placing center points and ROI shapes onto the image. Use the layer named "Centers" to place and center point and "ROIs" to create ROI shapes

around these center points. You may place multiple center points and ROIs on the same image, but it is important that center points and ROIs are placed in the same order.



It is recommend to draw 1 ROI and then immediately place its center point. A less feasible but still valid approach would be to draw all ROIs and then place all center points in the SAME ORDER the ROIs were added. What CANNOT be done is creating ROI_1, create ROI_2, place ROI_2's center point and then place ROI_1's center point. This will associate ROI_2 with ROI_1's center point and vice versa.

Once satisfied, you can simply close out of the viewer instance using the red X in the top right corner. If you had previously selected multiple samples/scenes to analyze, the next scene will open and you can simply repeat the procedure just outlined. If the viewer instance you are trying to close keeps popping up after being closed, then the number of ROIs and center points differs. In this case, it is advised to clear the layers and start over unless confident in the ordering.

2.1 Output

Once the steps above are complete there should be a new folder called RadialProfiles present at the specified output path. The RadialProfiles folder contains a folder for each sample/scene in the image and each sample/scene folder contains a folder for each ROI in that sample/scene. See the README within the GitHub repository for the full list of output files.