

Instructions for ImageJ PlugIn *Alae Tracker*

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1 Introduction

ImageJ is a public available Java program to display, edit, process and analyze images. Additional functionality can be easily included by implementing user defined plugins. To use this plugin you should be familiar with basic ImageJ functionality like opening an image or place a selection/region of interest.

The ImageJ plugin described in this instruction manual provides functionality to measure and track the movement of the nasal alars and the columellar (?right words?) of a test person or patient during breathing.

2 Installing the Plugin

This plugin requires a working installation of ImageJ. For an instruction how to install ImageJ please refer to ¹ and ².

To use this plugin, a copy of the corresponding .jar-file PR_LAB.jar has to be in the plugins folder of the ImageJ installation. Example: If ImageJ is installed under C:\Programs\ImageJ put a copy the file in C:\Programs\ImageJ\plugins.

If ImageJ is currently running, the program has to be restarted. Afterwards the plugin *Alae Tracker* is available in the ImageJ **Plugins** menu and ready to use.

3 Using the PlugIn

To use this plugin an MR image sequence is required. The sequence has to show a cross section through the human head (as depicted in Fig. 1) while the test person or patient is breathing.

The image sequence then has to be loaded as an image stack into ImageJ. This can be done by dragging the folder that contains the image sequence to the ImageJ window. An other way to open the image sequence as a stack is via the menu item **File > Import > Image Sequence...** Open the first image in the corresponding folder and confirm the dialog *Sequence Options* with **OK**.

Apart from the image data, this plugin also requires a straight line selection through the nose. This line denotes the positions where the movement is observed. It should be located in the middle between the tip of the nose and the cheeks and be approximately at right angle to the columellar. Place the selection in the first image of the image stack. An example of a correct line selection

¹<http://rsbweb.nih.gov/ij/docs/index.html>

²<http://rsbweb.nih.gov/ij/download.html>



Fig. 1: Example for a cross section as required for this plugin.

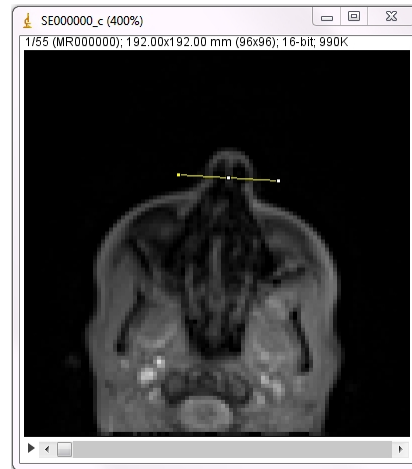


Fig. 2: Example for the required line selection.

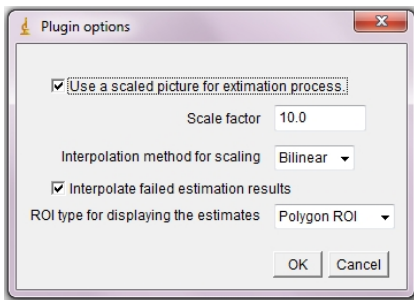


Fig. 3: Dialog window.

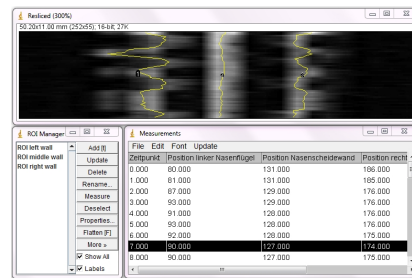


Fig. 4: Result of the tracking process is a resliced image (top), the three regions of interest (that are also displayed in the resliced image) and the corresponding measurements.

is shown in Fig. 2.

The plugin can be invoked via **Plugins > Alae Tracker**. In the now opening dialog window it can be set if the image shall be scaled for the tracking. Also the scaling factor can be adjusted. A scaled image may provide a smoother tracking result. The recommended scaling factor is 10.0. (Note to author: Maybe additional section to explain the other options. Right now they are only interesting for analyzing the plugin itself.) Press **OK** to start the measuring process.

The result of the estimation process is a *resliced* image, where each line corresponds to the line selection of one image in the stack. Furthermore a **Measurements** window is displayed as well as **ImageJ's** inherent **RoiManager**.

In the **RoiManager** three regions of interest are shown that represent the

tracked left, middle and right nasal wall in the resliced image. The **Measurements** window shows the pixel positions where the walls have been tracked as well as the distances.

If you want to correct single points of the ROI you can do this by moving the point in the image and then pressing **Update** in the ROI Manager. Please make sure that the correct ROI is selected when you do that. To update the measurements, use the menu item **Update** in the **Measurements** window.

You can export the measurements via File > Save as... as an Microsoft Excel xls-file for further evaluation. Please keep in mind that the columns *Position linker Nasenflügel*, *Position Nasenscheidewand* and *Position rechter Nasenflügel* are measured in pixels, whereas the corresponding distances are measured in millimeters.