A collection of basic plugins and functions for Fiji

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Basic plugins, functions and building blocks

The following list offers a set of Fiji functionality that can be used to help you with your image analysis problems.

The collection is divided into two parts. The first part lists complete plugins that can be used directly, no further programming required. In most cases, there is the possibility to configure the plugin to adjust its precise outcome, but this can be done by adjusting well documented values at the start of the plugin.

Functions and building blocks are partial bits of functionality that do require (a limited amount) of macro building. Mostly, the using them exists of slotting in another macro at a well-defined spot of a building block or using one or more of

the self-contained functions into your own macro.

This list is a directory in which each plugin is discussed only briefly to explain its general functionality. For each of the entries in this list, more information can be found in a plugin-specific manual that describes what the plugin does and how to use, configure, and install it.

Plugins summary

12 To 8 Bits

Converts a 16-bit image that in reality is imaged with only 12-bits of information into an 8-bit image with the correct intensity profile.

Circle Profile Plot

Create a profile plot similar to the Profile Plot function of Fiji, but based on a circle instead of a line. The user selects a center point and the plugin calculates the average value of all pixels at the same distance from that point up to a set maximum distance. The averages are than plotted against the distance.

Fill Holes Based on Size

Fill holes in a binary mask, but only fill holes below/above a given size threshold.

HistoLite Measurer

The HistoLite_Measurer uses (3DHistech) whole slide images on which the user has manually pre-selected a tissue sample to measure. A measurement of the amount of staining is performed on the area of this tissue. The plugin will process all the images within one folder and report the results per image back in one aggregate file.

Line from Points

Based on a point selection ROI, this macro gets the best-fit straight line through those points and draws it in the image as an overlay or as part of the image itself.
This macro also contains a function that does the same for any set of coordinates (i.e., not just an ROI).

Percentile Threshold

This macro will threshold your image based on a percentile setting. A maximum of the x-percentile of pixels will pass the threshold. By changing the percentile and bins settings you can control the range and precision of the threshold. Works on selections if present.

Percentile Count

This macro will suggest a threshold value for each slice in your image based on a percentile setting; i.e., a maximum of the x-percentile of pixels will pass the threshold. By changing the percentile and bins settings you can control the range and precision of the threshold.

Works on selections if present.

RGB Plot Profile

Plot profile functionality for RGB and 3 channel composite images with one plot per colour.

Select measurements from ROIs

After using Analyze Particles to generate a large set of potential areas of interest, use the multi-point selection tool to retrieve the precise set of measurements and selections.

Stack from Folder

Create a 3D image stack from separate slice images in a folder.

Plugin	Macro	Stack	Additional
12 To 8 Bits	Yes	Yes	
Circle Profile Plot	Yes	No	
Fill Holes Based on Size	Yes	No	
HistoLite Measurer	No	No	Requires the PMA.start local server and the HistoJ Lite plugin from Pathomation.
Line from Points	Yes	Yes*	* Works on a stack, but only on the current slice.
Percentile Threshold	Yes	No	
Percentile Count	Yes	Yes	
RGB Plot Profile	Yes	No*	* Works on 3 channel image (stack), but not on multi-slice or multi time-frame
Select measurements by ROIs	Yes	No	
Stack from Folder	Yes	No	

- Plugin: Name of the plugin
- Macro: Written in the Fiji macro language (true) or not (false, e.g. Java)?
- Stack: Can be applied to a image stack?
- Additional: Any prerequisites to run or other limiting remarks

Functions & Building Blocks

For users that are comfortable with writing or extending their own plugins, the following list offers a set of partial Fiji solutions.

Building blocks are macros or plugins that produce a generic functionality which still needs to be extended with more specific image analysis functionality. They are a framework that can be used as the starting point for a macro or a quick way in which to extend an existing macro by overlaying it with a control structure.

Functions, on the other hand, are small self-contained bits of functionality. There is not much of a point to run them separately, but they can be used to quickly add specific functionality to an existing macro or plugin.

Functions summary

Channel Job

This macro takes a multi-channel image, splits it and then performs a pre-defined job on a pre-defined set of those channels. Afterwards, the image is reconstructed and saved.

Conditional Results

Several examples on how to use a results table:

- Get the latest result of a Summary column.
- Get the average of all the results of a column that meet a condition.
- Remove all the results from a results table that do not meet a certain condition.

Dialog Examples

Functions to create a dialog that request for and retrieve a specific type of user input. The examples include:

- Choice: (textual) values in a drop down menu.
- Radio button: Similar to choice, but presented as a radio button group.
- Slider: A slider that allows the user to give a numerical value.
- Checkbox: A checkbox that can be marked (true) or not (false) to indicate a Boolean value.
- Checkbox group: A function that allows for grouping a set of checkbox input options. The grouping only affects the display of the checkboxes, not the values. Allows for organizing the checkboxes in rows and columns.
- Text: A field in which text can be inserted.
- Number: A field in which a number can be filled in.

Find RGB Foreground Outline

Select one channel in an RGB image and find the largest foreground area after thresholding. The outline ROI of that area is returned.

Folder With Extended Name

Create a new folder based on an existing folder source path name.

Example:
When adding the extension "_changed" a folder at "c:/data/", the result will be the creation of a folder "c:/data_changed/".

Example 2:
By adding “/results" to the existing folder "c:/data/", a subfolder "c:/data/results“ will be created.

Get Area of Deconvolution Channel

Use deconvolution to isolate a specific staining and measure the area percentage of this staining within a given ROI (or the whole image).

HistoLite Image Fetcher

This is an example plugin for Fiji that reads either a single image file or an entire folder of image files via the Pathomation PMA.start local server. The read images can then be processed as part of this plugin if so desired.

Measure Staining Percentage

This method will automatically determine an outline of the tissue in an RGB image by means of a threshold. It will then use this outline to measure the amount of staining within that outline.

Note that by setting a ROI on the image before running this method, the possible tissue outline can be restricted.

ROIs inside ROIs

This macro will use the segments of two channels. It will measure the segments of one channel as they occur within each segment of the other channel.

User Annotation

Allow the user to create a (multi-point tool) annotation and collect the coordinates.

Plugin	Function or BB?	Macro	Stack	Additional
Channel Job	BB	Yes	Yes	
Conditional Results	Function	Yes	Yes	
Dialog Examples	Function	Yes	Yes	
Find RGB Foreground Outline	Function	No	No	
Folder With Extended Name	Function	Yes	Yes	
Get Area of Deconvolution Channel	Function	No	No	
HistoLite Image Fetcher	BB	No	No	Requires the PMA.start local server and the HistoJ Lite plugin from Pathomation.
Measure Staining Percentage	Function	No	No	
ROIs inside ROIs	BB	Yes	No	
User Annotation	Function	Yes	Yes	Works on a stack or multichannel image, but only X/Y coordinates are retrieved

- Plugin: Name of the plugin
- Function or BB: Is this a configurable building block or a separate function?
- Macro: Written in the Fiji macro language (true) or not (false, e.g. Java)?
- Stack: Can be applied to a image stack?
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Work in progress

ROI Distance Measures

Measure the distance between a selected region of interest and a point or between two regions of interest.
Measures shortest/longest/mean distance.

Main issue remaining: composite ROIs which are made up out of several simple ROIs

Plugin	Full plugin	Macro	Stack	Prerequisite
ROI Distance Measures	Yes	Yes	No	