Method Workshop – IRTG 914 – wintersemester 2017/18

Image Processing and Analysis using Fiji

Summary

The course explains the concepts behind important image processing steps like rotation, changing image size (=resampling), contrast enhancements and type-conversions (e.g. 16-bit to 8-bit conversion). Knowing the concepts the students will learn the risks of these processes and will know how to process the images in a scientifically correct manner. We will further discuss how to generate publication-quality images by inspecting image quality and inserting essential image information (dimension scaling, scale bar, time-stamp, composite color images). We then will talk about how to extract quantitative data out of images to set the basis for a statistically grounded image analysis.
In the second part of the course, the students will learn how to automate processes in Fiji using the ImageJ Macro language. This will allow the students not only to save time analyzing their images but is also essential for documenting their workflows and analyzing the images in a reproducible manner.

Topics

Basics of the basic: opening images and inspecting them. Updating Fiji and installing plug-ins. Online resources about Fiji. Tips and Tricks for faster handling.
Preparation of publication-quality images: insertion of scale-bars and time stamps, creating composite color images and montages. Dos and don'ts of contrast enhancement, resizing and rotating. File formats and metadata.
Quantifications: Set measurements and measure structures of the image. Segmentation by setting a threshold value. Measure single objects by "Analyze Particles…" command. Creating a line profile.
Filters: Principle of filter kernels to smooth the image before segmentation. Removing background.

Plug-Ins: Introduction to useful plug-ins for tracking and counting of objects.

How to automate processes in Fiji = Introduction to the ImageJ Macro Language
Macro Recorder
Batch Processing
Modifying recorded functions using variables
String manipulations
Built-in Macro Functions, Arrays
Control structures (for-loops, if-statements)

Literature

Basics of Image Processing and Analysis, Kota Miura
Macro Programming in ImageJ, Kota Miura
Both documents can be (freely) downloaded at: **http://wiki.cmci.info/documents/ijcourses**

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