INVITED SPEAKER 2

Analysis in live cell imaging - ImageJ/Fiji solutions

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ImageJ and its distribution Fiji are widely-used public-domain software for live cell imaging applications. The open architecture of ImageJ/Fiji provides extensibility via recordable macros and Java plugins; this simulates the creativity of the developers and facilitates the dissemination of algorithms to the biological community. ImageJ, the defacto standard in bioimage software, federates people from different fields: biology, neuroscience, imaging science, microscopy, computer science in a community promoted by a new group: the Open Bio Image Alliance.

In this context, we present a collection of image-processing algorithms useful for microscopy and biological applications. The presentation includes intuitions and concepts of algorithms, their implementations running as ImageJ plugins and an application to biological microscopic images. We cover the image preparation (correction for drift by registration, correction for photobleaching, correction for non-uniform illumination), the image restoration (extended-of-field procedure, denoising of fluorescence images, 3D microscopy deconvolution by PSF modelling), the image analysis (feature identification, segmentation by parametric active contour, directional image analysis) and tracking of biological particles (spot tracking). Most of the plugins have been developed by researchers of the Biomedical Imaging Group at the EPFL during the past ten years. We have made them freely available and accessible to end-users.

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