

A Biologists Perspective on the Challenges in Biological Image Analysis and how the Fiji Platform Attempts to Meet them

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Abstract

Most primary data in biological research are in the form of images and recent advances in microscopy have brought about orders of magnitude increase in the volume of biological imagery. Since it is no longer possible to draw meaningful conclusions on these vast image datasets by simply inspecting them, computer assisted image analysis is increasingly becoming an indispensable tool for discovery in biological research. Several fields of computer science, in particular computer vision, deal with analysis of image data, however the biology application domain poses unique challenges necessitating adjustment of existing algorithms and development on entirely novel approaches. Therefore biologists need to engage in productive collaboration with computer scientists to enable computer assisted reasoning on top of vast biological image datasets. The necessary pre-requisite for such interdisciplinary collaboration is an Open Source software platform that offers on one hand advanced programming facilities to computer scientist and at the same time is broadly accepted by biologists. We have been, over the past few years, investing a lot of effort into making Fiji (Fiji Is Just ImageJ) such a platform that enables collaborative, interdisciplinary research in the area of biological image analysis. I will demonstrate the fruits of these efforts on applications connected to my research agenda that focuses on imaging of tissue specific gene expression patterns in developing biological systems. In particular, I will show how Fiji facilitates the acquisition, processing and analysis of massive image datasets from an emerging microscopic imaging modality, the Selective Plane Illumination Microscopy (SPIM) of large, living biological specimen.

Biography



2005 - present: Group leader at the Max Planck Institute of Molecular Cell Biology and Genetics, Dresden focusing on live imaging of gene expression patterns and evolution of gene regulation.

2000 - 2004: Postdoctoral work at the Dept. of Molecular and Cell Biology, University of California in Berkeley at the laboratory of Dr. Gerald M. Rubin focusing on functional genomics of gene expression patterns in *Drosophila* embryogenesis

1995 - 1999: PhD work at EMBL Heidelberg, Germany at the laboratory of Dr. Anne Ephrussi working on establishment of polarity during oogenesis.