BioImageXD Image Processing, Analysis and Visualization Platform

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Abstract

We present BioImageXD (manuscript under revision), a new open source software project for bioimage analysis, processing, visualization and animation, written in Python and C++. Software comparison tests show BioImageXD to be faster, more versatile, and capable of dealing with more complex image processing tasks than most other similar programs (both open source and proprietary), while remaining intuitive to use and offering a graphical user interface also for batch processing. BioImageXD aims at being a single large package for processing images inherently in 3D/4D, leveraging the power of the VTK and ITK libraries, and being suitable for high throughput applications without requiring programming skills. Thus it differs in design philosophy from projects such as ImageJ. However, as ImageJ and many other projects are highly important and useful, it would be advantageous for the projects to work together and benefit from synergy. BioImageXD has therefore been designed to be extendable and to interoperate with other open source projects, as currently exemplified by its support for VTK, ITK and the Open Microscopy Environment. This interoperability is further enhanced in the next BioImageXD version, which is currently under development. It is written in Java, supports Bio-Formats, and it is planned to interoperate with ImageJ both "externally" (by seamlessly transferring data between the two programs) and "internally" (by directly running selected ImageJ plugins). Specific attention is being paid to high throughput and performance aspects. We hope that these qualities would enable BioImageXD to play a role in the future European bioimaging software scheme.

Biography

Pasi Kankaanpää started specializing in microscopy and image processing while studying cell biology at the University of Jyväskylä in Finland. In 2001 he was one of the first to work extensively with 4D confocal microscopy of living cells in Finland. In 2005 he initiated a new open source software project, BioImageXD, for analyzing and visualizing multi-dimensional microscopy image data, aimed at solving the bioimaging bottle-neck of software unavailability. He has been the design lead and coordinator of the large, international, multi-disciplinary project since then. The software has been in active use since 2006, and is currently one of the largest and most versatile available in the field, with an extensive manuscript currently under revision. In 2005 Kankaanpää moved to the University of Turku (Turku, Finland) to pursue PhD studies, and in 2008 he became a special/senior researcher, establishing and running a new confocal and atomic force microscopy facility. In the beginning of 2012 Kankaanpää was appointed coordinator of the Cell Imaging Core facility of the Turku Centre for Biotechnology, which is one of the major imaging facilities of Northern Europe. Kankaanpää regularly visits many European universities, lecturing and teaching about microscopy and image analysis. He is also one of the key members of the Turku BioImaging umbrella organization, developing bioimaging on a national and pan-European level.