

Massive Stitcher–Integrating Plugins for New Tasks

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Abstract

The main intention of the plugin is to facilitate the assembly of a large amount of 3D stacks, taken at multiple time-points. Even though several software (MosaicJ, Stitching, Grid Assembly and TrackEM2) existed in order to perform the operation, none of them met all of the needed requirements. We are aiming for a simple to use interface that could open and manipulate typical microscopy formats (e.g. Leica LIF and Zeiss LSM files), stitch the data using acceptable memory requirements and register multiple stacks from a time-lapse experiment.

The resulting plugin is based on the assembling of several available plugins built for ImageJ, wrapped around a simple classic ImageJ interface. The LOCI BioFormats reader plugin and its metadata structure were used to extract position data, as well as selectively load planes onto memory. The Stitching of each timepoint was performed on a maximum intensity projection (MIP) of a given slice range by using code from Stephan Preibish's "Stitch Grid Collection" plugins. By adapting code from the StackReg plugin, the stitched MIPs were then registered in 2D. The stitching and registration are then propagated to the individual slices and timepoints. Memory-wise, a maximum of two complete images are simultaneously loaded, the required data and results being directly read and written to disk. This approach allows for the plane-by-plane stitching of very large datasets on desktop machines with acceptable speeds.

Keywords

Stitching, registration, plugins, ImageJ, StackReg, LOCI, microscopy