

Objective quality assessment workflow using ArgoLight slide and OMERO

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Abstract

The growing need for reliable quantitative measurements in light microscopy has been identified by the community recently and led to the creation of an initiative called Quality Assessment and Reproducibility for Instruments & Images in Light Microscopy (QUAREP-LiMI). One of the aims is to push for the creation of simple, direct, reliable and widely adoptable instrument quality controls. This serves for defect detection, continuous proof of the instrument's ability to reliably produce quality imaging data, and the possibility to compare performance across devices.

In order to assess the quality of our objectives, and therefore the quality of images, we produced a workflow for the acquisition and measurements of typical light microscope metrics using a single pattern from a commercially available ArgoLight-SIM slide.

A 39x39 ring pattern, with a central cross, is imaged. Images, hosted on an OMERO server, are analyzed with an automated Fiji pipeline. Field distortion, field uniformity and axial resolution metrics are computed, from multiple positions within the image.

In order to ease bookkeeping, OMERO database is used as a backend to store the acquired images, metadata, as well as the resulting metrics and reports. These reports in turn can be used within OMERO.Parade to follow instrument performance changes across time. This workflow is built on open-source software and will facilitate the assessment of instrument quality over time with minimal effort.