CorrectGSDIM, A SOFTWARE FOR PROCESSING OF SUPER-RESOLUTION MICROSCOPY DATA

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KEY WORDS: Super-resolution microscopy, GSDIM, STORM, image processing.

The last decade in the light microscopy field was marked by invention of super-resolution microscopy that has overcome the diffraction limit. Among other techniques, the most resolutive ones for now are stochastic-based methods reaching up to 20 nm in resolution [1]. Now the resolution is limited mostly by localization precision, sample drift and labelling density [2]. For multi-color imaging, the precision of colocalization is additionally impaired by chromatic aberrations of microscope [3]. Most of these aspects can be significantly improved through post-processing of localization data.

We introduce an interactive open-source software with a graphical user interface that allows performing processing steps for super-resolution data, such as correction of chromatic aberrations; cross-correlation-based iterative correction of drift; selection of localization events; reconstruction of super-resolution images in different modes, namely histogram, Gaussian and time-in-color; reconstruction of 3D-images; estimation of resolution by Fourier ring correlation. The software is optimized to work with eventlist tables exported from most popular localization software. The output can be saved in widespread .tiff (pictures), .png (graphs) or .ascii (tables) formats allowing further analysis or preparation of publications.

The software is designed to use exclusively localization tables as the input for both processing and calibration, which has advantage of very small size comparing to raw time-lapse acquisitions and the highest precision of the contained information comparing to reconstructed super-resolution images. The functionality of CorrectGSDIM can be easily extended to satisfy user’s needs as we provide the source code for Matlab. The software is also distributed as a compiled stand-alone application for Windows. CorrectGSDIM can be found at https://github.com/andronovl/CorrectGSDIM.