A JOINT RICHARDSON-LUCY DECONVOLUTION ALGORITHM FOR THE RECONSTRUCTION OF MULTIFOCAL STRUCTURED ILLUMINATION MICROSCOPY DATA

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ABSTRACT
We demonstrate the reconstruction of images obtained by multifocal structured illumination microscopy, MSIM [1], using a joint Richardson-Lucy, jRL-MSIM, deconvolution algorithm [2], which is based on an underlying widefield image-formation model. The method is efficient in the suppression of out-of-focus light and greatly improves image contrast and resolution. Furthermore, it is particularly well suited for the processing of noise corrupted data. The principle was verified on simulated as well as experimental data and a comparison of the jRL-MSIM approach with the standard reconstruction procedure, which is based on image scanning microscopy, ISM [3], is made. Our algorithm is efficient and freely available in a user friendly software package.

Figure 1: 3D renderings of two human red blood cells, imaged in MSIM mode. The left rendering shows the sum of all raw images to produce a widefield image; the right rendering was generated using the jRL-MSIM algorithm.

REFERENCES