Author(s) of the Contribution: Theis, F. J.; Neher, R.; Zeug, A.

Title of the Contribution: Blind decomposition of spectral imaging microscopy: A study on artificial and real test data

Abstract: Recently, we have proposed a blind source separation algorithm to separate dyes in multiply labeled fluorescence microscopy images. Applying the algorithm, we are able to successfully extract the dye distributions from the images. It thereby solves an often challenging problem since the recorded emission spectra of fluorescent dyes are environment and instrument specific. The separation algorithm is based on nonnegative matrix factorization in a Poisson noise model and works well on many samples. In some cases, however, additional cost function terms such as sparseness enhancement are necessary to arrive at a satisfactory decomposition. In this contribution we analyze the algorithm on two very well controlled real data sets. In the first case, known sources are artificially mixed in varying mixing conditions. In the second case, fluorescent beads are used to generate well behaved mixing situations. In both cases we can successfully extract the original sources. We discuss how the separation is influenced by the weight of the additional cost function terms, thereby illustrating that BSS can be vastly improved by invoking qualitative knowledge about the nature of the sources.

Page Numbers: 548-556

Publisher: Springer
Berlin

Jahr:
2009

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Mathematik > Zentrum Mathematik > M12 Mathematische Modelle biol. Systeme (Prof. Theis) > Lehrstuhl für Mathematische Modelle biol. Systeme (Prof. Theis)

entries: