Author(s): Rodrigues, I (Rodrigues, Isabel); Sanches, J (Sanches, Joao)

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Abstract: Fluorescent protein microscopy imaging is nowadays one of the most important tools in biomedical research. However, the resulting images present a low signal to noise ratio and a time intensity decay due to the photobleaching effect. This phenomenon is a consequence of the decreasing on the radiation emission efficiency of the tagging protein. This occurs because the fluorophore permanently loses its ability to fluoresce, due to photochemical reactions induced by the incident light. The Poisson multiplicative noise that corrupts these images, in addition with its quality degradation due to photobleaching, make long time biological observation processes very difficult. In this paper a denoising algorithm for Poisson data, where the photobleaching effect is explicitly taken into account, is described. The algorithm is designed in a Bayesian framework where the data fidelity term models the Poisson noise generation process as well as the exponential intensity decay caused by the photobleaching. The prior term is conceived with Gibbs priors and log-Euclidean potential functions, suitable to cope with the positivity constrained nature of the parameters to be estimated. Monte Carlo tests with synthetic data are presented to characterize the performance of the algorithm. One example with real data is included to illustrate its application.

Addresses: [Rodrigues, Isabel] Inst Super Engn Lisboa, Lisbon, Portugal

Reprint Address: Rodrigues, I, Inst Super Engn Lisboa, Lisbon, Portugal.

E-mail Address: irodrigues@isr.ist.utl.pt

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