Particle Swarm Optimization Multitensor Fitting.

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For the purpose of the ISBI HARDI reconstruction challenge 2013 and for the categories DTI and HARDI we reconstructed the data by fitting a multitensor (MT) with particle swarm optimization (PSO) [?].

The goal is to find the optimal parameters so that the MT model, $\sum_{i=0}^{N} f_i e^{-bg^t D_i g}$, fits the measured signal where D_i is a rank 2 symmetric tensor with volume fraction f_i, g the normalized gradient wavevector and b the corresponding b-value. This is accomplished by minimizing the squared error $\sum_{k=0}^{M} \left(\sum_{i=0}^{N} f_i e^{-b_k g_k^t D_i g_k} - y_k \right)$ for a fixed diffusion signal $y = \{y_k\}_{k=0}^{M}$, number of compartement N and gradient scheme $\{b_k, g_k\}_{k=0}^{M}$

The DW dataset was denoised with the adaptive nonlocal means [?] using a rician noise model. As proposed in [?], each DW images were processed independently.

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