Statistics > Applications

Bayesian Multi-Dipole Modeling of Single MEG Topographies by Adaptive Sequential Monte Carlo Samplers

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We describe a novel Bayesian approach to the estimation of neural currents from a single distribution of magnetic field, measured by magnetoencephalography. We model neural currents as an unknown number of current dipoles, and we make use of a variable dimension model for their state space. We set up a sequential Monte Carlo sampler for exploring the posterior distribution of our Bayesian model, and describe an adaptation technique that effectively balances the computational cost and the quality of the sample approximation. We assess the performance of the method by applying it to synthetic data, generated by source configurations containing up to four dipoles. We also describe the results obtained by analyzing data from a real experiment, involving somatosensory evoked fields, and compare them to those provided by three other methods.

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