

On the complexity of analyzing brain functional images with high-temporal resolution

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Abstract

Recent neuroimaging advances yield the estimation of cortical currents at the origin of electro and magnetoencephalography scalp recordings. Because this problem is highly underdetermined, this poses crucial issues in terms of modeling, estimation and optimization. We will discuss several of these aspects by introducing explicit piecewise models of brain currents and adapted procedures for optimization and statistical inference. As a consequence to high-temporal resolution, image sequences of brain activation need to be subsequently explored. We will also introduce approaches to feature extraction and analysis adapted to this problem.

Key words: Electromagnetic Brain Imaging, MEG, EEG, Current Source Models, Forward Modeling, Inverse Problems, Image Reconstruction, Source Localization, Estimation, Optimization, Statistical Inference and Appraisal.
