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EEG source localisation and cortical mapping

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We present a theoretical and numerical framework for performing source localisation and cortical mapping using EEG data with various source models. This framework is built on the idea that the problems of source localisation and cortical mapping are different aspects of the same inverse problem rather than independent inverse problems. This approach promises to improve numerical accuracy and to provide context to the numerical results obtained both for source localisation and cortical mapping. We provide theoretical results which allow the sources to be modelled as vector-fields from a wide range of functional and distributional spaces. The study of the various source models in motivated by a need to take advantage of advances in medical imaging such as diffusion MRI. This opens the possibility to restrict the support of the sources to anatomical structures of the brain that we now have access to thanks to these advances. We present numerical results to demonstrate the proposed alternating minimisation algorithm for solving the source location and cortical mapping problems simultaneously. Such an alternating minimisation procedure provides practical advantages especially in computer memory usage.

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