EEG as an imaging tool: which inverse method can successfully disentangle sources in proximity?

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Abstract
The accuracy of EEG source localization depends on the choice of the inverse method, the resolution of the forward model, and the signal to noise ratio (SNR) of the recordings. Since we are interested in disentangling sources in proximity, the goal of our study is to examine the sensitivity of spatial resolution of EEG source reconstruction to a wide variety of factors like reconstruction method, SNR, orientation, inter-dipole distance and depth of the simulated dipoles, etc.
We simulated time series to resemble waveforms of somatosensory evoked potentials. Inter-dipole distances and different dipole orientations were investigated as well as the effect of (realistic) noise. We employed both spherical and realistic head models. Source reconstruction was realized using a conventional stationary dipole model, MUSIC, self-consistent MUSIC (SC-MUSIC) algorithm, and e-LORETA. In addition to the above mentioned methods, a new approach is tested building upon the e-LORETA solution: the topography of the maximum of the e-LORETA distribution is projected out of the data before calculating the next e-LORETA inverse solution in a iterative process.
The quality of fit (or localization) was defined as the distance between the simulated point- sources and either the estimated point-sources or the activity distributions by means of the Euclidean distance or of the Earth Mover"s Distance, respectively.
As expected, inter-dipole distances played an important role in the ability of every method to disentangle the simulated sources. Overall, SC-MUSIC appeared best suited for disentangling the two simulated sources even at high-noise simulations.