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Abstract

The accurate reconstruction of deep cortical regional source activities from EEG recordings is crucial for understanding spatiotemporal cognitive processes and the origins of impairments in brain disorders. Recently, several state-of-the-art source localization algorithms have been developed that claim to outperform standard methods. However, a rigorous comparison of the strengths and weaknesses of these methods in EEG source localization has yet to be conducted. This study aims to evaluate the algorithms, namely Full Dugh, Thin Dugh, and Mackay, against standard methods, namely minimum norm and eLORETA, using a realistic head model and simulated spatially-propagated source signals. Results indicate that Thin Dugh performed superiorly in both spatial and temporal source reconstruction, followed by Mackay. Both Thin Dugh and Mackay effectively identified contributing sources and diminished the amplitudes of non-contributing sources. Additionally, we have also proven that there are serious theoretical flaws within Full Dugh algorithm through both mathematical analysis and simulation results.

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