

Licensing Opportunity

High-resolution M/EEG tomography by leveraging brain connectivity

Localizing non-invasively, with high spatial precision and signal-to-noise ratio, brain electrical source activity and related network dynamics is of highest interest for several fields in clinical neuroscience.

It is nowadays largely admitted that neural electrical activity is tightly bound to the underlying connectivity structure of the brain. There is also growing evidence supporting the notion that brain electrical activity spans only over a small subset of possible connectivity sub-networks.

CSET (Connectome spectrum electromagnetic tomography) leverages this knowledge about brain activity directly in the the source reconstruction process to improve performance.

TECH OVERVIEW

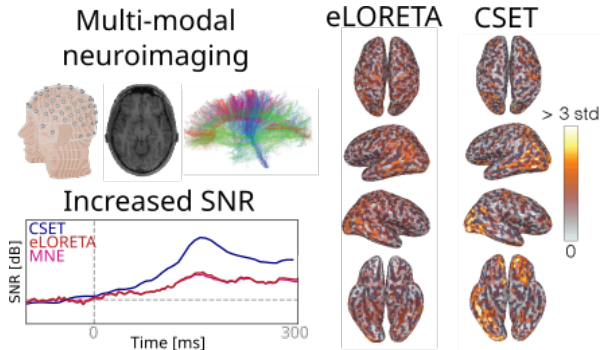
Connectome spectrum electromagnetic tomography (CSET) is a method to reconstruct an electrical source activity image of the entire brain from signals obtained from scalp sensors (M/EEG) and a brain connectivity pattern (e.g. diffusion MRI). CSET leverages *both*, - the knowledge that structural connectivity constrains functional activity of the brain and that the latter admits a parsimonious representation -, to improve significantly not only the reconstruction accuracy but also the signal-to-noise ratio of the electrical source signal and related brain network dynamics.

APPLICATIONS

In the context of refractory epilepsy, a precise localization of epileptic sources is crucial to maximize positive surgical outcome. The raising interest for brain network dynamics in field of cognitive neuroscience offers an important potential for new applications of the proposed method, in particular when it comes to the development of novel biomarkers in psychiatric illness, such as depression or dementia such as Alzheimer's.

REFERENCE

IDF 08-21



ADVANTAGES

Current available methods (M/EEG tomography) are bound to low resolution and spatially smooth solutions (e.g. eLORETA). CSET enhances:

- the spatial conspicuity and accuracy of the reconstructed brain electrical source activity image.
- the signal-to-noise ratio (SNR) of the reconstructed brain electrical source activity image.

STAGE OF DEVELOPMENT

Superior reconstruction accuracy against state of the art methods demonstrated on 20 human subjects and two different task EEG datasets. The reconstruction accuracy was computed taking the fMRI activation pattern to the same tasks as the reference.

INTELLECTUAL PROPERTY

Patent application EP21 207 375.3

"Connectome based electrical source image reconstruction"

Priority date: November 10th, 2021

Applicant: University Hospital of Lausanne

Inventors: P. Hagmann, J. Rué Queralt

KEY PUBLICATION:

Connectome spectrum electromagnetic tomography: a method to reconstruct electrical brain sources at high-spatial resolution. J. Rué Queralt et al. *Under Review* (2022)

OPPORTUNITY

PACTT is looking for industrial partners for further development and offers to grant exclusive or non-exclusive license.

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