Definition and validation of source localization methods in Stereotactical EEG recordings

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Stereotactical EEG recordings are used to characterize the epileptogenic zone in patients affected by partial epilepsy. SEEG records local field potentials from ~5 mm of cortical tissue. Recent evidence suggests that LFPs are not “so local”, and concerns arise about the geometrical resolution yielded by linear shafts. These methods call for advanced source reconstruction techniques also for intracerebral electrodes.

The aim of the thesis is to define, construct, and validate a pipeline to reconstruct neural sources from Stereotactical EEG recordings only. The project will:

- Explore state of the art forward and inverse problem solvers
- Define the set of tools that most reliably reconstruct real source locations
- Implement these tools in a standardized pipeline
- Validate the pipeline using simulated as well as real data (with and without internal stimulation)

The thesis is expected to yield a validated set of tools that are able to perform source localization starting from resting-state SEEG data.

The candidate will learn to handle publicly available source localization softwares largely used in the neuroscience community. He will also investigate the mathematical methods behind forward and inverse problem solutions (e.g. BEM and FEM-based methods or LORETA, sLORETA, and MNE). The candidate will improve his programming skill using matlab.

Biolab - Unige
Matlab

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