

An Optimization Approach for Transcranial Current Stimulation (TCS)

Proposal for a Master's Thesis Topic

Transcranial current stimulation (TCS) delivers a weak current into the brain through electrodes to modulate neural activities. TCS has been widely used to investigate how brain functions are modulated by electric stimulation. Although many studies have been proposed to determine electrode position and current intensities, there are still considerable gaps in finding a suitable set of optimal solutions.

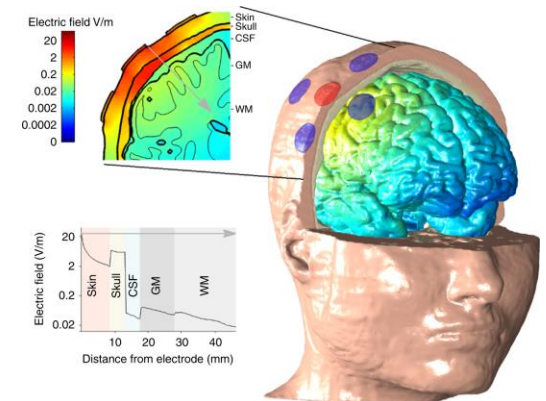
The aim of this study is to propose a computationally efficient method for the automatic determination of electrode positions. We plan to use the Finite Element Method (FEM) to calculate the electric fields in the brain regions. This electric field helps us to shape the algebraic equation we use in the optimization to find the electrode positions for a fixed stimulation intensity. In particular, the goals of this project are:

- Analyse the human brain imaging data
- Literature review on brain simulation techniques
- Design a volume conductor model of a human head
- Optimization of electrode montage

Requirements:

- Good knowledge in Signal processing and Machine Learning
- Basic knowledge of modelling and optimization
- Good skills in MATLAB/Python

Language: English



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