

# IDENTIFYING BIO-MAGNETIC SOURCES IN THE BRAIN BY MAXIMUM ENTROPY APPROACH

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## Abstract

Magnetoencephalographic (MEG) measurements record magnetic fields generated from neurons while information is being processed in the brain. Yet when one attempts to extract neurons information from MEG measurements, it shows poor spatial resolutions due to recorded magnetic field data is far less than actual numbers of neurons, which is a so called ill posed question. By selecting a proper prior distribution to address the state of knowledge of neuron distributions and treating MEG data as information of neuron activities, the question of identifying bio-magnetic source with high spatial resolution becomes the question of selecting a preferred posterior distribution for activated neuron distributions that is updated from prior according to MEG data. This is one kind of problem that extended use of method of Maximum Entropy (ME) designed to answer, a reasoning tool to update probability distributions while information in hand is in the form of constraint [1-3]. We therefore developed a strategy based on this extended use of ME and standard distributed model to identify bio-magnetic sources for noise-free problems in this work. It includes two steps, location estimation and current intensity fine tune. We investigate and demonstrate the availability of this strategy through two tests, the distinguishabilities in horizontal interval and depth of neurons distributions. The results indicate ME approach to be a promising tool in source identification problems. Some future investigations to improve upon it and conclusions are also given.

Reference:

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