Inferring the dynamic of personalized large-scale brain network models using Bayesian framework

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Despite the importance and common use of Bayesian inference in brain network modelling to understand how experimental modalities result from the dynamics of coupled neural populations, many challenges remain to be addressed in this context. The recent successful personalized strategies towards epilepsy treatment [1] motivated us to focus on Bayesian parameter estimation of Virtual Epileptic Patient (VEP) brain model. The VEP is based on personalized brain network models derived from non-invasive structural data of individual patients. Using VEP as generative model, and the recently developed Bayesian algorithms implemented in probabilistic programming languages [2], our aim is to infer the dynamics of brain network model from the patient's empirical data. We estimate the spatial dependence of excitability and provide a heat map capturing an estimate of epileptogenicity and our confidence thereof. The Bayesian framework taken in this work proposes an appropriate patient-specific strategy to infer epileptogenicity of the brain regions to improve outcomes after epilepsy surgery.

References:

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