Abstract:

There is a significant push for using parametric description of Neural Power Spectrum. In particular, one parametric model, FOOOF, has been introduced recently and it gained significant attention in the field. FOOOF algorithm suggested a parametric model to estimate Power Spectrum density of signals. However, the FOOOF algorithm provides an interesting framework to assess frequency domain time-series data; it suffers from numerous of shortages. FOOOF model is not able to provide a robust frequency estimation, control variability of parameters, and include the notion of continuity of neural signals in the model. In this research, we are introducing a Bayesian FOOOF model which addresses multiple issues of the previous model including time continuity over time, much more flexibility in controlling specific frequency bands, and also rather than providing a point estimate for each free parameter, this model will provide an posterior estimation of each parameter of the model. In addition to the method development information of this proposed model, we also develop a toolbox which can be used for lots of different kinds of time series data without having the expertise of the field. This model would be a significant endeavor in the computational neuroscience field to provide a parametric model of the Power Spectrum Density, which is very important notion in Neuroscience data analysis.

Draft of the FOOOF paper

* Literature review about frequency domain analysis
* Introducing mulititaper
* Why we should use benefit of multitaper in our model
* illustration of covariance matrix that shows covariance frequency of adjacent frequencies are related
* introducing method
* illustration of goodness of fit of our method with using synthetic data
* application of the model for real data