Generalized Gaussian model for EEG data

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Abstract

Previous analysis of electroencephalogram (EEG) data from [4] showed that stochastic modelling of EEG features can improve the explanation of variation in neurodevelopmental and cognitive outcomes of children who were affected by cerebral malaria. In our analysis, EEG increments were viewed as discrete time observations from a diffusion process with a stationary PDF based on the diffusion process construction presented in [1]. Based on the EEG increments' observations, the choice for the PDF was generalized Gaussian distribution (GGD) and the GGD parametrization was adapted from [3], which comprises both light-tailed and heavy-tailed distributions. Two versions of this model were then fit to the data. In the first model, marginal distributions were from the light-tailed GGD subfamily. In the second model, marginal distributions were heavy-tailed (Student), and the tail index was estimated using the empirical scaling function ([2]). The estimated parameters from models across EEG channels were explored as potential predictors of neurocognitive outcomes of affected children 6 months after recovering from cerebral malaria. Our analysis concludes that some of these EEG parameters were important predictors of neurodevelopment and cognition.

Acknowledgements: Z. Salinger was supported by the UK Engineering and Physical Sciences Research Council (EPSRC) Doctoral Training Partnership (project reference 2275322).

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