

Random changepoint segmented regression with smooth transition: an example with lateral amyotrophic sclerosis data

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We consider random changepoint segmented regression models to analyze data from a study conducted to verify whether treatment with stem cells may delay the onset of a symptom of amyotrophic lateral sclerosis in genetically modified mice. The proposed models capture the biological aspects of the data, accommodating a smooth transition between the periods with and without symptoms. An additional changepoint is considered to avoid negative predicted responses. Given the nonlinear nature of the model, we adapt an algorithm proposed by Muggeo et al. (2014, Statistical Modelling) to estimate the fixed parameters and to predict the random effects by fitting linear mixed models at each step. We compare the variances obtained in the final step with bootstrapped and robust ones. We also average the parameters of individually fitted models in an attempt to evaluate the difference between such “population averaged” parameters and those obtained from the proposed model which correspond to “typical subjects”, i.e. for which the random effects are null.

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