Goodness of fit test for shifted dilated regression model.

Myriam Vimond
Laboratoire de Statistique et Probabilités
Université Paul Sabatier, Toulouse III

We observe a fixed number of unknown 2π-periodic functions, we assume that the data follows the regression model:

$$Y_{ij} = f_j^*(t_{ij}) + \sigma_j^* \epsilon_{ij} \quad i = 1 \dots n_j,\ j = 1 \dots J.$$

Here, the unknown regression functions f_j are 2π-periodic and may depend nonlinearly on the known regressors $t_{ij} \in [0, 2\pi]$. The unknown error terms ϵ_{ij} are independent zero mean random variables, and σ_j^* is a fixed real number.

We propose a statistic procedure in order to test if the regression functions differ from each other by both phases and amplitude. In other words, we want to test the following null hypothesis:

$$(H_0): \qquad \forall j = 1 \dots J \ \exists (\theta_j^*, a_j^*, \upsilon_j^*) \in \mathbb{R}^3 \text{ such that } f_j^*(\cdot) = a_j^* f_1^*(\cdot - \theta_j^*) + \upsilon_j^*,$$

against

$$(H_1): \qquad \exists j \in \{1 \dots J\} \text{ such that } \forall (\theta_j, a_j, \upsilon_j) \in \mathbb{R}^3 \ f_j^*(\cdot) \neq a_j f_1^*(\cdot - \theta_j) + \upsilon_j.$$

Since the limit distribution of the test statistic under the null hypothesis is complex, we use a bootstrap procedure. The test procedure is illustrated on EEG data.