Seminars

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January 18, 2023

Contents

Lecture 1: Functional data analysis methods for large scale physical activity studies

2023-01-18

1.1 Additive functional Cox Model

$$\log \lambda_i(t|\boldsymbol{Z}_i, \boldsymbol{X}_i) = \log \lambda_0(t) + \boldsymbol{Z}_i^\top \boldsymbol{\beta} + \int_{\mathcal{S}} X_i(s)\gamma(s)\,\mathrm{d}s,$$

need to improve the linear assumption by extending it into an additive model

$$\log \lambda_i(t|\boldsymbol{Z}_i, \boldsymbol{X}_i) = \log \lambda_0(t) + \boldsymbol{Z}_i^\top \boldsymbol{\beta} + \int_{\mathcal{S}} F\left[s, h_{is}\left(X_i(s)\right)\right]\,\mathrm{d}s,$$

where h_{is} is a pre-specified transformation of the data. Use the **quantile transformation** so that the data spans the space better. As for the quantile transformation, instead of using the naive transformation

$$\widehat{\mathbb{P}}(\ldots),$$

they use a quantile regression approach. In order to estimate the nonlinear term, they use bivariate penalized splines to obtain a simple application.

› Fast multilevel functional PCA (Cui et al., 2022)

References

Cui, E. et al. (2022). «Fast Multilevel Functional Principal Component Analysis». In: *Journal of Computational and Graphical Statistics* 0.0, 1–12.