

Periodic Trends, Non-Periodic Trends, and Their Interactions in Longitudinal and Functional Data

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Abstract

A functional data analysis model is developed for longitudinal and functional data that reflect both periodic and long-term trends. Moreover, the model examines long-term changes in the periodic trends themselves.

Longitudinal data that reflect cyclicity are measurements taken over a long time series with a period (a day, a week, or a year) over which the data tend to repeat themselves. These cyclical effects often also change systematically over time. Thus, the model explores the smooth long-term trend, cyclical effects, and the interaction between periodic and long-term trends in these data.

An example would be the application of the model to a set of longitudinal personality data collected daily over a 20-day period to study the cyclical patterns in the expression of four interpersonal behaviors, the changes of these patterns over time, and the interaction between periodic and non-periodic trends in our interpersonal behaviors.

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