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Antedependence Models for Longitudinal Nonstationary Data

Antedependence models are useful, albeit underutilized, generalizations of well-known stationary autoregressive models for longitudinal data. Like stationary autoregressive models, antedependence models specify parsimonious parametric forms for the conditional mean and variance of each observation, given all the observations preceding it from the same subject. However, antedependence models differ by allowing these parametric forms to change over the course of the longitudinal study. This makes them much more flexible than their stationary autoregressive counterparts and hence, as a result, they are often able to fit longitudinal data exhibiting nonstationary characteristics (e.g., increasing variances or same-lag correlations that change over time) quite well. We motivate these models and show where they sit in the broad spectrum of statistical models used for longitudinal data analysis. We begin by describing some important features common to many longitudinal data sets, especially the tendency for observations from the same subject to be correlated. We then briefly review how various classical methods for continuous longitudinal data analysis and a more modern parametric modelling approach deal with these correlations. Next, antedependence models, as well as other alternative not commonly used models, are very briefly described. Finally, two real data sets are used to motivate their usefulness.