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Multivariate Longitudinal Data Analysis Using Hidden Markov Models

Extending hidden Markov models (HMMs) to include random effects to describe subject-specific differences between HMM processes have allowed for effective modeling of longitudinal data in several disease areas. We propose further extensions to such models to accommodate multivariate longitudinal data of mixed data types. This approach was motivated by a smoking cessation clinical trial where subjects are monitored longitudinally using several distinct measures of smoking status. Under such models, the inclusion of hidden states describes heterogeneity due to changes in disease state (e.g. abstinence, smoking). The advantages and consequences of using such models will also be discussed.