World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:13, No:03, 2019

Joint Modeling of Longitudinal and Time-To-Event Data with Latent Variable

Authors : Xinyuan Y. Song, Kai Kang

Abstract : Joint models for analyzing longitudinal and survival data are widely used to investigate the relationship between a failure time process and time-variant predictors. A common assumption in conventional joint models in the survival analysis literature is that all predictors are observable. However, this assumption may not always be supported because unobservable traits, namely, latent variables, which are indirectly observable and should be measured through multiple observed variables, are commonly encountered in the medical, behavioral, and financial research settings. In this study, a joint modeling approach to deal with this feature is proposed. The proposed model comprises three parts. The first part is a dynamic factor analysis model for characterizing latent variables through multiple observed indicators over time. The second part is a random coefficient trajectory model for describing the individual trajectories of latent variables. The third part is a proportional hazard model for examining the effects of time-invariant predictors and the longitudinal trajectories of time-variant latent risk factors on hazards of interest. A Bayesian approach coupled with a Markov chain Monte Carlo algorithm to perform statistical inference. An application of the proposed joint model to a study on the Alzheimer's disease neuroimaging Initiative is presented.

Keywords : Bayesian analysis, joint model, longitudinal data, time-to-event data
Conference Title : ICSS 2019 : International Conference on Statistical Sciences
Conference Location : Dubai, United Arab Emirates
Conference Dates : March 21-22, 2019