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数学与统计学院学术报告

A factor-augmented regression approach to learning bivariate interval-censored data

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摘 要: Comorbidity, such as the coexistence of hypertension and diabetes, poses a major challenge in modern medicine, as it reflects the systemic and holistic nature of human health. Understanding the latent risk factors underlying comorbidity is essential for the prevention and treatment of diseases from a more comprehensive and integrated perspective. In real-life disease surveillance, comorbidity occurrence is often monitored through periodic examinations, leading to the frequent emergence of bivariate interval-censored data. In this article, we propose a generalized exploratory factor analysis model within a likelihood-based framework and integrate it with a class of time-to-event frailty models. This joint modeling framework enables the extraction of latent factors from various types of covariates while simultaneously assessing their effects on bivariate interval-censored failure events. We focus on nonparametric maximum likelihood estimation and develop an expectation-maximization algorithm to achieve reliable and efficient implementation. Sufficient conditions for model identifiability are established, and the asymptotic properties of the proposed estimators are derived. The proposed method demonstrates satisfactory performance in simulation studies and is further applied to a real-world data analysis of Type 2 diabetes, showing its desirable abilities in addressing the multicollinearity issue and uncovering the latent covariate structure.

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