Marginalized Two-Part Joint Models for Generalized Gamma Family of Distributions

Authors : Mohadeseh Shojaei Shahrokhabadi, Ding-Geng (Din) Chen

Abstract : Positive continuous outcomes with a substantial number of zero values and incomplete longitudinal follow-up are quite common in medical cost data. To jointly model semi-continuous longitudinal cost data and survival data and to provide marginalized covariate effect estimates, a marginalized two-part joint model (MTJM) has been developed for outcome variables with lognormal distributions. In this paper, we propose MTJM models for outcome variables from a generalized gamma (GG) family of distributions. The GG distribution constitutes a general family that includes approximately all of the most frequently used distributions like the Gamma, Exponential, Weibull, and Log Normal. In the proposed MTJM-GG model, the conditional mean from a conventional two-part model with a three-parameter GG distribution is parameterized to provide the marginal interpretation for regression coefficients. In addition, MTJM-gamma and MTJM-Weibull are developed as special cases of MTJM-GG. To illustrate the applicability of the MTJM-GG, we applied the model to a set of real electronic health record data recently collected in Iran, and we provided SAS code for application. The simulation results showed that when the outcome distribution is unknown or misspecified, which is usually the case in real data sets, the MTJM-GG consistently outperforms other models. The GG family of distribution facilitates estimating a model with improved fit over the MTJM-gamma, standard Weibull, or Log-Normal distributions.

Keywords : marginalized two-part model, zero-inflated, right-skewed, semi-continuous, generalized gamma
Conference Title : ICASA 2021 : International Conference on Applied Statistics and Analytics
Conference Location : Cape Town, South Africa
Conference Dates : November 04-05, 2021