BAYESIAN MODELING OF SPATIALLY CLUSTERED SURVIVAL DATA UNDER CURE FRACTION

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Resumen

This paper proposes a Bayesian hierarchical cure rate survival model for right censored spatially clustered time to event data. Spatial variability components, cure possibilities, and the changes over time of the survival curve have been of paramount interest to researchers and public health decision makers. Research addressing each of these factors have been done independently. A comprehensive survival model for spatially clustered data that integrates cure rates has a broad applicability in clinical and nonclinical settings. We consider a mixture cure rate model framework. The cure rate and the survival function for uncured subjects are modeled with covariates. A flexible family of (semi)parametric baseline hazard functions is proposed using a grid defined by join-point parameters similar to the ones used in join-point regression models. The spatial correlation structure is introduced in the form of spatial frailties defined on a pre-specified map of interest. We use the log of the pseudo-marginal likelihood (LMPL) to select the best model across a broad collection of high-dimensional family of hierarchical models. We obtain the usual posterior estimates, smoothed by regional level maps of spatial frailties and cure rates.

A simulation study demonstrates that the parameters of the models that account for spatial correlation have smaller relative biases and MSE and higher coverage than the ones obtained using a simple frailty models. Finally, we apply our methodology to Hodgkins Lymphoma cancer survival times for patients diagnosed in SEERs centers across the state of Connecticut between 1988 and 2003, and with follow up time until 2008. We investigate the effect of several covariates on the cure rates and survival times distribution of the uncured patients. Although, we illustrate our methodology with a survival data set, the proposed work offers useful contributions to general time to event analysis and methodology.