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Tree-based modeling of time-varying coefficients in discrete time-to-event models. (English)

Zbl 1458.62219

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Summary: Hazard models are popular tools for the modeling of discrete time-to-event data. In particular two approaches for modeling time dependent effects are in common use. The more traditional one assumes a linear predictor with effects of explanatory variables being constant over time. The more flexible approach uses the class of semiparametric models that allow the effects of the explanatory variables to vary smoothly over time. The approach considered here is in between these modeling strategies. It assumes that the effects of the explanatory variables are piecewise constant. It allows, in particular, to evaluate at which time points the effect strength changes and is able to approximate quite complex variations of the change of effects in a simple way. A tree-based method is proposed for modeling the piecewise constant time-varying coefficients, which is embedded into the framework of varying-coefficient models. One important feature of the approach is that it automatically selects the relevant explanatory variables and no separate variable selection procedure is needed. The properties of the method are investigated in several simulation studies and its usefulness is demonstrated by considering two real-world applications.

MSC:

62N02 Estimation in survival analysis and censored data

62J02 General nonlinear regression

62G08 Nonparametric regression and quantile regression

62P10 Applications of statistics to biology and medical sciences; meta analysis

Keywords:

discrete time-to-event data; time-varying coefficients; recursive partitioning; semiparametric regression; survival analysis

Software:

discSurv; mgcv; gamair; VGAM

Full Text: DOI

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