

Bayesian approaches to analyzing competing and semi-competing risks data

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Abstract

The topic of analyzing time-to-event data where individuals are subjected to multiple risks for the event occurrence has been well-studied for decades. In this framework a particular case that has received lion's share of attention is when the event is caused by the earliest onset of a cause, known as the case of competing risks. Earlier work in competing risks analysis utilized a series system (observing the minimum of several lifetimes) formulation in terms of latent event times. It is well known that such a formulation is fraught with the issue of identifiability, unless one can assume the different causes to act independently. In recent times, substantial efforts have been made to formulate a model that has direct links to the observables and avoids imposing a dependence structure on the causes. We present two scenarios arising in the context of analyzing competing risks data. The first focuses on the premise where the exact cause of the event may only be known partially, necessitating methodologies appropriate for handling missing data. The second deals with dependent censoring that acts as a competing risk to the main event of interest that is recurrent in nature. We shall conclude with some highlight of the difficulties of dependent competing risks formulation in general.