The conditional C-index for survival data with a cure fraction

Juan Carlos Pardo-Fernández[1], Bo Han[2] and Ingrid Van Keilegom[3]

[1]Department of Statistics and Operations Research and CITMAga, Universidade de Vigo, Spain
[2]School of Mathematics and Statistics, Yunnan University, China
[3]Research Centre for Operations Research and Statistics, KU Leuven, Belgium

Abstract

When analyzing survival data, it often occurs that some individuals never experience the event of interest. These individuals are called cured and cure models are then used to take into account this situation. In particular, in this talk we will consider a mixture cure model, which combines the probability of being uncured (also called incidence) and the survival function of the uncured patients (also called latency).

In practice, risk scoring systems of latency and incidence are crucial elements for identifying relevant biomarkers and treatment strategies. Concordance measures that discriminate higher-risk subjects from lower-risk subjects are valuable tools to evaluate the overall performance of risk scoring systems. In contrast to conventional concordance measures, conditional concordance measures are proposed in this talk to provide comprehensive assessment of fitted cure models for particular values of a set of covariates. Specifically, we will consider the conditional version of the *concordance index* or *C-index* to evaluate the discrimination capacity of risk factors for both the latency and the incidence.

Non- and semi-parametric modelling strategies are proposed to estimate and perform inferences about the conditional C-index. Simulation studies demonstrate that our proposal has a promising performance in finite samples. An application to real data is presented for illustrating the methodology.