

Cure rate models: a review of recent progress with a study of change-point cure models when cured is partially known

Abstract

In medicine and public health researches, survival cure models are widely used to analyse time-to-event data in which some subjects are reasonably believed to be medically cured. In general, there are two types of models for estimation of the cure fraction. The first one is the Mixture Cure Model (MCM), which was developed by Boag in 1949. This type of models assumes that the whole population is composed of susceptible subjects and cured subjects. The second cure model type was proposed by Yakovlev et al. (1993) based on the assumption that the treatment leaves the patient with a number of cancer cells, which may grow slowly over time and produce a detectable recurrence of cancer. It is known as the Non-Mixture Cure Model (NMCM). These two models are related and the NMCM can be transformed into the MCM, when the cure fraction specially specified. Different parametric and semi-parametric estimation methods for model parameters in both types have been proposed and many applications of these models have been reported. The extensions of the cure model focus on study of change point effects on the cure or hazard rate. A change point cure model is proposed when cured is partially known.

Keyword: Cure rate models; Mixture cure model; Non-mixture cure model; Change point models