

Title. Cure Models

Abstract. With the advancement in medical technology, more and more patients, after going through a cancer treatment (or for other serious diseases, as a matter of fact), tend to live a long life, free of cancer. If one were to model the lifetimes of these individuals after the treatment, then one has to duly account for such long-term survivors. Models that are intended for this purpose are called "cure models" or "long-term survival models". Such models have become very popular in the last decade or two, and have been used in many different contexts, including biostatistics, finance, demography, reliability theory, etc.

In this talk, I will first introduce a basic mixture cure rate model as it was originally introduced in 1950s. After that, I will formulate cure rate model in the context of competing risks and present some flexible families of cure rate models. I will then describe various inferential results for these models. Next, as a two-stage model, I will present destructive cure rate models and discuss inferential methods for it. In the final part of the talk, I will discuss various other extensions and generalizations of these models and the associated inferential methods. All the models and inferential methods will be illustrated with simulation studies as well as some well-known melanoma data sets from the literature. While discussing inference, likelihood method based on EM algorithm will be focused as a natural method of fit of these models. Some steps of this method will be described in detail as well.