A BAYESIAN APPROACH TO THE CONSTANT HAZARD MODEL WITH A CHANGE POINT AND AN APPLICATION TO BREAST CANCER DATA

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Abstract

In this paper, a Bayesian approach to the problem of constant hazard with a change point is considered using noninformative priors. We apply the model to a data set gathered from a group of patients with breast cancer.

Keywords: Change point, Constant hazard, Hazard rate, Bayesian analysis.

1. Introduction

The distribution of survival times is usually described or characterized in terms of three functions:

(1) The survival function,
(2) The probability density function, and
(3) The hazard function.

These three functions are mathematically equivalent - if one of them is given, the other two can be derived [3,4,5].

Our aim in this study is to consider the constant hazard model with a change point and use Bayesian analysis to estimate the parameters in this model. We also consider an application with real data.

Often, researches in the medical area are interested in constant hazard models involving a single change point. Let $T$ be a random variable representing the time to some event, the constant hazard model with change point is given by:

\begin{equation}
\label{eq:1.1}
h(t) = \begin{cases} 
\lambda & t \leq \tau \\
\rho & t > \tau 
\end{cases},
\end{equation}

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