

The Proportional Hazards Regression Model with Unknown Link Function

Abstract

The Cox proportional hazards model usually assumes that the relationship between the log-hazard function and the covariate variables is linear. However, many times this assumption may be violated and a nonlinear relationship may be more appropriate. We consider the proportional hazards model with an unknown link function. We propose a method to estimate the link function and the regression parameters simultaneously by first approximating the link function by a spline and then employing the maximum partial likelihood estimation. Using the specific structure of the model, an iterative, computationally efficient algorithm is developed to implement the proposed method. Simulation study shows that this method is robust to the unknown link function. We also illustrate our method by applying it to the Primary Biliary Cirrhosis and VA Lung Cancer data sets.