

Exercises 6

Kalbfleisch and Prentice (2002, p. 71-74) illustrate parametric survival models with “Veterans administration lung cancer trial” data set. In this trial, males with advanced inoperable lung cancer were randomised to either a standard or test chemotherapy. In addition to treatment status the data set includes several factors for which the analysis has to be adjusted. The data set can be found from the R `survival` package.

1. (Veterans administration lung cancer trial) Plot a histogram of the non-censored survival times. Fit both exponential and Weibull survival models for the data, using the `survreg` function of the survival package. In addition to treatment status, adjust the analysis with performance status, disease duration, age, prior therapy status and cell type. Note that `survreg` uses somewhat unusual parametrization, so the estimated effects have to be interpreted with respect to survival time instead of hazard rates. The relationship to the Weibull parametrization given in the lecture notes formula (95) is: intercept $\alpha = \log \lambda$, scale $\sigma = 1/\nu$. Regression coefficients are given by $\beta^* = -\sigma\beta$, where β are coefficients in a proportional hazards model.
2. (Veterans administration lung cancer trial) Obtain a likelihood ratio test for the null hypothesis that exponential regression model is adequate for these data. A (Wald) test for this hypothesis is also given in the summary output of the Weibull regression (find where).
3. (Veterans administration lung cancer trial) Kalbfleisch and Prentice (2002, p. 78) suggest that the survival time distribution may be different for individuals with and without prior therapy. Fit separate Weibull models by the prior therapy status and obtain likelihood ratio test for the null hypothesis that the two models are same.
4. (Third Party Motor Insurance in Sweden) Write a statistical analysis plan for “Third Party Motor Insurance in Sweden” data <http://www.statsci.org/data/general/motorins.html>. Try to use the style of scientific articles.
5. (Third Party Motor Insurance in Sweden) Carry out the analysis according to your plan. Revise the plan if needed.