SURVIVAL ANALYSIS - COMPUTER ASSIGNMENT 2

Description

This computer assignment may be solved using any program language and/or software package that you find suitable. If you do not have any preference or do not know which to choose, the recommendation is to use `R`.

It is ok to do the assignment in groups, but the group size must not be greater than three.

Things to do:

- Generate $n = 200$ Weibull distributed random numbers given by the density

$$f(t; a, b) = \frac{a}{b}(\frac{t}{b})^{a-1} \exp\{-(\frac{t}{b})^a\},\ t, a, b \geq 0,$$

  with $a = 5.5$ and $b = 22.5$ and denote these by $T_i^{(1)}, i = 1, \ldots, n$, corresponding to life times of group 1.
- Generate $m = 100$ Weibull distributed random numbers with parameters $a = 4.5$ and $b = 28$ and denote these by $T_i^{(2)}, i = 1, \ldots, m$, corresponding to life times of group 2.
- Add (possible) independent censoring per individual and let the distribution of censoring times for both groups be uniform on $[20, 60]$.
- Make separate Nelson-Aalen estimates for the two groups.
- Carry out a logrank test for testing that the cumulative hazards are not equal between the two groups.
- Fit a Cox regression model to the two group setting above and test the regression coefficient.
- Estimate survival curves for the two groups using Kaplan-Meier.
- Estimate survival curves for the two groups using the Cox-model.
- Redo the above when the censoring time distribution for group 2 is uniform on $[30, 60]$.

Questions to Answer

- Since you know that data is generated using certain Weibull distributions, you know whether or not the proportional hazards assumption is fulfilled - can you based on the Nelson-Aalen (or Kaplan-Meier) estimates say something about the assumption regarding proportional hazard?
- What does the logrank test say?
- Is there a difference between the two groups with respect to estimated regression coefficients?
- Comment on the comparison between the Kaplan-Meier curves and the Cox-curves.
- What is the effect of that the censoring is group dependent?

Report

A short written report (preferably not more than 5 pages) shall be submitted as a single pdf file using the submission tool on the course homepage. It is important that the report is submitted using the online submission tool, since this tool uses automatic plagiarism detection.

Note that the report shall

- only contain graphs/figures that are clearly referenced in the text and which are central to your argumentation – make sure that all figures, including captions and axis labels are *possible to read*,
- not contain any source code, but be prepared to supply code if asked for,
- be submitted by *one* of the group members – make sure that all group member's names are written on the front page of the report.