Course work IV:
Analysis of divorce data

EHA September 1 - 25, 2015

1. Piecewise constant hazards: Consider a partition $0 = t_0 < t_1 < t_2 < \ldots < t_K = \tau$ of the study time interval $[0, \tau]$ into K subintervals, and assume (as an approximation) that $\alpha(t)$ is constant (say θ_k in the kth interval) over each of the subintervals. Give a general single expression of $\alpha(t)$ in terms of θ_k and the intervals. Derive the maximum likelihood estimator of θ_k, $k = 1, \ldots, K$. Also, give an estimator of the corresponding survival function.

2. The data set divorcedata-tab.csv gives the numbers of divorces and existing marriages by duration of marriages for marriages contracted in Norway in 1960, 1970, and 1980. The numbers of existing marriages are approximations obtained by disregarding mortality and emigration. (Table 5.2, page 221 of Aalen et al., 2008)

    What is the study time in this example?

    Assuming piecewise constant divorce rate over one-year period, obtain divorce rates for the three cohorts 1960, 1970, 1980. Present the results graphically and interpret.

    Also, plot the survival of marriages for the three years.

    {Hint: For population data, we approximate the total observation time in a one-year interval by the average of the number married at the beginning and at the end of the interval.}

References

Aalen, O, Borgan, Gjessing, H. *Survival and Event History Analysis*. Springer-Verlag, (2008).