Book Reviews

Lawless, J. F.: Statistical Models and Methods for Lifetime Data. Wiley, New York 1982, XI + 580 pp.

Although the recent surge of interest in statistical methods for the analysis of failure time/life-time/survival data has been prompted largely by applications in medical statistics, engineering reliability problems have always been a major stimulus to the development of these techniques. Professor Lawless has written a substantial text which draws examples from both these areas, but his choice of material gives a greater emphasis to the engineering applications. Parametric analysis of censored samples from the exponential, Weibull, gamma and log-normal distributions is especially well treated. The proportional hazard model of D R Cox is also discussed in some detail. Time dependent covariates receive little attention, which is perhaps unfortunate in view of their importance in some applications and the conceptual difficulties over their interpretation. Other topics considered include goodness-of-fit tests, and multivariate and stochastic process models.

Valuable features of the book include the many exercises and numerical examples, a long bibliography and subject and author indexes. I noticed few slips, although the discussion of Example 4.2.1 (p. 175,6) appears to be slightly in error and $\hat{\lambda}$ and $\hat{k}$ have been interchanged at one point on p. 245.

The wealth of special techniques presented may make the book a little overpowering to students with no previous familiarity with the subject, although the author does indicate some sections which could be omitted on first reading. The comprehensive nature of the treatment ensures that the book will be an essential reference for all workers in this field.

London

D. Oakes

Dik, J.J.: Test for Preference. DFL 20.90.

This monograph treats a stochastic model where n individuals are making mutually independent choices from a collection of k objects. Moreover, these choices are independently taking place on m days. The present study concerns in particular the detection of differences of preferences which may change in time. To be more precise let $p_{ij}^{(\nu)}$ denote the probability that the ν -th individual selected the j -th object on the i -th day. Then, for testing the differences of preferences among the individuals the null-hypothesis is formulated by the property that $p_{ij}^{(1)} = p_{ij}^{(2)} = \dots = p_{ij}^{(n)}$ for all $i = 1, \dots, m$ and $j = 1, \dots, k$. Thus under the null-hypothesis the individuals have the same preferences (or aversions) for each object. The author suggests test-statistics of the quadratic form $t' Q t$ where t is a distribution-free statistic under the null-hypothesis and Q may vary over all non-negative definite matrices.

The chapters 1–3 contain examples, preliminary explanations and the main technical tools. Some of the auxiliary results are of interest in its own right and concern the general inverse of a matrix and the distribution of quadratic forms of normal random variables. Further theoretical motivation for the choice of quadratic forms $t' Q t$ can be found in chapter 8. The asymptotic theory – for m going to infinity – is developed in the chapters 4 and 5. The asymptotic results concern the consistency, the asymptotic power and the asymptotic relative efficiency of tests with respect to fixed and local alternatives. The asymptotic relative efficiency also depends on the rejection probability and the different alternatives. It seems not to be possible to single out an optimal test (in other words, an optimal matrix Q) as far as overall properties are concerned. Therefore, mostly motivated by intuitive arguments, a χ^2 -type test-statistic is recommended for practical use (chapter 6). The recommendation is supported by Monte Carlo results which are given in chapter 9. Finally, several formulas for the expectation and variance of test-statistics are contained in chapter 8.

Siegen

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