CONFIDENCE INTERVALS IN SURVIVAL ANALYSIS

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ABSTRACT

In obtaining confidence interval for the survivor function using Greenwood's formula and in performing log-rank test for comparing the survivor functions of two groups of individuals, only the information given by the first two moments of the relevant statistics are used. Presently we show that by incorporating the information given by the third and fourth moments of the statistics, the performance of the confidence interval and statistical test can be improved.

When the survivor function can be described by the Weibull distribution, the knowledge regarding the survivor function can be obtained through the estimation of the Weibull scale and shape parameters and the Weibull quantiles. In the present work we use the method based on hypothesis testing to construct confidence intervals for these parameters. In implementing the procedure based on hypothesis testing, we have made use of the distribution of the relevant statistic evaluated at a value of the parameter vector which satisfies the conditions under the null hypothesis and yet is nearest to the estimated parameter vector. It is found that compared to the bootstrap confidence intervals, the confidence intervals based on hypothesis testing tend to perform better.

ABSTRAK

Dalam proses untuk mencari selang keyakinan bagi fungsi masa hidup dengan menggunakan formula Greenwood dan melakukan ujian log-rank bagi membandingkan fungsi masa hidup daripada dua kumpulan individu berasingan, maklumat yang digunakan adalah momen pertama dan kedua bagi statistik berkenaan. Kini, dengan menggunakan momen ketiga dan keempat bagi statistik berkenaan, ditunjukkan bahawa prestasi selang keyakinan dan ujian berstatistik boleh dipertingkatkan.

Ketika fungsi masa hidup dapat ditentukan dengan menggunakan taburan Weibull, pengetahuan tentang fungsi masa hidup dapat diperolehi melalui anggaran bagi parameter skala, parameter bentuk dan kuantil untuk taburan Weibull. Dalam kajian kini, kaedah berdasarkan ujian hipotesis digunakkan untuk membina selang keyakinan bagi parameter tersebut. Dalam proses menggunakan kaedah yang berdasarkan ujian hipotesis, maklumat penting yang diperlukan ialah taburan bagi statistik yang berkenaan pada nilai untuk vektor parameter yang memenuhi syarat dalam hipotesis nul dan terdekat dengan jangkaan vektor parameter tersebut. Didapati bahawa sekiranya dibandingkan dengan selang keyakinan *bootstrap*, selang keyakinan yang berdasarkan ujian hipotesis adalah lebih memuaskan.

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TABLES OF CONTENTS

LIST OF FIGURES

LIST OF TABLES