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SINGLE COVARIATE LOG-LOGISTIC MODEL ADEQUACY WITH RIGHT AND INTERVAL CENSORED DATA

(Kecukupan Model Log-Logistik Kovariat Tunggal dengan Data Tertapis Kanan dan Selang)

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ABSTRACT

This research aims to analyze and examine the adequacy of the log-logistic model for a covariate, right, and interval censored data by using various types of imputation methods. We started by incorporating a covariate to the log-logistic model with right and interval censored data and obtained its parameter estimates via maximum likelihood estimation (MLE). Performance of the parameter estimates using the left, mid, and right point imputation methods is assessed and compared at various sample sizes and censoring proportions via a simulation study. The best imputation method is chosen based on minimum values of standard error (SE), and root mean square error (RMSE). Also, newly proposed Modified Cox-Snell residuals based on the geometric mean (GMCS) and harmonic mean (HMCS) were compared with Cox-Snell (CS) and Modified Cox-Snell (MCS) residuals via simulation study by comparing the range of residual's intercept, slope, and R-square at different settings. Conclusions are then made based on the simulation results. The proposed residual worked well with real data and provided simple and easy interpretation of the results using log(-log(estimated survivor function of residual)) versus log(residual) plot. The results show the data is fitted well with the log-logistic model and gender of patients is not giving any significant impact on the development of diabetic nephropathy.

Keywords: log-logistic; covariate; interval censored

ABSTRAK

Tujuan kajian ini dijalankan adalah untuk menyiasat kebagusan penyuaian model log-logistik bagi data berkovariat dan data tertapis kanan dan selang menggunakan pelbagai kaedah imputasi yang berbeza. Analisis dimulakan dengan menggabungkan kovariat ke dalam model log logistik dengan data tertapis kanan dan selang dengan anggaran parameter model diperoleh melalui penganggaran kebolehjadian maksimum (MLE). Prestasi parameter yang dianggarkan melalui kaedah imputasi titik kiri, tengah dan kanan dibandingkan dengan sampel pelbagai saiz dan kadar tapisan berbeza melalui kajian simulasi. Kaedah imputasi terbaik dikenal pasti melalui nilai minimum ralat piawai dan punca min kuasa dua ralat. Di samping itu, reja baharu yang dicadangkan dinamakan sebagai reja Cox-Snell Terubah suai min Geometri dan reja Cox-Snell Terubah suai min Harmonik dibandingkan dengan reja Cox-Snell dan reja Cox-Snell Terubah suai melalui kajian simulasi menggunakan tetapan berbeza pada julat reja pintasan, kecerunan dan kuasa dua R. Kesimpulan seterusnya dibuat berdasarkan keputusan simulasi. Reja yang dicadangkan berfungsi dengan baik ke atas data sebenar dan memberikan tafsiran hasil yang mudah menggunakan plot log(-log(fungsi kemandirian teranggar untuk reja)) lawan log(reja). Hasil kajian menunjukkan data berkenaan adalah sesuai digunakan dalam model log-logistik dan jantina pesakit tidak memberikan kesan yang signifikan terhadap perkembangan nefropati diabetes.

Kata kunci: log-logistik; kovariat; tertapis selang

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